APPENDIX NO 1: SCOPE OF SERVICES

"ENGINEERING SERVICES FOR PREPARATION, PROCUREMENT AND SUPERVISION OF RAIL BALTICA ENE SUBSYSTEM DEPLOYMENT"

(IDENTIFICATION NO RBR 2020/10)

Co-financed by the European Union
Connecting Europe Facility

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1. GENERAL

1.1. Rail Baltica project

Rail Baltica is a joint project of three EU Member States – Estonia, Latvia and Lithuania – and concerns the building of a fast conventional double-track 1435 mm gauge electrified and ERTMS equipped railway line with overall length of 870 km on the route from Tallinn through Pärnu (EE), Riga (LV), Panevėžys (LT), Kaunas (LT) to the Lithuania/Poland state border (including a Kaunas – Vilnius spur) with a design speed of 249km/h.

Railway line for both passenger and freight transport shall be interoperable with the TEN-T Network in the rest of Europe and competitive in terms of quality with other modes of transport in the region.

Rail Baltica is to become a part of the EU TEN-T North Sea – Baltic Core Network Corridor, which links Europe's largest ports of Rotterdam, Hamburg and Antwerp – through the Netherlands, Belgium, Germany and Poland – with the three Baltic States, further connecting to Finland via the Gulf of Finland short sea shipping connections with a future fixed link possibility between Tallinn and Helsinki. Further northbound extension of this corridor shall pave the way for future connectivity also with the emerging Arctic corridor, especially in light of the lucrative prospects of the alternative Northern Circle maritime route development between Europe and Asia. Furthermore, the North Sea – Baltic Corridor crosses with the Baltic-Adriatic Corridor in Warsaw, paving the way for new supply chain development between the Baltic and Adriatic seas, connecting the Baltics with the hitherto inadequately accessible Southern European markets.

The Contracting authority RB Rail AS (RBR) was established by the Republics of Estonia, Latvia and Lithuania, via state-owned holding companies, to coordinate the Rail Baltica project. The diagram below illustrates current shareholders and structure of the Rail Baltica project in Estonia, Latvia and Lithuania.

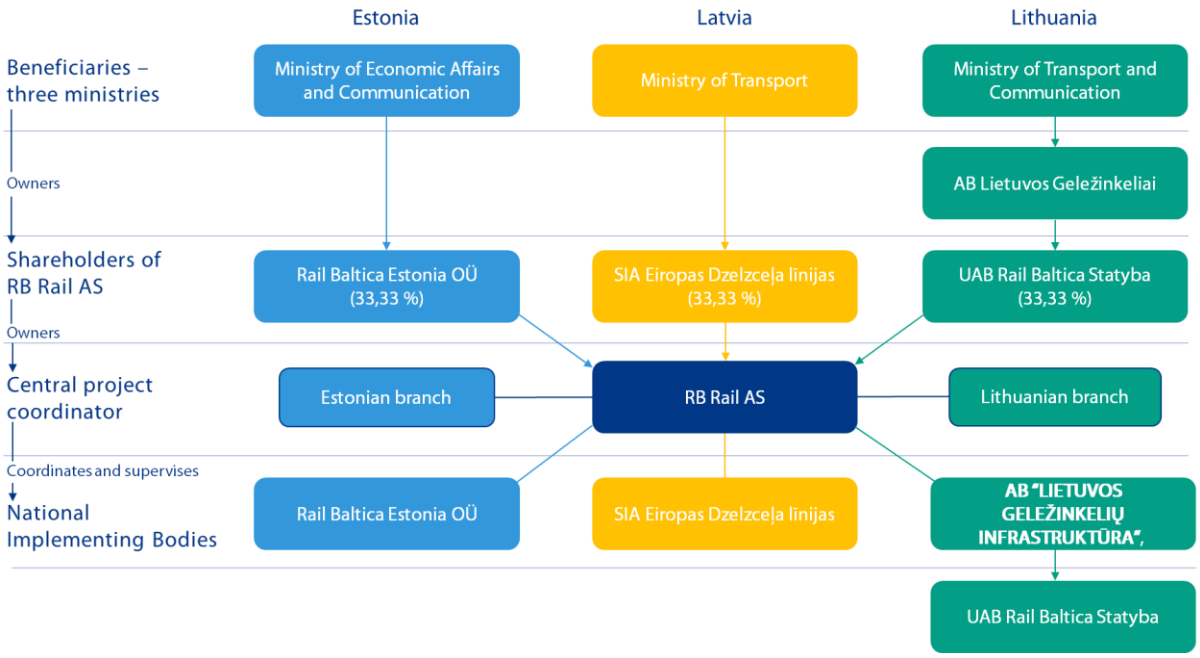

Figure 1. The shareholders structure

1.2. Abbreviations and terms

All abbreviations, designations, definitions and terms defined in the applicable laws, legislation, regulations, directives, TSIs, standards, rules, Design Guidelines, other guidelines and documents of RB

Rail are used in this Scope of Service without modifications if not defined otherwise further. In this document where the context admits, the following words shall have the meaning assigned to them hereafter:

Table 1. Abbreviations and definitions

Denomination	*Abbreviation*	*Definition*
Affected parties		State institutions, local government bodies, public and/or private enterprises, legal or private entities (persons) representing the owners and/or managers of the assets (networks and/or objects of power supply, gas, oil, water, drainage etc.) that are linked to the designed layout of Rail Baltica railway line and shall be considered.
Agreement		"Agreement" means the Form of Agreement together with the Client/Consultant Model Services Agreement (General Conditions and Particular Conditions), with all its Annexes.
Asset Information Management	AIM	-
Authorization of placement in service	APIS	-
BIM Execution Plan	BEP	A formal document that defines how the project will be executed, monitored and controlled with regard to BIM. A BEP is developed at project initiation to provide important information/data management plans and assignment of roles and responsibilities for model creation and data integration throughout the project.
Building Information Management	BIM	-
CCS Strategy study		Study on Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy, planned to be completed on September 2020.
Commencement Date	CD	Effective Date
Common Data Environment	CDE	-
Conformity Assessment Body	CAB	A body that performs one or several elements of conformity assessment.

Connection Point		Point where HVFL is conncted to the HV or MV network.
Contracting Scheme Agreement		Agreement on the Contracting Scheme for the Rail Baltic / Rail Baltica between RB Rail AS, Ministry of Economic Affairs and Communications of the Republic of Estonia, Ministry of Transport of the Republic of Latvia, Ministry of Transport and Communications of the Republic of Lithuania, Estonian Technical Regulatory Authority, Rail Baltic Estonia OÜ, Eiropas dzelceļa līnijas SIA, Lietuvos Geležinkeliai AB, Rail Baltica Statyba AB, concluded on 30 September 2016.
Contractor		"Contractor" means any contractor to be engaged by the Client (or other stakeholders involved in ENE Deployment process, as the case may be) for performance of any part of the Works, and identified by the Client as the "Contractor".
Country		Any and all of the following countries (as the context requires): Republic of Latvia; Republic of Estonia; Republic of Lithuania as described in Appendix 1 [Scope of Services].
Critical Path Method	CPM	-
Critical Items Action Report	CIAR	-
Defects Notification Period	DNP	As to be defined in the Works Contract.
Detailed Technical Design	DTD	Final stage of the design process in accordance with Country's construction legislation and it gives right to start construction works. For Estonia, Detailed Technical Design corresponds to Operational Building Design documentation ("Tööprojekt" in Estonian); For Latvia, Detailed Technical Design corresponds to Building design ("Būvprojekts" in Latvian);

		For Lithuania, Detailed Technical Design corresponds to work's design ("Darbo projektas" in Lithuanian).
Energy Control Command System	ECCS	-
Electrical energy Distribution System Operator	DSO	-
Electricity Transmission Grid	ETG	Electricity Transmission Grid are managed by Transmission System Operator, for every Baltic state. ETG is considered as a generic term and means for one or several ETG depending of the context.
Electromagnetical Compatibility	EMC	-
Employer	RBR	RB Rail AS
ENE		Rail Baltica railway energy subsystem, covering extended energy term (as defined in ENE TSI), High Voltage Feeding Lines, other facilities falling under scope of Rail Baltica Global Project implementation and related to the feeding/control of traction facilities.
ENE Deployment		Full realisation of Rail Baltica railway energy subsystem covering necessary studies, concept design preparation, design preparation, construction works, testing, commissioning, defect notification period covering the opening of electrified railway operations on Rail Baltica line.
ENE Deployment Management Plan		Project Management Plan is a formal, approved document that defines how ENE Deployment is executed, monitored, and controlled to achieve the main targets for ENE subsystem. This document shall be used as a reference throughout the ENE Deployment process to ensure that the management of ENE Deployment is carried out consistently and in line with the main targets.
ENE Deployment process		All activities required for successful introduction of Rail Baltica railway energy subsystem according to

		objective and targets set by the Employer and covering all necessary studies, concept design preparation, design process, works, testing, comissioning, defect notification period covering the opening of electrified railway operations on Rail Baltica line.
ENE Deployment Programme		Part of Rail Baltica Master Programme related to ENE Deployment.
ENE Detailed Technical Design	ENE DTD	A final stage of the ENE design process in accordance with Country's construction legislation and it gives right to start ENE construction works.
ENE Engineer		Agreement party providing services to the Employer.
ENE Strategy study		Study on Rail Baltica energy subsystem procurement and deployment strategy, completed on 2020.
ENE Technical Working Group	ENE TWG	Ad hoc working group established and managed by RB Rail AS, consisting of Rail Baltica Global Project implementing parties and stakeholders involved in ENE Deployment process. ENE TWG is the platform for the exchange of information and opinions on ENE Deployemnt process to ensure an efficient feedback mechanism and promote cooperation during the ENE Deployment process.
Generic Design		General Rail Baltica railway ENE subsystem design, part of ENE DTD, prepared by ENE Contractor during Works implementation process, and defining ENE susbsystem architecture and components in details.
High Voltage Feeding Line	HVFL	High Voltage line dedicated for the feeding of the Traction Power Substation.
International Project Management Association	IPMA	-
Infrastructure kilometer	inf-km	Infrastructure kilometre: length of linear infrastructure in kilometres.

Local facilities		Geographically limited parts of railway infrastructure with extended structural or functional elements (terminals, service facilities, roads, major crossings and bridges etc.) which are related or needed to ensure a safe and smooth operation of the railway. Examples: 1) a passenger terminal, 2) a freight terminal, 3) a rolling stock facility, 4) infrastructure maintenance facility.
Local legislation		Legislation applicable in the particular Country.
Life Cycle Cost	LCC	-
Multi Criteria Analysis	MCA	-
National Safety Authority	NSA	National safety authority of respective country, which authorises placing Interoperable subsystems into service.
Overhead Contact System	OCS	-
Operation & Maintenance	O&M	-
Operational Plan	OP	Comprehensive set of documents defining all long term operational principles of the Rail Baltica railway line on the wider corridor of Warsaw – Helsinki and describing the future structure of train traffic and operational processes on Rail Baltica railway line, outlining railway capacity, establishing operational requirements with regard to the infrastructure and rolling stock and outlining the related effort for maintenance of the infrastructure and rolling stock. Operational Plan defines also the infrastructure parameters on Rail Baltica railway line, covering speed limitations, track layouts of the stations, main line and facilities, type of turnouts, main infrastructure objects. Timetable and travel times defined in the Operational Plan are the ones of the essential targets to be complied with during Global project implementation. Operational plan is being updated on a regular basis

		throughout the progress of Rail Baltica Global Project.
Organizational Breakdown Structure	OBS	-
Project Management Body of Knowledge	PMBOK	-
Preliminary Design	PD	Completed pre-design stage in accordance with Country's national construction legislation and approved at the State level.
Preliminary Hazard Analysis	PHA	-
Project Management Office	PMO	The organization / management structure established by the ENE Engineer responsible for defining and managing the ENE Deployment governance process, procedures, templates, sharing of resources, methodologies, tools and techniques, supporting and facilitating the Employer for ENE Deployment process.
Rail Baltica Global Project		All the activities undertaken by the Rail Baltica railway implementing parties in order to build, put in operation and commercialize the Rail Baltica railway and related railway infrastructure in accordance with the agreed route, technical parameters and time schedule.
Rail Baltica Master Programme		Rail Baltica Global project implementation schedule regularly updated by the Employer.
Rail Baltica railway		A new fast conventional double track electrified European standard gauge (1435 mm) railway line on the route from Tallinn through Pärnu - Riga - Panevėžys - Kaunas to Lithuanian - Polish border, with a connection line between Kaunas and Vilnius.
Rail Baltica Track Layout		Rail Baltica track layout developed as a part of Operational Plan and updated regurarly as Rail Baltica Global Project progresses.
Railway infrastructure		Has the meaning in the Directive 2012/34/EU of the European Parliament and of the Council of 21

		November 2012 establishing a single European railway area (recast), as well includes freight and passenger terminals and infrastructure and rolling stock maintenance facilities and the ground underneath them and the airspace above them to the extent that the national legislation permits the ownership of the ground and the airspace.
Reliability, Availability, Maintainability and Safety	RAMS	-
Scope of Services		This document with all its Annexes.
Service Deliverable		Tangible Service result with the defined content, subject to the completion of a Service milestone and approval.
Service Package		Part of the Services with the defined scope and subject to the completion of a Service milestone and approval by the Employer.
Services		Services implemented by the ENE Engineer in accordance with the Agreement.
Service Section		A part of Rail Baltica railway infrastructure identified for convenient managing of the ENE Deployment process.
Spatial planning		As defined in Country's corresponding legal acts as territorial planning activity.
Static Frequency Converter	SFC	-
Subsystem		Structural or functional part of the rail system as defined in DIRECTIVE (EU) 2016/797 on the interoperability of the rail system within the European Union.
Technical Supervision		Services implemented by the ENE Engineer in accordance with national construction legislation of the Country concerned: - *Ehitusjärelevalve* (in accordance

		with Estonian construction legislation); - *Būvuzraudzība* (in accordance with Latvian construction legislation); - *Techninė priežiūra* (in accordance with Lithuanian construciton legislation).
Technical Reference Group	TRG	Coordination and alignment body for the implementation of the technical substance of Rail Baltica Global Project with the ultimate aim to ensure interoperability within the project and alignment between the parties involved in Rail Baltica Global Project implementation. One of the responsibilities of the TRG is to manage the change processes of the Design Guidelines. The TRG consists of members from each of the Baltic States appointed by the Beneficiary as well as the representatives of the technical team of RB Rail AS.
Testing and commissioning		Testing and commissioning of completed Works.
Traction power simulation		Combined mathematical modelling by a single dedicated software tool of the railway infrastructure elements, including ENE subsystems, railway alignment, rolling stock and train operation parameters. The model is based on all elements influencing electrical traction of train and use advanced electrical and physical modelling on time dynamic basis.
Traction power simulation software tool		Software tool for Traction power simulation proposed by the ENE Engineer for the ENE Engineering service procurement process.
Technical Specifications for Interoperability	TSI	-
Transmission System Operator	TSO	National electrical energy Transmission System Operators responsible for the national ETG:

		- in Estonia: Elering AS; - in Latvia: AS "Augstsprieguma tīkls" (AST); - in Lithuania: AB „Litgrid“. TSO is considered as a generic term and means for one or several TSO depending of the context.
Traction Power Substation	TSS	An electrical installation where power is received at high voltage and transformed to the voltage and characteristics required at the catenary and negative feeders for the nominal 2x25 kV system, containing equipment such as transformers, circuit breakers and sectionalising switches. It also includes the incoming lines from the power supply utility.
Work Breakdown Structure	WBS	-
Works		All and any Permanent and Temporary works required for implementation of the Project as defined in the Works Contract.
Works Contract		""Works Contract" means contract (or several contracts, as the case may be) concluded between the Client (or other stakeholders involved in ENE Deployment process acting as employers under respective contracts, as the case may be) and the Contractor for performance of Works (or any part of them as the case may be) and identified by the Employer as "Works Contract".
Verification and Validation	V&V	-
Innovation and Networks Executive Agency	INEA	The Innovation and Networks Executive Agency (INEA) is an executive agency established by the European Commission and is in charge of all open TEN-T projects.
European Court of Auditors	ECA	The European Court of Auditors (ECA) is one of the seven institutions of the European Union and It is in charge of

		improvement of EU financial management.

1.3. Document references

Table 2. Main documents to be considered

Ref. Nr.	***Title of document***	***Availability / Web link***
[1]	Design Guidelines	Annex 1 to this Scope of Service
[2]	Operational Plan (including updated Track layout and Annexes)	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/
[3]	Contracting Scheme (Agreement on the Contracting Scheme for the Rail Baltic / Rail Baltica between RB Rail AS, Ministry of Economic Affairs and Communications of the Republic of Estonia, Ministry of Transport of the Republic of Latvia, Ministry of Transport and Communications of the Republic of Lithuania, Estonian Technical Regulatory Authority, Rail Baltic Estonia OÜ, Eiropas dzelceļa līnijas SIA, Lietuvos Geležinkeliai AB, Rail Baltica Statyba AB, dated 30.09.2016)	Relevant extract to be provided after signature of the Agreement
[4]	Rail Baltica Cost-Benefit Analysis, 2017	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/
[5]	ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy)	Annex 3 to this Scope of Service
[6]	Zero Environmental Impact during O&M phase Strategy (ZEIS)	To be provided after signature of the Agreement
[7]	CCS Strategy study (Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy)	To be provided after signature of the Agreement
[8]	Climate change study (Study on climate change impact assessment for the design, construction, maintenance and operation of Rail Baltica railway)	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/
[9]	Technical study for the impact of high voltage line parallel to Rail Baltica line	Annex 7 to this Scope of Service
[10]	Rail Baltica EMC study	Annex 8 to this Scope of Service

1.4. Legal references

1.4.1. The Consultant shall follow EU directives, all Country's construction and other national legislation, EU standards, Country-specific legislation/standards/rules and other legal acts applicable for the provision of the Services.

2. GENERAL SCOPE

2.1. General

2.1.1. The Employer is appointed as central purchasing body for procurement of studies, plans and design for Rail Baltica Global Project, which include organization of the entire ENE subsystem deployment across Estonia, Latvia and Lithuania.

2.1.2. The Employer is appointed to conclude contracts and supervise the execution of the concluded contracts on behalf of Rail Baltica Global project Beneficiaries and Implementing Bodies for the ENE subsystem scope.

2.1.3. The ENE Engineer shall verify at any opportunity that the implementation of the ENE susbsystem is in full compliance with the eligibility conditions edited by INEA. During any auditing or claim processes from INEA, ECA or any other entitled authority, the ENE Engineer shall provide technical assistance to the Employer in the preparation of any supporting argumentation or by producing and assembling required documentation.

2.1.4. As part of the scope of the Services, t**he Employer delegates and the ENE Engineer undertakes full responsibility of the management of Rail Baltica Global Project ENE Deployment as described in chapter 2.8**, except for the procedural organisation of public procurements, concluding contracts with the Contractors.

2.1.5. The ENE Engineering services are aimed to:

a. Implement all tasks assigned to Project Management Office for ENE Deployment process;

b. Implement technical analysis and prepare technical studies necessary for the preparation for ENE Deployment process;

c. Deliver Concept Design for ENE subsystem;

d. Prepare technical specifications and provide necessary assistance during the procurements for ENE Deployment process;

e. Perform all responsibilities of the Engineer during the implementation of Works Contracts.

2.1.6. During all the performance of the Services, the ENE Engineer shall endeavour to deliver to the Employer the ENE subsystem with the optimum Life Cycle Cost (LCC) and minimal environmental impact.

2.1.7. The main objective of the ENE Engineer is to ensure the management of ENE Deployment process in order to deploy Rail Baltica railway energy subsystem (ENE) that is interoperable across the Baltic States (including Poland) and compliant with Design Guidelines, by ensuring the proper quality control, application of the best practice transparent procurement model, efficient supervision of full deployment process with the aim to satisfy the highest standards regarding the environmental impact and achieve the delivery of the most optimum solution for Rail Baltica railway energy subsystem from life cycle costs perspective.

2.1.8. The ENE Engineer shall seek for the implementation of the ENE subsystem solutions maintaining the following main targets:

a. Safety management;

b. Environmental impact reduction;

c. Railway operation needs;

d. Railway maintenance needs;

e. Life cycle costs;

f. Efficiency of energy consumption;

g. Compliance to TSI`s;

h. Delivery with respect to with Rail Baltica program.

2.1.9. The ENE Engineer is responsible for the early reallocation of his resources and adaptive planning of the Services in relation to the status / changes of Rail Baltica Master Programme.

2.1.10. The ENE Engineer will provide the Services during spread of COVID-19 disease and is responsible the Services will be provided in accordance with the Agreement without prejudice to restrictions or limitations (i.e. travel restrictions, mandatory self isolation, use of protective equipment and measures, etc.) imposed by the governments of the relevant Countries where the personnel works, whilst complying with mandatory safety requirements.

2.2. Geographical scope

2.2.1. Global Project scope: ENE subsystem for Rail Baltica Global Project infrastructure in Estonia, Latvia and Lithuania, plus the section in the territory of Poland until the technical border with PKP-PLK, defined by the closest electrical separation section behind the Lithuanian – Polish border[1]. The geographical scope is defined as a whole by the present specification and infrastructure changes within this geographical scope and within Rail Baltica Global Project will not be considered for any variations.

For the avoidance of doubt, the geographical scope includes all stations, yards, freight and intermodal terminals, infrastructure maintenance facilities and rolling stock maintenance tracks of Rail Baltica Global Project.

The Track layouts annexed to Operational Plan [2] indicate the present status of Global Project scope and is regurlary updated according to design progress.

2.2.2. Optional scope for 1435 mm railway lines: As part of potential variations of the Agreement, the ENE engineer could be invited to deliver services regarding the following scope:

a. The parts of the line Jiesia – Kazlų Rūda – Marijampolė – Šestokai – Mockava – LT/PL border which will not be included in the Global Project scope after finalisation of the Spatial Planning procedures and Detailed Design of the Rail Baltica infrastructure between Kaunas and LT/PL border, in the territory of Lithuania. This optional scope includes the electrical separation sections between this line and the Rail Baltica infrastructure and all necessary ENE subsystem dedicated to this line;

b. The section of line between the electrical separation section closest to the Lithuanian – Polish border in the territory of Poland, and the 25 kV AC / 3 kV DC electrical border located near the station of Elk. This optional scope includes all necessary ENE subsystem dedicated to this line;

c. Any other optional 1435 mm scope related to ENE subsystems implementation for Rail Baltica railway.

[1] Specific resources and competences for technical and construction supervision according regulations of Republic of Poland are not required inside the scope of this Agreement.

2.2.3. Optional scope for 1520 mm railway lines: As part of potential variations of the Agreement, the ENE engineer could be invited to deliver services regarding the following scope:

a. The conversion of the Riga node core area from 3 kV DC to 25 kV AC. Riga node core area includes 1520 mm railway lines from Riga station to the closest 25 kV AC / 3 kV DC electrical separation sections near the stations of Imanta (Tukums 2 line), Turība (Jelgava line), Zemitāni (Skulte line) and Jāņavārti (Krustpils line). This optional scope includes all necessary ENE subsystems dedicated to each line, as well as necessary technical and operational studies for conversion process;

b. The electrification in 25 kV or 2x25 kV of the line section Zemitani – Sigulda and Zasulauks - Daugavgrīva, in Latvia. This optional scope is an extension of the conversion of Riga node core area from 3 kV DC to 25 kV AC, which may become necessary as part of the coordination of train passengers' services between Rail Baltica and 1520 mm railways. This optional scope includes all necessary ENE subsystem dedicated to this line;

c. The electrification in 25 kV or 2x25 kV of the Muuga intermodal terminal tracks;

d. The electrification in 25 kV or 2x25 kV of the Salaspils intermodal terminal tracks;

e. The electrification in 25 kV or 2x25 kV of the Palemonas freight yard tracks;

f. Any other optional 1520 mm railway related to ENE subsystems implementation for Rail Baltica railway.

2.2.4. Design / construction of HVFL connections: in case one or several TSO would transfer the responsibility of design and/or construction on some HVFL, the ENE engineer will be invited through variations to deliver part or all the following services: design and construction procurements preparation, design and construction supervision services. Exact scope of responsibilities could be only agreed after completion of electrical simulations and negotiations with TSO. Preparatory phase electrical simulations and negotiations with TSO are integral part of scope and cannot be subject of variations.

2.3. System scope

2.3.1. ENE subsystem scope being deployed for entire Rail Baltica Global project covers the following key components:

a. High voltage feeding lines (HVFL) for connection of Traction Power Substation to high voltage electrical grids;

b. Traction Power Substations (including autotransformer posts and related equipment);

c. Overhead Contact System;

d. Electrification Control Command System;

e. Other components and facilities directly linked to ENE subsystem, as technical buildings, cableways, interfaces etc.

2.3.2. Service scope includes also the analysis of technical interfaces with adjacent infrastructures and provide functional and technical solutions for its deployment:

a. Interfaces with existing 1520 mm railway infrastructure systems as 1520/1435 mm intersections and 1520/1435 mm gauntleted track sections. These interfaces are available at Kaunas station, Kaunas tunnel, Palemonas, Vilnius, Vilnius airport station, Riga central station, intermodal terminals in Kaunas, Vilnius, Salaspils, Muuga and other locations along Rail Baltica line;

b. Power supply infrastructure (including high voltage transmission and distribution lines);

c. Other utilities infrastructure objects identified during Service provision and impacting the solutions to be considered for ENE Deployment (for example: high voltage line crossing or parallel to the railway infrastructure, 1520 mm railway, airport, industrial plant or similar, which are source of specific requirements for the ENE subsystem design).

2.3.3. Service scope covers also the analysis and the supply of technical solutions regarding all aspect of electrical and electromagnetical compatibility (EMC) inside the ENE subsystem and between the ENE subsystem and all surrounding or interfaced systems or infrastructure, whomever being the owners.

2.3.4. The ENE Engineer shall propose innovative technical solutions to be considered in order to reach ENE subsystem main targets specified in chapter 2.1.8.

2.3.5. Service scope covers also necessary modifications of 1520 mm electrification system on the track in interaction with Rail Baltica 1435 mm tracks, in the stations of Kaunas (gauge crossings and gauntleted track in Kaunas tunnel) and Vilnius (gauge crossings and gauntleted track to Vilnius airport station), in the intermodal terminals of Vaidotai, Palemonas, Salaspils and Muuga, and in other locations if applicable.

2.4. ENE Deployment process scope

2.4.1. Services to be provided by the ENE Engineer shall cover all phases of ENE Deployment and are divided in two phases, in particular:

a. **Preparatory phase;**

b. **Works implementation phase.**

2.5. ENE Deployment management scope

2.5.1. The ENE Engineer shall provide the Services throughout the full ENE Deployment Process.

2.5.2. For provision of the Services the ENE Engineer shall establish the Program Management Office (chapter 3) responsible for defining and managing the program-related governance process, procedures, templates, etc. supporting individual program management teams by handling administrative functions centrally or providing dedicated assistance to the Employer.

2.6. Expert technical assistance

2.6.1. The ENE Engineer shall ensure technical expertise throughout the full ENE Deployment Process and provide technical assistance in the following fields of technical expertise:

a. High voltage networks;

b. Medium and low voltage networks;

c. Interface with CCS subsystem;

d. Interface with INF subsystem;

e. Interfaces between 1435- and 1520-mm railways;

f. Electromagnetic Compatibility;

g. RAMS;

h. ENE maintenance.

2.6.2. The ENE Engineer shall provide technical support to the Employer as part of the implementation of Common Safety Methods and safety techniques in compliance with requirements and standards applicable for ENE Deployment.

2.7. Language

2.7.1. In provision of the ENE engineer services working language with the Employer is English.

2.7.2. The ENE Engineer is responsible for the provision of the Services in Country's local language, in particular:

a. Review of documents which are only available in Country`s local language;

b. Review of design documents which are only available in Country's local language;

c. Communication with local stakeholders;

d. Provision of necessary data for local stakeholders (local language if necessary).

2.7.3. The ENE Engineer shall ensure the communication and provision of documents in English and if required/requested, in Country's local language.

2.7.4. Non-exhaustive list of documents which shall be provided by the ENE Engineer and translated into Country's local language includes:

a. Presentations to local stakeholders (if requied by stakeholders);

b. Applications for receiving Technical conditions from Affected parties;

c. Concept Design (if specific part is required).

2.8. Responsibility table

Table 3. Main responsibility table

Activity	Employer	ENE Engineer	Works Contractor	CAB`s
Consolidate the Employer's expectations and requirements	C+A	R		
Concept Design	A	R		I+C
Prepare Works procurement functional and technical specification	A	R		I+C
Manage Works procurement	R	C		C
Design, construction, testing and commissioning of ENE system works	I	A+C	R	
Conformity assessment of Works Specifications (NoBo & AsBo)	A	I+C	C	R
ENE Requirement Management	A	R	I+C	I

ENE subsystems implementation project management (PMO) including Works contract management	I+A	R	I+C	I

R: Responsible for producing process outputs

A: Approves process outputs

C: Contributes to production of process outputs

I: Informed of content of process outputs

3. PROJECT MANAGEMENT OFFICE

3.1. General

3.1.1. The role of the Project Management Office to be established by the ENE Engineer is to manage the ENE Engineering services and ENE deployment with the following:

a. Defining the ENE Deployment management processes and procedures that will be followed by the ENE Engineer and the Works Contractor;

b. Creation and management of the ENE Deployment Programme according to AACE[2] standards;

c. During the ENE Engineering services, the ENE engineer shall establish at least one permanent office in Riga, and possibly other offices in Vilnius (or Kaunas) and Tallinn. In main office in Riga there shall be meeting room allowing meetings with the Employer (min 15 persons);

d. Necessary site offices and all the office equipement necessary for the ENE Engineer during the supervision of construction, of installation works, of testing and commissioning and of Defect Notification Period shall be provided free of charge by the Contractor, following the progress of the ENE subsystem deployment;

e. Defining the quality standards for ENE Deployment and for its components;

f. Resource management across ENE Deployment;

g. Providing document and configuration management (knowledge management);

h. Providing centralized support for managing changes and tracking risks and issues;

i. Contract management of Works contract;

j. Providing management support for personnel and other resources, contracts and procurements, and legislative issues;

k. Providing necessary expert and administrative resources.

3.1.2. The ENE Engineer shall employ the best industry practice of applying project management principles set out by PMI (Project Management Institute[3]) or similar organisations.

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[2] Association for the Advancement of Cost Engineering - https://web.aacei.org/.

[3] Project Management Institute - https://www.pmi.org/.

3.1.3. The ENE Engineer shall prepare and maintain the ENE Deployment Management Plan covering at least the following parts:

a. ENE Deployment Programme;

b. Scope management plan;

c. Quality assurance management plan;

d. Stakeholder management plan;

e. Documentation management plan;

f. Resource management plan;

g. Interface management plan;

h. Communication plan;

i. Risk management plan;

j. Cost management plan;

k. Schedule management plan;

l. Change management plan;

m. Technical compliance plan.

3.1.4. The ENE Engineer shall review the ENE Deployment Management Plan and update it monthly (related parts) as a result of Rail Baltica Global Project development (including ENE Deployment) by taking all necessary factors (including external factors related to economical situation, market trends etc.).

3.2. Quality assurance management

3.2.1. The ENE Engineer is responsible for the quality assurance management through out ENE Deployment process with the aim to ensure the main targets of ENE subsystem.

3.2.2. The ENE Engineer shall include in quality assurance management at least the following:

a. Personnel organization, resources and means;

b. Management system and responsibility;

c. Requirement management;

d. Control organization and procedures;

e. Works management procedures;

f. Quality audits.

3.3. Stakeholder management

3.3.1. The ENE Engineer shall be fully responsible for the stakeholder management process, by at least ensuring the following:

a. Maintainance of an up to date stakeholder structure;

b. Stakeholder interests, responsibilities and involvement in ENE Deployment process;

c. Early engagement with stakeholders;

d. Communication and coordination of related activities with stakeholders in local language in at least B2 level[4];

e. Necessary alignment and approval to be obtained from the stakeholders;

f. Provision of necessary analysis and data at the request[5] of stakeholders;

g. Coordination of stakeholder management with the Employer;

h. Informing the Employer on the status of the ENE Engineer activities with stakeholders.

3.3.2. The ENE Engineer shall be responsible for coordination of activities with the stakeholders and management of following list[6] of stakeholders to be considered by the ENE Engineer:

Table 4. List of stakeholders

	Stakeholder group	Stakeholders
a.	Rail Baltica Global Project implementers[7]	IBs, BENs, RBR
b.	National Safety Authorities	EE, LV, LT
c.	Conformity Assessment Bodies	
d.	National power transmission / distribution companies	TSOs, DSOs.
e.	Other	Other Contractors and service providers for Rail Baltica global project
f.	Affected parties	As defined in "Abbreviations and definitions" table
g.	Other identified stakeholders directly linked to ENE Deployment	To be updated during ENE Deployment

3.3.3. The Employer shall provide necessary support for the ENE Engineer regarding the communication with the necessary stakeholders. However, the ENE Engineer holds full responsibility for the stakeholder management process.

3.3.4. The ENE Engineer shall cooperate also with the stakeholders of Rail Baltica Global Project that are not directly linked with ENE Deployment.

3.4. Documentation management

[4] Based on Common European Framework of Reference for Languages. Available here: http://europass.cedefop.europa.eu/resources/european-language-levels-cefr.

[5] Any request of a stakeholder shall be coordinated with the Employer.

[6] The list of stakeholders is to be updated throughout ENE Deployment process.

[7] The Employer remains responsible for the communication and coordination process with indicated Rail Baltica Global Project implementers.

3.4.1. The ENE Engineer shall be responsible for establishment of document management ensuring the effective document (including any other data) flow throughout ENE Deployment.

3.4.2. The ENE Engineer shall be responsible for the management of Requirements Management System tool provided by the Employer:

a. Listing requirements;

b. Maintaining requirements.

3.4.3. The ENE Engineer shall seek for the possibility to sign the documents by using e-signature systems, available in Baltic states.

3.4.4. The ENE Engineer shall agree with the Employer on the approach to use the Employer's Common Data Environment (CDE) for project documentation using Bentley ProjectWise Connect Edition.

3.4.5. All the data about the deliveries must be stored in a Common Data Environment (CDE). The Employer is the owner of this platform – Bentley ProjectWise Connect Edition.

3.4.6. All the data is stored within a data source and access to this data shall be granted as required and requested by the Employer. A separate process must be established how the access rights are granted to the Contractor.

3.4.7. It is required that all of the technical documentation about the project during the Design, Construction stage and taking over stage must be stored in the repository and all of the up-to-date information is stored in this data repository. The information uploaded to the Employers CDE shall be done using the system/prepared tools/forms. All the data required by the national legislation must be included, organized and must be digitally signed by the responsible Party.

3.4.8. In order to access the information, the ENE Engineer shall allocate financial and human resources. The financial resources in order to access the platform, must include personal user license for each user accessing the system. The number of users which the ENE Engineer shall allocate is not defined, however it shall ensure that the information flow is realized in a timely manner and the information is updated on regular basis as stipulated in the Agreement and its annexes. The exact list of all named users using and accessing the platform shall be agreed with the Employer directly.

3.4.9. Indicative[8] license costs for accessing the Employers CDE are as follows:

a. VISA license cost for ProjectWise CONNECT Edition ~1000 EUR/user/year;

b. PASSPORT license cost for ProjectWise CONNECT Edition ~300 EUR/user/year.

3.4.10. All users who must access the platform shall undergo a security background check and receive a security clearance. The security clearance must be granted by the Security Risk Manager of the Employer or by equivalent instance/person from the Employer's side. All information must be treated as minimum as Limited Access Information.

3.4.11. Any violation and security threat and breach shall be immediately reported to Security Risk Manager of the Employer or to equivalent instance/person from the Employer's side.

3.4.12. The ENE Engineer's human resources and experts shall be trained to use the platform for the specific tasks. The training materials in written or video format will be prepared and delivered to the ENE Engineer by the Employer prior to the granting an access. Any

[8] The licenese cost has indicative nature and exact prices shall be quated from the vendor

additional training required to be performed for the ENE Engineer employees is the responsibility of the ENE Engineer.

3.4.13. The exact workflows and responsible persons shall be defined during the Inception phase of the Contract. The definition of the workflows is a collaborative work between the Employer and the ENE Engineer. As minimum, but not limited to, those shall include:

a. Any information management according to respective Country's laws, legislation and rules;

b. Any deliverables information exchange using the Employer's ProjectWise CDE platform and Deliverables Management services;

c. Requests for information (RFI) exchange using the Employer's ProjectWise CDE platform and Deliverables Management services;

d. General and Contractual Communication exchange using the Employer's ProjectWise CDE platform and Deliverables Management services.

3.4.14. The ENE Engineer is responsible for ensuring that its sub-contractors are able to use the CDE platform and are trained to do it. The ENE Engineer remains responsible for any information uploaded/downloaded or any actions performed by its sub-contractor within the CDE platform.

3.4.15. As a part of documentation management system, the ENE Engineer shall be responsible for preparation and managing of minutes of the meetings for every meeting.

3.5. Application of BIM, AIM and GIS

3.5.1. All requirements towards BIM implementation are included in the Design Guidelines [1] and are integral part of all design deliverables and later will be applied during construction and operational phases. All design deliverables shall include BIM models and other supporting data.

3.5.2. Depending on the design stage of the project the Level of Geometry and Level of Information for the design deliverables varies from generally adopted BIM LoG and LoI 200 to 400 levels. Detailed LoG and LoI tables for each stage of the project are described in "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document, chapters 4., 11. and annexes 1., 2. and 3.

3.5.3. GIS platform for accessing the design and asset information is used by the Employer. If necessary and for the benefit of both parties to better organize and carry out the tasks and works, the Employer can grant access rights to the GIS for the ENE Engineer. The details of the tasks carried out and prepared within the GIS system shall be separately agreed.

3.5.4. The general requirements and recommendations towards the most used software solutions from the Employer are the following:

a. CDE (Data, model and drawing management) – ProjectWise CONNECT Edition from Bentley Systems (mandatory to be used);

b. Project Control, Planning, Scheduling and Risk management – Primavera P6 from Oracle; mandatory to be used);

c. Geographic Information System (GIS) – ArcGIS Enterprise from ESRI;

d. Asset Information Management (AIM) – ArcGIS Enterprise from ESRI;

e. CAD design (*.dwg) – Trueview (viewer), AutoCAD and CIVIL 3D (latest versions) from Autodesk;

f. CAD design (*.dgn) – Bentley View CONNECT Edition (viewer), MicroStation CONNECT Edition from Bentley Systems;

g. BIM Model viewers

   1. IFC – Solibri Anywhere, Trimble Connect, Navisworks Manage (also for *.nwd and *.nwc), Bentley View CONNECT Edition (also for *. imodel), BIM Collab ZOOM;

   2. Native – depending on the software solution used to create the models.

      - *.rvt – Revit (different versions) from Autodesk;
      - *.dgn – various Bentley Systems products (different versions);
      - *.db1 – Tekla Structures (different versions) from Trimble;
      - *.ndw – Allplan (different versions) from Nemetschek;
      - *.mur – CivilEstudio (37.9 or superior).

h. Text, spreadsheet, presentation, simple schedule, email creators/editors – Microsoft 365 Suite.

3.5.5. The exact specific model types and file formats are specified in the each of the contract's BIM Execution Plans (BEP) agreed with each of the designers, but the requirements are set out in the "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document and in the "BIM Manual" RBDG-MAN-033 document.

3.5.6. Dedicated BIM review meetings with the ENE Engineer and the Works Contractor shall be organized monthly or the schedule can be agreed separately with the Employer.

3.6. Resource management

3.6.1. The ENE Engineer shall ensure enough resources with necessary facilities, equipment and tools for the provision of the Services.

3.6.2. Resource management plan elaborated by the ENE Engineer shall include the organizational breakdown structure (OBS) together with statements of duties and responsibilities of each role, which shall demonstrate how the ENE Engineer would allocate all the responsibilities for the Service provision and how the OBS is interrelated to the work breakdown structure of the services.

3.6.3. Human resource management plan shall include:

a. Roles and Responsibilities;

b. Project Organization Charts;

c. Mobilization plan for Preparatory phase;

d. Mobilization plan for Works implementation phase;

e. Staffing Management Plan (incl. workload);

f. Plan for staff acquisition;

g. Resource calendars;

h. Staff release plan;

i. Staff training needs.

3.6.4. Works implementation phase timesheet management process aim is to ensure clear reporting and respective remuneration to the ENE engineer.

3.6.5. Timesheets and mobilisation plan shall be submitted monthly till every months 5th day and shall contain:

a. Experts name;

b. Experts position;

c. Experts daily rates;

d. Actual working days;

e. Detailed report and tasks description provided in reporting period for each day, including expert's geographical location;

f. Respective Service package activity;

g. Estimated days to complete Service packages activity;

h. Respective months planned working days in updated mobilization plan;

i. Respective months planned working days in initial mobilization plan that was submitted by the ENE Engineer in the procurement;

j. Planned and actual working day comparison chart between procurement and updated mobilization plan and justification if deviations have been occurred;

k. Planned tasks and working days for next month and forecast of expert's workload for next 12 months.

3.6.6. Employer shall review timesheet and provide comments (Employer can require any additional supporting information to be included in timesheets) or acceptance within 5 working days.

3.6.7. The Employer can reject timesheets:

a. If it does not contain the requested information;

b. If it contains tasks that in the Employer`s opinion does not reflect correct actual working days spent;

c. Tasks description is not well justified;

d. Indicated tasks are not related to respective service package activity;

e. For other justified reasons.

3.6.8. If the Employer provides comments to timesheets, the ENE Engineer within 5 working days must make adjustments, and/or provide additional explanations, information, or evidence confirming the information provided in timesheets. If requested information will not be provided within set time period, the Employer will accept only those parts of services, where no comments were provided.

3.7. Interface management

3.7.1. The ENE Engineer shall be responsible for all interface (including technical, legal, administrative, Rail Baltica progress related, etc.) management related to the ENE Deployment.

3.7.2. The ENE Engineer shall be responsible for management of all the ENE Deployment Programme interfaces with Rail Baltica Master Programme.

3.7.3. The ENE Engineer shall be responsible for management of all technical interfaces, in particular:

a. CCS subsystem (for whole deployment process, covering planning, design, installation, testing, operation);

b. INF subsystem (for whole deployment process, covering planning, design, construction, testing, operation);

c. 1520 mm railways (including 3 kV DC electrification systems in Latvia and Estonia, and 25 kV 50 Hz in Lithuania);

d. Electricity Transmission Grids;

e. Rolling Stock subsystem interface, for design, test and operation;

f. Other utilities affected;

g. Other interfaces with ENE subsystem identified during Service provision.

3.7.4. Assist ENE contractor(s) in the development of interface specifications, establishing Interface cards for each particular interface, liaising with suppliers and monitoring implementation until resolution of interface case.

3.8. Communication

3.8.1. The ENE Engineer shall develop and maintain communication strategy with at least covering the following parts:

a. Communication parties / stakeholders involved;

b. Communication frequency;

c. Description/Purpose of communication;

d. Means of communication.

3.8.2. While maintaining the communication requirements set in the Agreement, the ENE Engineer shall agree with the Employer on written communication means and format regarding the provision of the Service.

3.8.3. The ENE Engineer shall agree with the stakeholders on written communication means and format.

3.9. Risk management

3.9.1. The ENE Engineer shall establish governance around the process for management of risks to ENE deployment that shall be aligned with the Employer and shall be in accordance with up to date version of the Rail Baltica Global Project risk management plan. The ENE Engineer shall utilise agreed with the Employer risk management processes, procedures, organization, tools and systems to proactively manage risks that have the potential to impact the ENE Deployment process and the Rail Baltica Global Project implementation. Risk information, including identified risks, assessment, treatment plans and post treatment analysis shall be developed and continuously updated in Oracle Primavera Cloud risk management solution for the Rail Baltica Global Project. The ENE Engineer shall plan in advance all its activities necessary to carry out the full scope of the Services in due time and in the agreed quality by considering the all relevant risks and providing risk management strategies to reduce their adverse influence on costs and time schedule and mitigate any identified supply chain risks. Such risk management strategies shall be developed and approved for all risks.

3.9.2. ENE Engineer’s responsibility regarding risk management shall cover it’s obligations related activities under this section (including but not limited to risk governance, risk identification, preparations of Project Risk Management Plan, implementation of mitigation measures attributable to the ENE Engineer, etc.) and risks that are attributable and are in control of the ENE Engineer.

3.9.3. To minimize risk event occurrence and/or impact the ENE Engineer shall develop and implement risk mitigation strategies for at least below mentioned risks.

a. Delays, inactivity, procrastination of the stakeholders in regard to their involvement in the ENE Deployment process;

b. Territorial, environmental restrictions to plan necessary land plots for the ENE subsystem facilities;

c. Interface risk of the ENE services with other construction activities scope implemented by third parties;

d. Interface risk of land acquisition, Environmental impact assessment and other important activities;

e. Delayed Works during construction;

f. Poor ENE subsystems collaboration with Contractor and coordination of other subsystem design and construction works (INF, CCS…);

g. Changes in Operational Plan requirements;

h. Changes in applicable laws and regulations;

i. Potential claims and litigation by third parties;

j. Changes in the Rail Baltica Master Programme;

k. Non-performance of Works Contractor;

l. Potential conflict of interest cases.

3.9.4. The goal of risk management by the ENE Engineer is to ensure that ENE Deployment achieves established project objectives and stakeholder expectations in terms of:

a. Keep within agreed budget;

b. Achieve the required completion dates;

c. Achieve the required performance.

3.9.5. The ENE Engineer shall develop and maintain Project Risk Management Plan that covers practices and procedures how the project team will implement risk management that is integrated with overall Project Management Plan to ensure that project objectives are achieved throughout the life cycle of the project. Risk Management plan shall at least cover the following parts:

a. Risk planning;

b. Risk identification;

c. Risk assessment / prioritisation;

d. Qualitative and quantitative risk analysis;

e. Response planning;

f. Proposals for risk management and mitigation measures;

g. Risk monitoring and control.

3.9.6. Risk Planning

Risk planning activities set the foundation for ENE Deployment risk management objectives and plan necessary effort to prepare for risk assessment, treatment and risk control, and set criteria to determine whether the initiative is successful. During the risk planning phase, the ENE engineer shall define how risks are addressed and managed and how it will be incorporated with the overall Project Management Plan. Risk planning shall take into consideration the following:

a. Corporate risk management guidelines (including tolerance level for risk);

b. Resources allocation (staffing, budgets);

c. Reporting and communication;

d. Developing a risk matrix and assigning risk ratings to identify risks. The risk matrix should define risk ratings based on probability and impact by considering the organisations risk tolerance.

3.9.7. Risk identification

Risk identification is the identification of all foreseeable risks that could either negatively or positively affect the ENE Deployment process according to agreed risk classification, description of risk cause, event and consequences. The ENE Engineer shall acquire input from all Rail Baltica Global project stakeholders. These risks shall be captured by the ENE Engineer in Rail Baltica Global Project Oracle Primavera Cloud risk management tool. Potential contributors to risk identification shall include:

a. Project team members;

b. Subject matter professionals;

c. Customers (internal and external);

d. End users;

e. Organisation management and leadership.

3.9.8. Risk assessment

The ENE Engineer shall assess and prioritise every risk by determining its likelihood to happen and impact according to established probability and impact categories and threshold levels. For every risk, the ENE engineer shall undertake Qualitative analysis as well as Quantitative analysis.

3.9.9. Response Planning

The ENE Engineer shall develop the risk response plans with response actions and action owners agreed to reduce the risk level and negative impact on overall project objectives. The following principal risk management strategies shall be defined:

a. Risk mitigation;

b. Risk avoidance;

c. Risk transfer;

d. Risk acceptance;

e. Risk sharing;

f. Risk contingency.

3.9.10. Risk monitoring and control

The final step of risk management is monitoring and control. This step tracks potential risks, oversee the implementation of risk plans, and evaluate the effectiveness of risk management procedures. Monitoring and control occur throughout the project lifecycle and feedback back into overall risk management process and planning.

The ENE Engineer shall monthly update the Risk Register and provide necessary risk response plans with current status.

3.10. Cost management

3.10.1. Throughout the progress of Rail Baltica Global Project development (including ENE Deployment) the ENE Engineer shall prepare and maintain the cost estimates for ENE Deployment (including Works contract). Cost estimates updates shall include:

a. Global Project CAPEX, with breakdown per country and per electrical section;

b. CAPEX and OPEX per line-km and per Traction Power Substation;

c. CAPEX and OPEX of HVFL lines;

d. Breakdown of connecting fees per country / per connection;

e. Indication of all assumptions, indexes and unit prices taken as a basis for cost estimation.

3.10.2. The ENE Engineer shall update cost estimates quarterly by taking all factors impacting the costs for ENE Deployment, such as: Rail Baltica Global Project development updates, economical situation in the region, market trends, etc.

3.10.3. The ENE Engineer shall provide cost forecast for the ENE Engineering services and ENE Works monthly, for next 12 months.

3.11. Change management

3.11.1. The ENE Engineer shall develop and maintain change management process and plan by involving the Employer for decision making.

3.11.2. The ENE Engineer shall document proposed scope, timeline and cost change of the project. Change management request shall at least contain:

a. Detailed description of the proposed change and reasons for it;

b. Detailed description of how the proposed change or variation is to be affected, including activities and anticipated durations for any resulting design changes to be undertaken by the Employer, additional or revised contents, amended key dates or relevant information;

c. Detailed description of impact on Rail Baltica Master Programme.

3.12. Technical compliance management

3.12.1. The ENE Engineer shall develop and maintain technical compliance management process in order to ensure that the ENE subsystem is in compliance with all mandatory standards, regulations, Design Guidelines and other related requirements.

3.12.2. The ENE Engineer shall use requirement management system to ensure Technical compliance management, including ensuring full traceability of the Employer's requirements. The ENE Engineer shall be responsible for the communication with the CAB`s involved in the Rail Baltica Global project implementation, appointed at Country's level, or contracted by the Employer. The purpose of this communication is to demonstrate the compliance of ENE subsystem with all mandatory, interoperability, safety and any other specific national legislative requirements of the Country.

3.12.3. The ENE Engineer shall be responsible for the provision of information to CAB`s regarding any ENE Deployment activity, covering design, construction and testing, delivery of documentation, approval status etc. Such information must be part of the progress report to be delivered by the ENE Engineer.

3.12.4. The ENE Engineer's review shall be independent from the CAB`s review. The ENE Engineer shall not oversee the delivery of and shall not endorse the CAB`s review results.

3.13. ENE Deployment Programme Control

3.13.1. The ENE Engineer shall prepare the ENE Deployment Management Plan in accordance with *Project management Body of Knowledge*[9], or other equivalent / similar requirements. ENE Deployment Management Plan shall describe how ENE deployment will be executed, monitored, controlled, and reported on a regular basis.

3.13.2. The ENE Deployment Management Plan draft version shall be submitted as a part of Inception Report. Minimal content of the ENE Deployment Management Plan is as follows.

a. Management Plan structure;

b. Organizational Breakdown Structure (OBS) and organizational chart together with a statement of duties and responsibilities, which shall demonstrate how the ENE Engineer will comply with responsibilities under the Agreement and how the OBS is interrelated to the work breakdown structure of the ENE Deployemt Programme;

c. The ENE Engineer shall define a template for Critical Items Action Report (CIAR) in the ENE Deployment Management Plan;

d. Milestones of Services to be provided by the ENE Engineer;

e. Works implementation activities with clear and logical predecessors and successors;

f. Preparatory phase milestones;

g. Works implementation milestones;

h. Milestones of all ENE Deployment contracts;

i. Key ENE Deployment deadlines;

j. Key Rail Baltica Master Programme deadlines;

k. The Activity IDs shall be presented by the ENE Engineer in the ENE Deployment Management Plan and organized according to the agreed Work Breakdown Structure (WBS). Activity ID shall be unique for the overall contract duration, i.e. no activity ID number shall be re-used;

l. The programme percent complete type shall be set to physical % complete. The method of measurement of physical percent complete shall be proposed by the ENE Engineer in the ENE Deployment Management Plan;

m. The ENE Engineer shall resource load the ENE Deployment Programme (Prices, Labour, etc.) and submit for acceptance within the ENE Deployment Management Plan;

n. The ENE Engineer shall submit the method for resource loading of the programme and the maintenance of the resource loading.

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[9] https://www.pmi.org/pmbok-guide-standards

3.13.3. The ENE Engineer shall control and manage the future ENE Works Contractor. The ENE Engineer shall develop requirements to the ENE Works Contractor regarding the ENE Deployment Programme consisting of but not limited to:

a. Review monthly reports;

b. Review critical paths;

c. Reports;

d. Cumulative S curves;

e. Histograms;

f. Labour histograms;

g. Review of the quality of the schedule according to 14-point DCMA guidelines;

h. Compliance to the technical specification, local laws, 14-point DCMA guidelines;

i. Risks and Opportunities in the Contractor's schedules;

j. Review Contractor's schedule variatons, delay analysis, claims;

k. Resource loading;

l. Other relevant requirements.

3.13.4. The ENE Engineer shall be responsible for creating and timely updating of the ENE Deployment Programme which shall be aligned with Rail Baltica Master Programme.

3.13.5. The detalisation level of the ENE Deployment Programme shall be sufficient to ensure the realisation of the ENE Deployment Management Plan prepared by the ENE Engineer.

3.13.6. The ENE Engineer shall provide clear procedures indicating how to implement all aspects of the ENE Deployment Programme Control requirements in the ENE Deployment Management Plan which will be submitted for approval by the Employer.

3.13.7. ENE Deployment Programme planning and Scheduling

a) **Programme – CPM[10] Planning and Scheduling**

The ENE Engineer shall develop, maintain and submit the ENE Deployment Programme using Oracle Primavera P6 software in the Employer's P6 cloud environment. The ENE Deployment Programme shall be created, maintained and updated exclusively in P6, cloud environment. Access shall be provided by the Employer, but the ENE Engineer shall be responsible for acquiring a Primavera P6 licence. The ENE Engineer shall work in P6, cloud environment according to the Employer's Project Control plan which shall be agreed and communicated with the ENE Engineer during Inception phase.

The Oracle Primavera P6 settings shall be in accordance with the Employer's requirements, which enables easy and efficient control of the progress and changes in the Programme.

The ENE Deployment Programme shall be in logic linked Critical Path Method (CPM) network format showing the critical paths per each Mandatory Milestone and the overall critical path of ENE Deployment.

[10] Critical Path Method. https://www.projectmanager.com/critical-path-method

The ENE Deployment Programme shall follow and be developed taking in consideration the highest industry standards of scheduling, including:

a. 14-point DCMA guidelines;

b. AACE International Recommended Practices[11];

c. "Planning, Scheduling, Monitoring and Control Guide (2015)" published by the Association for Project Management – APM.

All Planning and Scheduling submissions made by the ENE Engineer shall be in both Electronic PDF document and Electronic soft copy (P6 file) (e.g. compatible with the Employer's CPM software) formats.

All the ENE Deployment Programme submissions made by the ENE Engineer shall be clearly titled (e.g. Baseline Programme, Monthly Programme, What-if Programme), numbered (e.g. Period 00, 01, 02, …), revision coded (e.g. Rev 00, 01, 02, …) and dated (DDMMYYYY).

The level of detail shall correspond to AACE International Level 4 (detailed level; programme) or equivalent.

It is required that all activities have an original baseline and reporting period programme (monthly programme) to show variance against previous versions.

For the purposes of reporting, Programmes shall not be baselined or re-baselined without an agreement of the Employer.

b) **Programme representation**

Every ENE Deployment Programme shall be submitted for review of the accuracy and shall include a special document - Narrative which shall include following items, but not limited to:

a. Summary Description of the ENE Engineer's Execution Plan;

b. Format of activity descriptions including any abbreviations used;

c. Staffing plan consisting of a histogram indicating total manpower required per reporting period, inclusive of subcontractors;

d. The activity calendars used, particularly non-standard work patterns;

e. Holidays, weather windows and other non-work periods;

f. Description of the critical path(s) for each contractual date;

g. Description of the near critical path(s) (these activities being defined as a total float in the of 0 to 15 calendar days);

h. Listing of key interfaces with the Employer / Affected Parties / Other Consultants working alongside with the ENE Engineer or others and the dates those interfaces are planned to occur;

i. Details of any significant changes including revisions to the critical path since previous Approved or Submitted ENE Deployment Programme;

j. Impact on Progress;

[11] https://web.aacei.org/resources/publications/recommended-practices

k. Details of Changes to Key Dates, Milestones, and Associated float and time risk allowances;

l. List of Implemented Changes or Variations;

m. List of Predicted / potential Changes or Variations;

n. Any delay mitigation measures incorporated;

o. Assumptions and Constraints.

c) **Programme calendars**

All Calendars shall be set in calendar days. For level 3 and 4 Programmes, activities shall not exceed 20 calendar days without prior approval from the Employer.

All calendars must be presented in a table format, and clearly identify all the constraints and assumptions.

d) **ENE Deployment Programme loading**

The ENE Engineer shall resource load the ENE Deployment Programme (Prices, Labour, etc.). submitted for acceptance within the ENE Deployment Management Plan and submit the method for resource loading of the programme and the maintenance of the resource loading.

This will facilitate the assessment of progress, cost and performance. Once this Programme is approved, it will be known as the Approved ENE Deployment Programme.

The Approved ENE Deployment Programme and subsequent Revised ENE Deployment Programmes including resource loaded activities shall be organized and grouped by Employer's Work and Cost Breakdown structure and cost codes.

e) **Programme hierarchy**

The ENE Engineer's Programme will form an integral part of the overall Rail Baltica Master Programme and Reporting structure.

The ENE Engineer shall provide the hierarchy of Programmes as follows and provide with P6 version and an Electronic PDF version at the Progress Meeting. Critical Path Method Tool:

a. Level 1: Summary Programme – 1-2 Page(s) Summary;

b. Level 4: Programme – Resourced Loaded, Logic Linked, CPM Network, updated with Progress and under review and approved variations orders.

3.13.8. The ENE Engineer shall coordinate with the Employer the format of the ENE Deployment Programme (including structuring and coding of sub-activities).

3.13.9. The ENE Engineer shall adapt its Service implementation programme, organization and resources according to the development and status of Rail Baltica Global Project implementation (including Rail Baltica Master Programme).

3.13.10. The ENE Engineer shall consider that Rail Baltica railway construction strategy is under development and therefore the structure of work packages for construction / integration works and testing could be different from the current structure of design packages.

3.14. Reporting

3.14.1. The ENE Engineer shall prepare monthly the ENE Deployment Report. The structure and content of the ENE Deployment Report shall be proposed by the ENE Engineer in the ENE Deployment Management Plan and agreed with the Employer.

3.14.2. Based on ENE Deployment phase, the ENE Engineer shall propose and update structure and content of the ENE Deployment Report according to the updated status of ENE Deployment phase. As minimum content of the ENE Deployment Report shall consist of the following parts:

a. ENE Deployment Programme;

b. ENE Deployment progress;

c. Cost management;

d. Resource management;

e. Risk management;

f. Communication;

3.14.3. At each Monthly Progress Meeting, the ENE Engineer shall submit a revised ENE Deployment Programme for approval of the accuracy of the Progress Information, showing the progress, remaining duration, actuals, physical percentage complete and planned completion dates and submit it to the Employer for acceptance.

3.14.4. ENE Deployment progress reporting structure:

Table 5. Progress reporting structure

No.	Section	Content
1.	Summary Programme	The ENE Engineer shall provide a Summary Programme, which is submitted for approval by the ENE Engineer at the Progress Meeting. The Summary Programme is used as the basis for developing and reporting to management and key stakeholders from initiation to completion. The Summary Programme is developed in time-scaled format with typically not more than 100 activities and contained on 1-2 sheets. The Summary Programme highlights the Critical Path, major milestone events and interface events important to the overall Rail Baltica Master Programme delivery. Summary Programme activities must be related to the ENE Engineer's Programme activities in a rolled-up way or using level of effort activities.
2.	Updated Programme	Updated Programme must include and cover, but not limited to, all activities and dates as follows: a) All dates for the Contractual Milestones and Key Dates, Deadlines (including intermediate terms) and Commencement, Completion and Handover Milestones. b) All dates when the ENE Engineer plans to submit any particular deliverables. c) All dates when the ENE Engineer plans to submit Planning and Technical Studies. d) All durations and dates for any particular items of Equipment with long lead times.

		g) All the dates when any input information to be provided by the Employer or third parties will be required by the ENE Engineer. h) Details of any consents permits and licenses development, preparation, submission and approvals allowing enough time for each stage of the process and also allowances for resubmission. i) Details of any 3rd Party interfaces and/or documents preparation, submission and approvals allowing enough time for each stage of the process and also allowances for resubmission. j) The ENE Engineer shall describe in the Programme submissions details of any measures to be taken to minimize the effect of the ENE Engineer's operations on the public including as a minimum (where applicable): cleanliness of adjacent areas, intended working hours, safety risk assessments. k) Any other milestones and/or activities provided by the Employer. l) Activity durations must not exceed 40 calendar days, with exception of long lead items. p) Clear details on Handover processes and timeframes. q) Clear identification of any of the Employer's obligation. r) Details of how and where ENE Engineer's work deliverables will feed into as input data / input information. If any logic changes are required to be made to the programme, a Request for Approval shall be submitted by the ENE Engineer requesting the change and the justification for the Request. In line with good practice, a log shall be submitted with the updated programme each period outlining any logic changes agreed. The log should record the predecessor and successor activities before and after the change as well as any changes to lag.
3.	Programme Performance Report	The ENE Engineer within monthly ENE Deployment Report shall produce a Programme Performance Report for review by the Employer which shows cumulative and period movement data. Any areas which show significant variance between cost and value shall be investigated, explained and mitigation measures identified if applicable.
4.	Critical Items Action Report (CIAR)	The ENE Engineer shall maintain a Critical Items Action Report (CIAR) which will be maintained in conjunction with the Early Warning System[12]. A critical item is defined as any item that has caused or is likely to cause an impact to a key or contractual milestone or to overall Agreement completion. It should be noted that not every delay result in an impact to a key date or milestone and therefore not every delay counts as a critical item. The intent is that the CIAR becomes a working dynamic document, not a voluminous punch list for the contract. It should rarely contain more than 15-20 items. Significant critical items should have an accompanying entry in the ENE Deployment Programme. The main task of the CIAR is the analysis of the Programme to determine which items are critical or potentially critical.

[12] Early Warning System - the early warning process is a mechanism for both parties to identify potential problems to the project. https://gmhplanning.co.uk/nec-guidance-notes/nec3-ecc-clause-16-early-warnings/

		The CIAR shall be reviewed on Progress Meetings to discuss the corrective actions or alternatives to eliminate the programme impact of the critical items. The ENE Engineer shall nominate a CIAR coordinator from within his team. The CIAR coordinator shall be responsible for development, maintenance and production of the CIAR.
5.	Coordination Report	The ENE Engineer shall produce a monthly report showing the Authorities and Affected Parties contacted, their feedback, actions taken, future needed actions and documents exchange between the parties. Detailed format of the report will be agreed within the Inception Report.
6.	Open Items Report	The ENE Engineer shall produce a monthly report showing all the items raised during meetings, Request For Information (RFI) and Project Change Requests (PCR) submitted during the period and previous periods which have not received resolution to the date. The report shall show also all the decisions taken at working level meetings and open items from those meetings (Meeting Items). The report will be accompanied with RFI, PCR, Meeting Items and Open Items tracker which displays all the history of items raised and decisions taken. Detailed format of the report and the tracker will be agreed within the Inception Report.

3.15. Meetings

3.15.1. The ENE Engineer shall organise regular monthly[13] progress meetings with the Employer and/or other related stakeholders. The structure, content and agenda of the progress meetings shall be aligned between the ENE Engineer and the Employer in advance. 5 (five) calendar days before every progress meeting the ENE Engineer shall provide the ENE Deployment Report for the Employer review.

3.15.2. The ENE Engineer shall prepare and participate in the meetings according to the ENE Deployment Management plan as well as ad hoc meetings which shall be organised as needed. The minimal amount of the meetings is to be considered is proposed below.

Table 6. Meetings

Title	Responsible party organising the meeting	Scheduling	Participating parties (from both parties of the Agreement)
Kick-off meeting	Employer	1 week after Commencement Date of the Agreement	ENE Engineer and Employer project management team

[13] Based on ENE Deployment progress the ENE Engineer may agree with the Employer to extend the reporting periods.

Inception meeting	ENE Engineer	1 month after commencement date of the Agreement and provision of Inception Report	ENE Engineer and Employer project management team and necessary experts
Progress meetings	ENE Engineer	Every 1 month following the Inception meeting	ENE Engineer and Employer project management team and necessary experts
ENE Technical Working Group (ENE TWG) meetings	Employer	Depending on the progress (preliminary every quarter)	Employer will appoint representatives according internal rules and invite necessary ENE Engineer experts. Employer shall inform Consultant minimum 1 week ahead. Employer and Consultant project managers or deputies shall take part in all meetings
BIM collaboration meetings	ENE Engineer	Every month or schedule can be agreed separately with the Employer	ENE Engineer and sub Consultant's specialists (if required), representatives of Employer (if required) and Affected party authorized representatives (if required)
Implementing body and beneficiary man agement meetings	Employer	When needed (approximately on quarterly basis)	Employer and ENE engineer project managers or deputies shall take part in all meetings
Meeting with any stakeholder group	ENE Engineer	When needed	ENE Engineer, Employer's related stakeholder's representatives
Risk managment/revi e-w meeting	Employer	When needed	ENE Engineer, Employer's representatives

4. PREPARATORY PHASE

4.1. General

4.1.1. During this phase, the ENE Engineer shall analyse the status of the existing designs and documents and decisions already made and perform all necessary technical and economical studies necessary to prepare the procurements for the Works. The ENE Engineer shall deliver an optimal level of detailisation of his studies ***keeping neutral position regarding commercial technologies and products, in order to warranty a free competition between suppliers for the procurement of the Works***.

4.1.2. Main objective of the ENE Engineer during this phase shall be to ***minimize the level of uncertainties and risks perceived from Works procurement tenderers***, in order to ensure that the Employer receives the most comprehensive technical and financial proposals.

4.1.3. During the Preparatory phase, architectural and technical choices made by the ENE Engineer shall be guided by the reseach of the optimum Life Cycle Cost (LCC) and minimal environmental impact of the ENE subsytem.

4.1.4. The different tasks and deliverables specified below shall be considered as minimal and may be supplemented, improved and reorganised as far as necessary by the ENE Engineer to fulfil his overall responsibility and to reach the assigned objectives.

4.1.5. Preparatory phase consists of the following Service Packages to be provided by the ENE Engineer within indicated deadlines and deliverables:

Table 7. Service Packages in Preparatory phase.

Preparatory phase - Service Packages	Milestones (after CD)	Deadlines[14] (after CD)	Deliverables[15]
PrepPhase SP-1. Inception			
Inception report	**1 month**	**3 months**	**Report**
Draft ENE Deployment Management Plan	**1 month**		**Draft report**
Draft LCC / MCA / Environmental impact Plan	**1 months**		**Report**
ENE Deployment Management Plan	**3 months**		**Report**
ENE Engineer Mobilization plan	**1 month**		**Report**
PrepPhase SP-2. Initial data review			
Initial data collection list	**2 weeks**	**2 months**	**List**
Initial data (Including DG, DTDs) review	**2 months**		**Report**
PrepPhase SP-3. Electrical Simulation			
Collection of input data	**2 weeks**	**8 months**	**List**
Traction Simulation model	**2 months**		**Presentation**
Draft LCC / MCA / Environmental impact report – Architecture level	**3 months**		**Report**
Power demand simulation - Architecture level	**4 months**		**Report**
LCC / MCA / Environmental impact report – Architecture level	**4 months**		**Report**
Territorial analysis for TSS and HVFL	**2 months**		**Report**
Power demand simulation - Detailed level	**7 months**		**Report**
LCC / MCA / Environmental impact report – Detailed level	**8 months**		**Report**
Final electrical simulation report	**8 months**		**Report**
PrepPhase SP-4. ENE Concept Design preparation		**9 months**	
Concept Design structure	**1 month**		**Report**
ENE Architecture (including functional requirements)	**3 months**		**Report**

[14] Milestones are the time when the indicated documents shall be approved by Employer. Deadlines indicated are contractual – it is recommended to submit draft deliverables one week beforehand, in order to have first feedback on deliverable from the Employer.

[15] Full content deliverables shall be considered for the review by the Employer.

Draft Concept Design	**5 months**		**Report**
Proposal for update of DG	**8 months**		**Report**
EMC analysis	**9 months**		**Report**
Concept Design	**9 months**		**Report**
PrepPhase SP-5. ENE Deployment Strategy preparation			
OCS procurement strategy	**2 months**	**8 months**	**Report**
Supplier market research	**2 months**		**Report**
ENE Deployment Strategy Draft	**3 months**		**Report**
ENE Deployment Strategy	**4 months**		**Report**
Verification and Validation plan	**8 months**		**Report**
PrepPhase SP-6. Assistance to procurement*			
Draft Regulations technical part for first phase procurement	**4 months**	**11 months**	**Report**
Draft Regulations technical part for second phase procurement	**7 months**		**Report**
Recommendations/review for Works agreement	**8 months**		**Report**
Draft Technical Specifications for Works Contract	**9 months**		**Report**
Technical Specifications for Works Contract	**11 months**		**Report**
Support for supplier market consultation	**N/A***	**N/A***	**N/A***
Assistance in Works procurement process	**N/A***	**N/A***	**N/A***

* – deadlines to be agreed with the Employer depending on the Works procurement process

4.2. Inception report

4.2.1. The Inception Report shall address the Rail Baltica ENE deployment strategy which is "what, when and how".

4.2.2. The Inception Report shall include:

a. Detailed presentation of the organization of the ENE Engineer during the Preparatory phase (organization chart, roles and processes);

b. Detailed ENE Engineer Mobilization plan for the Preparatory phase, including date of establishing permanent office in Rīga, schedule of presence of involved experts in the Baltic states, schedule of meetings, etc;

c. Overview of the organization of the ENE Engineer during the Deployment phase (organization chart, roles and processes);

d. Overview of the ENE Engineer Mobilization plan for the Deployment phase;

e. Description of organisation of implementation of the tasks included in the Preparatory phase, and detailed schedule;

f. Organisation setup for stakeholder's management and technical interface management, including understanding of specific aspects for Estonia, Latvia and Lithuania and for interface with Poland;

g. The ENE Engineering Deployment project management plan as described in Chapter 3 of this Technical Specification;

h. The ENE engineer could propose to the Employer for approval different deliverable split, without financial impact and respecting at least main milestones:
   (a) Validation of ENE subsystem preferred architecture (part of draft concept design) - 5 months;
   (b) Technical Specifications for Works contract - 11 months;
   (c) Power demand simulation - Architecture level - 4 months.

i. Any other information relevant for the performance of the Agreement.

4.3. Initial data collection

4.3.1. Considering the documents identified in Table 8 below, the ENE Engineer shall prepare and deliver to the Employer a list of additional data which would be necessary to achieve the engineering services planned as part of the Preparatory phase. The Employer will deliver the necessary data in his possession to the ENE Engineer and will initiate all necessary contacts with stakeholders (refer to chapter 3, Stakeholder management) in order to ENE Engineer to collect data from them.

4.3.2. The ENE Engineer is responsible regarding data collection (including through engagement with stakeholders) and shall ensure sufficiency and consistency of the collected data.

4.4. Initial data review

4.4.1. The ENE Engineer shall collect and review all necessary information and existing studies in order to get full awareness and understanding of the Service delivery details and complexity.

4.4.2. As part of initial data, the ENE Engineer shall consider the reference documents and previous studies listed in the following table and perform a thorough analysis of their content. Findings, comments and professional opinions shall be summarised in a report, with clear hierarchization of the findings by their level of criticality for the Project implementation.

Preliminary list of the initial data to be reviewed is provided below:

Table 8. Preliminary list of the initial data to be reviewed.

No.	Title	Specific requirements for ENE Engineer in relation to the initial data
a.	**Design Guidelines [1]**	To perform a thorough review of the **Design Guidelines** and deliver a review report detailing findings and recommendations in relation to ENE Deployment. Proposed changes will be submitted to the Technical Reference Group before launching Works procurement process.

b.	**ENE Strategy study [5]**	The ENE Engineer shall perform a thorough review of the **ENE Strategy study** and deliver a review report detailing his findings and recommendations. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
c.	**Designs**	The ENE Engineer shall review the available designs by reviewing the Preliminary Designs and Spatial Planning documents, and by engaging with the designers responsible for the Detailed Technical Design of infrastructure. The Preliminary Designs in Estonia and Latvia include high level design of ENE subsystem based on 2x25kV solution. In Lithuania, the Spatial Plan for the section Palemonas – LT/LV border includes some assumption for system design and TSS locations. The Detailed Technical Design of infrastructure for all line sections north of Kaunas have started in 2018 and are planned to be completed in 2022. Some of the international stations, freight terminals and maintenance facilities are also in design phase and are planned to be completed before 2023. The Detailed Technical Design includes design of ENE only at conceptual level, with all necessary provsions allowing further implementation of ENE subsystem subsystems (similar situations apply to CCS subsystem and regional stops). On the section Kaunas – LT/PL border, a feasibility study on Rail Baltica Section "Polish / Lithuanian State Border – Kaunas – RRT Palemonas" Upgrade for upgrading to the Global Project standard the existing 1435 mm line Jiesia – Kazlų Rūda – Marijampolė – Šeštokai – Mockava – LT/PL border was completed in 2019 and includes specific electrification chapter. Spatial Planning process on this section is ongoing. On the section Kaunas – Vilnius, Jiesia – LT/PL border, Kaunas node Spatial Planning process is ongoing (where ENE Engineer shall consider separate alignment alternatives for Service provision). In Estonia, specific studies for HVFL have been prepared. The ENE Engineer shall engage with the designers in charge of design of infrastructure, stations, freight terminals and any other facilities to assess the status of their respective design documentation regarding ENE subsystem. Specific attention shall be made to structures over the railways (overpasses, ecoducts, tunnels, screening structure for protection of radionavigation equipments…), interfaces with bridges and viaducts, and station areas and buildings. The design of infrastructure sections (Detailed Technical Design) request design of railway systems at conceptual level only, which include all necessary physical provisions for further implementation of ENE subsystem elements, as well as design of necessary interfaces. The design of stations, freight terminals and other facilities require design of railway systems at conceptual level, however in some particular cases (Riga airport station, Pärnu station, Riga central

		station notably) more detailed level of design for OCS were necessary in order to decide on overall design solutions. The ENE Engineer shall perform a thorough review of the status of designs and deliver a review report detailing his findings and recommendations for every design section. Priority shall be given to the most advanced design sections, and to the ones for which urgent input is needed. Proposed changes will be assessed by the Employer, relevant designers and stakeholders.
d.	**Operational Plan [2]**	The ENE Engineer shall perform a thorough review of the **Operational Plan** (OP) and deliver a review report detailing his findings and recommendations. OP defines the future railway operation transport plan, and therefore includes the planned typology of rolling stock (type of trainsets, locomotives, train composition, tonnage etc.) as well as the timetable at different time horizons. Updated information on OP status will be delivered by the Employer after signature of the Agreement. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
e.	**Cost Benefit Analysis [4]**	The ENE Engineer shall perform a thorough review of the **Cost Benefit Analysis** and deliver a review report detailing his findings and recommendations. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer. The Global Project Cost Benefit Analysis is planned to be updated in 2022 after transport demand study to be completed in 2021.
f.	**Zero Impact Strategy [6]**	The ENE Engineer shall perform a thorough review of the **Zero Environmental Impact during O&M phase Strategy study** (ZEIS) and deliver a review report detailing his findings and recommendations. ZEIS defines recommendations regarding the impact of railway operation and maintenance phase, transport plan and roadmap for an environmental optimised design. As energy use for train traction is identified as main impact, the recommendations regarding ENE subsystem are of highest importance for the design of ENE subsystem. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations, assumptions, guidelines or requirements to the Employer. The ENE Engineer recommendations and proposals will be basis for the future updates of the ZEIS, and for its practical implementation.

g.	**CCS Strategy study [7]**	The ENE Engineer shall perform a thorough review of the **CCS Strategy study** and deliver a review report detailing his findings and recommendations. CCS Strategy study defines recommendations regarding specific applications of CCS subsystem providing optimised train driving functionality to reduce traction energy consumption. Other information regarding interface between CCS and ENE subsystems are also delivered, as well as requirements for CCS power supply to be provided by ENE subsystem. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
h.	**Climate Change study [8]**	The ENE Engineer shall perform a thorough review of the Climate Change study and deliver a review report detailing his findings and recommendations. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
i.	**Planning and deployment strategy**	Review of Planning and deployment strategy: The ENE Engineer shall perform a thorough review of the available Planning documents (Global Project Gantt chart, ENE schedule and ENE strategy Work Package 7) and deliver a review report detailing his findings and recommendations. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
j.	**Cost estimates**	The ENE Engineer shall perform a thorough review of the available cost estimates documents and deliver a review report detailing his findings and recommendations. The ENE Engineer shall assess the suitability of these information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
k.	**HV connection points**	The ENE Engineer shall engage with the TSO in charge of the ETG in Estonia, Latvia and Lithuania, request and collect all necessary information for the performance of his tasks. Already available and collected information will be delivered by the Employer, for which the ENE Engineer shall perform a thorough review and deliver comments, list of missing information and any other issue in a review report.
l.	**TEC 2 – Skulte HV line studies [9] & [10]**	In Latvia, between the power plant "TEC 2" and Skulte, the Rail Baltica railway is implemented in parallel at close distance with the Latvia-Estonia 330 kV intercoonection line, on an 80 km distance. In order to warranty feasibility, the studies [9] and [10] were ordered by the Employer. The ENE Engineer shall perform a thorough review of these studies and engage with the Latvian TSO to get updated information.

m.	**Other Studies / reports / relevant data review**	Any other relevant internally and externally prepared studies and documents that would be available at the time of the Initial data review.

4.4.3. The ENE Engineer shall prepare review reports separately for every document reviewed by the ENE Engineer as a part of the Service. The structure of a separate review report shall be agreed with the Employer. Review report shall cover the clear statement of the ENE Engineer regarding the acceptance / rejection / recommendations of a document provided for the review by the ENE Engineer.

4.5. Concept Design

4.5.1. Concept Design definition and objectives

The present chapter describes the Employer's requirements and processes regarding the preparation of the Concept Design. The ENE Engineer may amend the processes according his experience, but only on the conditions that requirements are met or exceeded. Processes amendments shall be described in the methodology to be delivered as part of Inception report.

The ENE Engineer shall prepare the Concept Design of the Rail Baltic ENE subsystem. The Concept Design shall be defined at the optimum level of details to prepare the specifications for the Works contract procurement. The Concept Design shall keep as open as possible the competition between tenderers for Works contract, in particular regarding suppliers' own technologies, under the necessary requirements to define the optimal type of ENE subsystem for Rail Baltica.

The Concept Design of the Rail Baltic ENE subsystem shall:

a. Define the optimal configuration of the ENE subsystem, including type of electrification, power supply architecture, feeding and sectioning diagrams, sizing of power supply equipments, etc;

b. Ensure optimum connectivity with the TSOs;

c. Define optimal number and geographical distribution of TSS and autotransformers (if any);

d. Define optimal architecture, type, features and sizing of OCS;

e. Define optimal architecture and features of ECCS;

f. Define technical interface solutions;

g. Ensure full interoperability of the ENE subsystem. In this aim, the Concept Design which be subject of review and approval of the Employer's contracted NoBo;

h. Ensure achievement of RAMS targets;

i. Deliver solutions optimized for Life Cycle Cost;

j. Minimise the Environmental Impact of the ENE subsystem and of the entire railway operation during O&M phase;

k. Deliver all necessary supporting documents to demonstrate that Concept Design fulfils his objective, including benchmarking reports, technical analysis, schematics, drawings, evidence of compliance to interoperability requirements calculation notes, bill of quantities, Life Cycle Cost analysis, Multi Criteria Analysis, Environmental Impact analysis, Traction power simulation reports, RAMS calculations.

The Concept Design, following approval by the Employer, shall be the basis of the ENE subsystem technical specifications for the Works contract procurement.

4.5.2. **Priorities in the analysis of type of electrification systems:**

The ENE Engineer shall consider the following priorities when analysing the type of electrification systems:

a. 2x25kV;

b. 2x25kV with some sections in 1x25kV;

c. 2x25kV with unbalance compensation devices;

d. SFC 1x25kV;

e. SFC 2x25kV.

This order in the priorities has been defined following the ENE Strategy study. The ENE Engineer can amend these priorities and add additional types of electrification systems, provided that all justifications are provided as part of the Tenderer's proposal methodology.

The rationale of these priorities is the following:

a. 2x25kV is the nominal type of railway electrification systems. However, feasibility of connectivity of Rail Baltica ENE subsystem with the transmission grids of the Baltic states may not ensured, in reason of the technical parameters available at some of the connection points. In particular, phase unbalance may reach unacceptable levels in some conditions: degraded modes of Rail Baltica ENE subsystem, seasonal conditions, etc. Other parameters may also cause partly unsuitability of 2x25kV electrification systems in the Baltic transmission grids' context;

b. In order to remedy consequences of such unsuitability and depending locations and extend of unbalance or other unfeasibilities, solution using 1x25kV electrification system may be partly proposed;

c. On a similar way, and in case 1x25kV would not be bring sufficient improvements, solutions using unbalance compensation devices may be proposed. As implementation of these power electronics active devices may have negative effect on LCC parameters, use of unbalance compensation devices shall be limited to extent necessary to deliver a feasible solution for electrification systems;

d. In the case of the extensive use of active unbalance compensation devices would be found necessary, the implemention of Static Frequency Converter solutions shall be considered – with 1x25kV or 2x25kV feeding architecture. SFC are active components with known drawbacks, but with also significant advantages (no unbalance, increase in distance between TSS, higher level of regenerative braking, extended electrical sections etc.);

e. As it is necessary to demonstrate to various stakeholders that the optimal type of electrification systems is chosen, a thorough analysis of electrification systems using SFC shall be performed in any case, considering it as an alternative to the 2x25kV type of railway electrification system.

At geographical point of view, the ENE Engineer shall perform the architecture level software simulation considering the following priority in the schedule of his activities:

a. Estonia;

b. Kaunas – Vilnius branch line;

c. Latvia;

d. LV/LT border – Kaunas;

e. Kaunas – LT/PL border.

4.5.3. Requirements for analysis of electrification systems and configurations for Concept Design

The ENE Engineer shall deliver all necessary documents to justify his analysis of electrification systems and his preffered solution for Concept Design. As main analysis tools, the ENE Engineer shall use the following:

a. traction power simulations (refer to chapter 4.6): Modelling of all possible type of electrification systems may not be necessary, however the ENE Engineer shall model and perform iterative simulations of all electrification systems and configurations necessary to demonstrate that preferred solution for electrification system is feasible and reach all objectives defined in 4.6.5. Modelling of 2x25kV and SFC (1x25kV or 2x25kV) systems shall be mandatorily prepared;

b. Multi Criteria Analysis and Life Cycle Cost Analysis (refer to chapter 4.7): On the basis of the MCA prepared as part of the Work Package 4 of the ENE Strategy study, the ENE Engineer shall deepen and supplement all parameters and deliver his own MCA, with amending weighting system if needed. MCA shall consider detailed LCC (CAPEX, OPEX, lifetime of elements etc.) and environmental impact of the entire ENE subsystem, including HVFL.

Parallel and interactive use of a traction power simulation and MCA-LCC tools is necessary to define solutions, verify their feasibilities and assess their LCC performances; and to provide iterative guidance toward the optimum solution.

Additionally, the ENE Engineer shall consider the requirements included in the Zero Impact Strategy study [6] and defines how these requirements will be implemented in the preparation of the Concept Design. At least the ENE Engineer shall include the following criteria:

a. Maximization of energy efficiency by optimization of all railway traction chain (from Connection point to Wheels), including use of:
    - Detailed software simulation of behavior of ENE subsystems and grids' connections;
    - Regenerative braking;
    - Energy storage;
    - Dynamic power demand management at train level (eco-driving);
    - High energy efficiency components.

b. Maximization of lifetime of the ENE subsystem components, fostering standardisation and replaceability of components or sub-components (eco-conception);

c. Minimisation of environmental impact of production, operation and recycling of the ENE subsystem components.

4.5.4. Specific requirements for analysis of Power supply and ECCS

The Power supply part of ENE shall be characterized by the following parameters:

a. type of electrification: as defined in 4.5.2, it represents the type of solutions for the architecture of Power supply part of ENE subsystem, with single or mixed solutions (for example 2x25kV with some sections in 1x25kV);

b. Specific analysis of electrification systems using SFC 1x25kV or 2x25 kV shall be performed, considering the WP 4 of ENE Strategy study, experience of the ENE Engineer experts in SFC electrification systems and consultations with suppliers.

c. Configuration: for a defined type of electrification, it is a variant defined by some changes in some part of architecture (for example addition of a feeder, different HV connection point, different busbar arrangement etc.);

d. Modes of operation:

- Normal Operation shall be defined as the ENE Subsytem operational configuration when all traction power stations and all individual power supply sources are in operation, except the ones implemented for redundancy or backup purpose which are normally not in operation;
- Reserve Operation shall be defined as the ENE Subsytem operational configuration when one or several elements (TSS, transformer, autotransformer posts (if any), HVFL, feeder etc.) are out of order, whether it is in reason of failure or for maintenance.

e. For every configuration, the ENE Engineer shall define the different cases and levels of Reserve Operation, considering the possible architectures of the the ENE Subsytem and the RAMS requirements. The ENE Engineer shall consider the requirements of the Employer regarding train operation and infrastructure maintenance linked to situation of ENE subsystem Reserve Operation modes;

f. Mutual securing with 1520 mm railway ENE subsystems: the ENE Engineer shall propose to implement mutual securing with 1520 mm railway ENE subsystems in the suitable locations (for example Riga, Salaspils, Kaunas, Vilnius etc.) where it is relevant to implement connections between 1435 mm and 1520 mm power supply systems. The mutual securing shall be considered only as additional Reserve Operation mode, in coordination with 1520 mm infrastructure manager;

g. Design of ECCS shall allow control/command of Power supply and OCS for all configuration and modes of operation, ensuring all necessary functionalities without limitation;

h. Connection of all ENE subsystem sites will be ensured by the transmission backbone, part of the CCS subsystem scope. ECCS shall be interfaced with all subsystems necessary to provide interconnectivity with required applications. This includes notably CCS subsystem, TSO and 1520 mm infrastructure managers control/command systems;

i. ECCS Control/command architecture and distribution of facilities shall allow remote centralized control and local control of the ENE equipment.

4.5.5. Specific requirements for analysis of OCS

The OCS part of ENE shall be studied with particular attention, considering the importance of the OCS in maintenance cost of railway infrastructure, the high level of availability required, and the climatic conditions in the Baltic states.

As part of Concept Design, the ENE Engineer shall deliver full definition of the Rail Baltica generic catenary type, which will be the basis of Technical Specifications for OCS.

The ENE Engineer shall analyse all parameters involved in the OCS design, deployment, operation, maintenance and decommisiong phases, and prepare a detailed MCA and LCC of the possible types of OCS. The ENE Engineer shall base his analysis on the Design Guidelines, the ENE Strategy study Work Package 5 and his professional experience. Life-Cycle Cost, technology proven in operation, RAMS and Environmental Impact performances shall be the main decision criteria.

In order to be able to start to perform the architecture level of the Traction power simulation, the ENE Engineer shall define a preliminary generic type of OCS for Rail Baltica infrastructure, including the necessary elements and parameters required by the simulation software.

The following specific issues shall be analysed, and solutions proposed by the ENE Engineer as part of OCS Concept Design:

a. Interest to define several types/variants of OCS for main line, lines with limited speed, sidings or depot tracks. Analysis shall be made at technical, LCC and procurement strategy point of view;

b. Definition of OCS requirements to allow a maximum operational speed to 280-300 km/h, and associated impacts on LCC parameters;

c. Additional analysis on catenary poles, foundations and interfaces with structures, and proposal for decision of a type, material and technical requirements;

d. Analysis and proposals regarding extension of lifetime of OCS components;

e. Predictive and smart monitoring and maintenance systems;

f. Type and characteristics of return traction current and earthing and bonding systems;

g. Necessity analysis and requirements for OCS de-icing systems, and all adjustments needed in OCS specifications in consequence of de-icing solution choice;

h. Compatibility of Rail Baltica generic catenary type with the operation of cargo trains with SE-C gauge, as defined in Swedish Infrastructure Manager Trafikverket document TDOK:2015-0555;

i. Technical conditions to be applied for the locations with 1435/1520 mm track gauge crossings (such as in Kaunas, Vilnius, Palemonas stations etc.) and gauntleted tracks (Kaunas tunnel);

j. Definition of a generic catenary type for 1520 mm railway lines in the Baltic states, by transposition of the Rail Baltica generic catenary type to 1520 mm requirements standards, including typical OCS design for all cases;

k. Technical requirements regarding connections on catenary system or negative feeder system to provide power supply for CCS systems and point heating systems;

l. Technical requirements in the case of existing or implementation of 3 kV DC 1520 mm track railway lines in parallel with Rail Baltica infrastructure (Tallinn Ülemiste, Riga urban area etc.);

m. Technical requirements for the System separation sections between 3 kV DC electrification of 1520 mm track railway lines and Rail Baltica electrification (Lithuanian – Polish border case, except if electrification in Poland would be implemented in 25 kV).

OCS Concept Design and description of Rail Baltica generic catenary type shall include:

a. Definition of all technical requirements of the OCS (geometrical, mechanical, electrical, RAMS aspects);

b. Definition of Feeding and Sectionning Diagrams for all cases, considering maintenance, degraded operation and safety aspects;

c. Typical OCS design for standard electrical section, as well for all necessary cases: stations, crossovers, junctions, depot or multimodal terminal access, bridges, tunnels, ecoducts, small radius curves, connections for feeding CCS or point heating systems, phase separation sections, electrification systems separation sections, gauge crossings, gauntleted tracks etc.

Pre setting-out of OCS masts for every section Rail Baltica infrastructure is not required, however the ENE Engineer shall:

a. Deliver the typical design for prototype sections, covering all OCS design cases;

b. Prepare bill of quantities of the OCS on the entire Rail Baltica infrastructure, and in this regard shall define all necessary OCS equipments at sufficient detail level;

c. Follow closely the progress of conceptual designs of OCS system in the scope of the infrastructure, stations, freight terminals and maintenance facilities Detailed Technical Design, and consider any specific situation in the preparation of OCS Concept Design. In this regard, the ENE Engineer shall participate to the design review of OCS conceptual solutions included in Master Design and Detailed Technical Design of infrastructure.

4.5.6. **ENE Engineer shall supplement the existing Design Guidelines and develop new parts for Design Guidelines necessary for the preparation for Works Implementation Phase.**

4.5.4. **Territorial analysis for TSS and HVFL**

The ENE Engineer shall analyse the Preliminary Design and Spatial Planning documents in the 3 States and get familiar to the regulatory processes necessary in every State for the implementation of TSS and HVFL.

In his analysis, the ENE Engineer shall define the different types of situation which may be encountered regarding TSS and HVFL implementation, with associated processes and timelines. The analysis shall be detailed in the Territorial analysis for TSS and HVFL report.

The TSS locations which were included in the Preliminary Design and Spatial Planning document **are not binding and shall not be considered as a basis for the Concept** Design of the Rail Baltica ENE subsystem, as the location were defined:

a. Without suitable traffic, timetabling, operational and rolling stock hypothesis;

b. Using different technical solutions (2x25kV, 1x25kV);

c. Without performing any detailed electrical simulations;

d. Without definition of degraded modes of ENE subsystem operation;

e. Without coordination of hypothesis and level of details between the States.

However, where the optimal location of a TSS proposed by the ENE Engineer (as part of Concept Design and supported by Traction power simulations) matches or is nearby a TSS location defined in Preliminary Design or Spatial Planning documents, the ENE Engineer shall investigate the possibilities to use the predefined location.

For the avoidance of doubt, the objective of most optimal ENE subsystem configuration shall always prevail to the use of a predefined TSS location.

Similarly, the number of HVFL necessary for a TSS shall result of the ENE Engineer optimal configuration, and not from predefined solutions or agreement with TSO.

4.6. Traction power simulation

4.6.1. The ENE Engineer shall carry out the traction power simulations using the specialized traction power simulation software tool mentioned in his Tenderer's proposal.

4.6.2. The scope for simulation shall be the complete extent of 1435 mm tracks of Rail Baltica Global Project geographical scope.

4.6.3. Traction power simulation shall be understood as a combined mathematical modelling by a single dedicated software tool of the railway infrastructure elements, including ENE subsystems, railway alignment, rolling stock and train operation parameters. The software shall consider all elements influencing electrical traction of train and use advanced electrical and physical modelling on time dynamic basis

4.6.4. The software model result of the Traction power simulation shall be a major decision tool regarding the type of electrification systems, the architecture and the sizing of the ENE subsystem, and therefore deliver all necessary detailed information requested to prepare the Concept Design and ultimately the procurement documentation for the Works contract. The level of detailisation of the simulation requested for Concept Design shall be similar as what is required for Detailed Technical Design of ENE subsystem, in order to deliver all the necessary informations for decision making, notably for technical discussions with TSO.

4.6.5. Traction Power simulation results shall allow establishing Concept Design for the entire Rail Baltica railway. Sizing and configuration of the ENE subsystemsystem must be determined, including connecting points to ETG, number and position of Traction Power Substations, Auto-Transformers and Neutral Sections, transformers characteristics, short circuit analysis determining the rating of power equipment, and redundancy arrangements securing the system operation in cases of Normal and Reserve operation modes.

4.6.6. Process for simulation shall be described in dedicated simulation plan defining objectives, simulation methods and tools, simulation steps, input data and hypothesis, reference standards, and reporting, as necessary. The simulation tool shall be proven in use for large scale electrification project with guaranteed outputs against relevant standards.

4.6.7. The Traction Power simulations shall consider the following generic inputs:

a. Typical timetable of train services and other operational parameters;

b. Nominal and Reserve ENE operation modes;

c. Track layout data;

d. Line speeds;

e. Climatic conditions;

f. Short circuit power limitation Connection Point;

g. Compensation requirements at Connection Point;

h. Electrical behaviour of HVFL between Connection point and TSS;

i. Catenary system characteristics (including impedance matrix of different types of catenary technologies);

j. Return traction current circuit characteristics;

k. Rolling stock characteristics;

l. Regenerative braking characteristics;

m. All auxillary loads from catenary system incl. heating of switches, power supply of railway system equipment, etc.

4.6.8. The key applicable standards for traction power simulation shall be:

Table 9. Key applicable standards for Traction power simulation

No.	Title
1.	EN 50163 - Railway Applications - Supply voltages of traction systems

2.	EN 50388 - Railway Applications - Power supply and rolling stock - Technical criteria for the coordination between power supply (substation) and rolling stock to achieve interoperability
3.	IEC 60076-2 - Power transformers – Part 2: Temperature rise
4.	IEC 60076-5 - Power transformers – Part 5: Ability to withstand short-circuit
5.	IEC 61000-3-13 - Electromagnetic compatibility (EMC) - Part 3-13: Limits - Assessment of emission limits for the connection of unbalanced installations to MV, HV and EHV power systems
6.	EU 1301/2014 - Commission Regulation (EU) No 1301/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'energy' subsystem of the rail system in the Union and amendment

4.6.9. The software model shall be developed in 2 steps:

a. Architecture level: the level of detailisation of the software model, the type of simulation performed, the simulation results and their accuracy shall allow to take decision on the topology of the ENE subsystem,

b. Detailed level: the level of detailisation of the software model, the type of simulation performed, the simulation results and their accuracy shall allow to have a full definition of the architecture, parameters, necessary requirements and sizing of the ENE subsystem. Detailed level is the basis of Concept Design, procurement documentation for the Works contract and agreement with TSO.

4.6.10. Modelling at architecture level:

The modelling at architecture level shall consider at least the following elements:

a. Type of electrification system: 2x25kV, 1x25kV, SFC 1x25kV, SFC 2x25kV etc.;

b. Location of TSS, sectioning post and other ENE subsystem elements (autotransformer posts, feeders etc.);

c. Location, length and parameters of HVFL and connection points;

d. Definition of configuration in nominal mode and degraded modes;

e. Generic type of OCS;

f. Preliminary voltage drop profile along the line in nominal and degraded modes;

g. Unbalance values at connection points level;

h. Preliminary technical parameters of HV connecting points (single/double feeding, short circuit power, unbalance etc.) in nominal and degraded modes;

i. Regenerative braking characteristics;

j. Preliminary feeding and sectioning diagrams.

The ENE Engineer shall consider the priorities defined in 4.16.2 when planning the Traction power simulations. Not all the possible systems and configurations shall be simulated, as far as:

- Feasibility of one configuration in the order of priorities defined in 4.16.2 is demonstrated;
- All the necessary information for the LCC and MCA analysis are available;

- The ENE Engineer could demonstrate that the proposed configuration is optimum.

However, the modelling of one SFC configuration (1x25kV or 2x25kV) shall be mandatorily prepared and presented in the architecture level modelling report, with the same level of details that the modelling of the configuration proposed with traditional transformers solutions.

The ENE Engineer shall perform as many iterations of simulation as necessary in order to demonstrate the feasibility of the proposed architecture configurations, to check the compliance with all functional and technical requirements, and to reach target of optimised LCC. During the phase of modelling at architecture level, regular interactions are necessary with the Employer's experts and with the team in charge of MCA/LCC, in order to discuss hypothesis and elements necessary for the simulation steps, and to agree on technical orientations. This interactive approach shall allow fast decisions and time saving in this critical phase.

The ENE Engineer shall consider all necessary elements and parameters during preparation of the software model, performance of simulations, and consolidation and presentation of the results to warranty their accuracy, exactitude and reliability for the architecture level. The ENE Engineer shall draw clear conclusion from the simulations regarding the ENE subsystem architecture to be selected. All necessary information shall be detailed in the interim software simulation report, including notably the following chapters:

a. General presentation of the railway traction power simulation software tool, modelling principle and specific parametrisation for RB project;

b. Configurations modelled;

c. Detailisation of input data used;

d. Results of simulation for each configuration (ENE subsystem and HV connecting points);

e. Recommended type of electrification system, architecture and configuration of ENE subsystem, HV connecting points location and parameters.

4.6.11. **Validation of ENE subsystem preferred architecture**

The ENE Engineer shall submit the interim software simulation report for review by the Employer. Relevant extracts shall be delivered to the TSO for review and comments. The ENE Engineer shall prepare and present the Report to the involved stakeholders (TSO, TWG etc.). Following collection of the opinions of the stakeholders, the Employer will take decision regarding the report status.

4.6.12. **Modelling at detailed level:**

The modelling at detailed level shall consider at least the following elements:

a. The approved type of electrification architecture and configuration;

b. Approved location of TSS, sectioning post and other ENE subsystem elements (autotransformer posts (if any), feeders etc.);

c. Location, length and parameters of approved HVFL and connection points;

d. Definition of configuration in normal mode and reserve modes;

e. Revised generic type of OCS;

f. Detailed voltage drop profile along the line in nominal and degraded modes;

g. Regenerative braking characteristics;

h. Unbalance level at connection points level;

i. Final technical parameters of HV connecting points (single/double feeding, short circuit power, unbalance etc.) in nominal and degraded modes;

j. Approved feeding and sectioning diagrams.

The ENE Engineer shall upgrade the simulation model at the necessary level to deliver all necessary information for Concept Design delivery and for technical agreements with TSO regarding HV connection points. In particular, all reserve modes shall be analysed and simulated, for all necessary TSS, autotransformer posts (if any), HV connection points etc. in order to verify the compliance of these modes with connection points technical conditions and with RAMS requirements.

The ENE Engineer shall perform as many iterations of simulation as necessary in order to refine an optimise the ENE subsystem architecture configurations, until delivery of best one at LCC point of view, and in full compliance with all functional and technical requirements.

The ENE Engineer shall consider all necessary elements and parameters during preparation of the software model, performance of simulation, and consolidation and presentation of the results to warranty their accuracy, exactitude and reliability for the architecture level. The ENE Engineer shall draw clear conclusion from the simulation regarding the ENE subsystem architecture to be selected. All necessary information shall be detailed in the final software simulation report, including notably the following chapters:

a. General presentation of the railway traction power simulation software tool, modelling principle and specific parametrisation for RB project;

b. Detailed presentation of the configurations modelled;

c. Detailisation of input data used;

d. Results of simulation for each configuration (ENE subsystem and HV connecting points);

e. Recommended configuration of ENE subsystem, HV connecting points location and parameters.

4.6.13. Validation of ENE subsystem recommended configuration

The ENE Engineer shall submit the final software simulation report for review by the Employer. Relevant extracts shall be delivered to the TSO for review and comments. The ENE Engineer shall prepare and present the Report to the involved stakeholders (TSO, TWG etc.). Following collection of the opinions of the stakeholders, the Employer will take decision regarding the report status, and the approval of the ENE subsystem recommended configuration for Concept Design.

4.7. Cost estimates for ENE deployment / Life Cycle Cost analysis / Environmental impact analysis / Multi Criteria Analysis

The ENE Engineer shall demonstrate that the deployment of preferred configuration for the ENE subsystem will deliver the most economically optimized solution with the most limited environmental impact for the railway operation needs. This is of highest importance due to the scale of Rail Baltica ENE subsystem deployment, the public financing and the long lifetime of its components. Therefore, the ENE Engineer shall develop the following tools:

a. Cost estimates: the ENE Engineer shall develop bill of quantities, unit prices, Cost estimates tables for CAPEX and OPEX for ENE deployment and O&M phase. Attention is drawn on the necessity to accurately define:

- the CAPEX of every HVFL and connection points, for all the configurations analysed. The CAPEX calculations shall consider all elements as lenght of HVFL, single or double connection, voltage level, physical constraints and other technical parameters, which shall be established involving the Employer and TSO;

- the OPEX of every HVFL and connection points, for all the configurations analysed. The OPEX calculations shall consider the different legislative framework, fare conditions in each country, as well as physical and technical parameters;
- the CAPEX and OPEX of SFC solutions, considering their characteristics in terms of energy efficiency, regenerative braking and ability to reuse or transfer back to ETG the regenerated electricity;
- the monetisation of the selling services of Power Demand management, as well as of storage systems.

b. Life Cycle Cost analysis: this method of economical analysis shall aggregate all the necessary elements of cost of ENE susbsystem: CAPEX, OPEX, dismantlement, disposal/recycling and replacement/renewal values. Classic methods of socio-econmical and financial analysis shall be used to calculate the LCC of every configuration, components or subsystem. Level of detailisation shall allow to provide clear comparisons between options.

c. Environmental impact analysis: the ENE Engineer shall analyse the environmental impacts of design, production, transport, installation, operation and maintenance, decommissioning and disposal/recycling of every configuration, components or subsystem.

d. Multicriteria Analysis: On the basis of the MCA prepared as part of the Work Package 4 of the ENE Strategy study and of the other elemnts of Concept Design, the ENE Engineer shall deepen and supplement all parameters and deliver his own MCA, with amending weighting system if needed. MCA shall consider detailed LCC (CAPEX, OPEX, lifetime of components etc.) and environmental impact of the entire ENE subsystem, including HVFL.

4.8. Earthing & Bonding concept - Electromagnetic Compatibility studies

The ENE Engineer shall perform the following studies and deliver corresponding reports:

a. ENE Earthing & Bonding concept: on the basis of his analysis of the traction return current circuit requirements, its interfaces with other systems and of relevant standards, the ENE Engineer shall deliver the ENE Earthing & Bonding concept for the Rail Baltica infrastructure;

b. ENE Earthing & Bonding concept shall identify the necessary provisions which will enable, during normal or under fault operation, keeping touch potential for human beings under normative limits, protect low voltage equipment from damages, and facilitate reaching Electro Magnetic Compatibility of the RB Railway system. Normal or Fault operation shall consider train operation conditions, short circuit conditions occurring as catenary falling in the catenary drop zone, lightning conditons and OCS de-icing mode;

c. ENE Earthing & Bonding concept shall provide architecture of the system, typical connection arrangements, typical distances between cross bondings, arrangements at rail bridges, road bridges, ecoducts, tunnels and other civil structures. Arrangements at civil structures shall elaborate on sizing of the earth connexions to be implemented for the earthing of the structure;

d. ENE Earthing & Bonding concept shall define Interface technical arrangements between ENE subsystem and other systems. Recommendations for split of responsibility between suppliers must be proposed;

e. ENE Earthing & Bonding concept shall be part of the ENE Concept Design. Recommendations for changing or supplementing Design Guidelines shall be part of the DG update proposal report;

f. Electromagnetic Compatibility studies for interfaces: on the basis of his analysis of the ENE susbsystem proposed architecture, surrounding systems and of relevant standards, the ENE Engineer shall deliver an EMC analysis for all interfaced elements, including other parts of Rail Baltica infrastructure (CCS, OCC, station or maintenance facilities etc.) and affected third parties (housing, industries, utilities etc.). The ENE engineer`s scope shall include also scope Electromagnetic combability analysis of parallel and crossing High Voltage lines. Identification (based on RBR technical interface management system) and clear recommendations for every interfaced element shall be part of the corresponding report. Analysis at detailed level and design of solutions for magnetic, electric, or magnetic fields and/or galvanic coupling studies in the context of reaching EMC will be within the scope of the Contractor;

g. Specific case of TEC 2 – Skulte 330 kV HV live: In Latvia, between the power plant "TEC 2" and Skulte, the Rail Baltica railway is implemented in parallel at close distance with the Latvia-Estonia 330 kV interconnection line, on an 80 km distance. In order to warranty feasibility, the studies [9] and [10] were ordered by the Employer. The ENE Engineer shall perform a detailed analysis and software simulation of the EMC configuration, considering:
   - The ENE susbsystem proposed architecture and of other parameters;
   - The detailed design of the 330 kV HV line;
   - The main characteristics of the CCS subsystem.

   The outputs of the study and the software simulation shall bring clear conclusions regarding:
   - Feasibility to operate and maintain Rail Baltica line section TEC 2 – Skulte in the vicinity of the 330 kV HV line, with acceptable safety working conditions for maintenance staff;
   - Feasibility to implement, operate and maintain the Rail Baltica CCS subsystem on this section;
   - Necessary requirements and conditions to be included in an O&M agreement between the Rail Baltica Infrastructure Manager and the Latvian TSO for management of this section.

e. Electromagnetic Compatibility studies for humans and animals: interfaces: on the basis of his analysis of the ENE susbsystem proposed architecture and of other parameters, the ENE Engineer shall perform 50Hz Magnetic Field Exposure studies in the vicinity of the complete Rail Baltica line. Magnetic field study shall be delivered after simulation, reporting results in the context of the RB Project cautionary principle. Analysis at detailed level and design of solutions for EMC for humans and animals will be within the scope of the Contractor.

Process for Magnetic field simulation shall be described in dedicated EMC management and simulation plan, defining objectives, deliverables, methodology and tools, simulation steps, input data and hypothesis, reference standards, and reporting.

4.9. RAMS analysis

4.9.1. Safety related activities

The ENE Engineer shall assist the Employer for establishing the conditions for most efficient Safety management as part of the development and deployment of the ENE subsystem, in line with provisons set as part of European directives, CSM regulations and EN 50126 / EN50562 standards.

The ENE Engineer shall identify and provide recommendations for such steps where the ENE Engineer and/or the Employer shall be involved during the ENE subsystem development/deployment stages, when such steps serve the demonstation of ENE subsystem/components safety.

The ENE Engineer shall contribute in the development of the System definition, establishing the description of the ENE subsystem and its boundaries, leading the development of the System Preliminary Hazard analysis for the part related to ENE subsystem, proposing adequate safety targets and establishing safety requirements specifications accordingly for ENE components / subsystems.

The ENE Engineer shall adapt his analysis and adapt recommendations considering the selected ENE procurement strategy and the resulting ENE suppliers/stakeholders mapping. The ENE Engineer shall identify all duties related to Safety management and recommend on organisation, and assignment of responsibilities to each party.

4.9.2. RAM related activities

The ENE Engineer shall asssit the Employer for establishing the conditions for most efficient RAM management as part of the development and deployment of the ENE subsystem, in line with provisons set as part of EN 50126 / EN50562 standards.

The ENE Engineer shall identify and provide recommendations for such steps where the ENE Engineer and/or the Employer shall be involved during the ENE development/deployment stages, when such steps serve the demonstation of ENE subsystem/components assurance.

As part of his contribution in the development of the System Preliminary Hazard analysis, and according to best practice in the Railway industry, the ENE Engineer shall propose RAM targets and establish RAM requirements specifications accordingly for ENE components / subsystems.

The ENE Engineer shall adapt his analysis and adapt recommendations considering the selected ENE procurement strategy and the resulting ENE suppliers/stakeholders mapping. The ENE Engineer shall identify all duties related to RAM management and recommend on organisation, and assignment of responsibilities to each party.

4.10. Verification and Validation

4.10.1. Verification and Validation Plan

The ENE Engineer shall prepare a Verification & Validation plan presenting the generic strategy for the Verification and Validation of the ENE subsystem, including:

a. Description of required V&V process according to best railway industry practice, for all tests stages according to the ENE design documentation hierarchy and the ENE system architecture, and guaranteing the control of the production / construction quality and compliance to the Employers requirement;

b. Required involvement of contractor and stakeholders along the ENE V&V cycle;

c. Strategy for test at interfaces;

d. Strategy for products and systems acceptance;

e. Strategy for products and systems certification;

f. Detailed plan for TSS energization;

g. Detailed plan for OCS energization;

h. Detailed plan for System Dynamic testing;

i. Requirement management supporting evidence of compliance;

j. Configuration management;

k. List and scope of V&V deliverables to be produced on the course of the Project, by contractors, suppliers and stakeholders involved in ENE delivery;

l. Schedule of all V&V operations, from Factory Acceptance Tests to APIS.

4.10.2. Development of V&V requirements

The ENE Engineer shall develop the set of V&V requirements to be specified as part of the ENE System procurement. The set of requirements shall reflect the elements established as part of the Verification and Validation plan and identify further the expected duties of the Contractor as part of the V&V activities.

4.11. Preparation of technical agreements with main stakeholders

4.11.1. Connection agreements with TSO

Following the validation of ENE subsystem recommended configuration, the ENE Engineer shall prepare the draft agreement with TSO for connection conditions of every TSS to HVFL. Draft agreement shall include technical, legal, operational and maintenance conditions. The ENE Engineer shall lead the negotiation phase with the TSO on behalf of the Employer until signature of the connection agreements.

4.11.2. Interface agreements with TSO

The ENE Engineer shall assist the DTD designers and the Employer in the discussions and the preparation of the technical conditions and draft agreements with TSO for interface with crossing or parallel HV line. Draft agreement shall include technical, legal, operational and maintenance conditions. The ENE Engineer shall lead the negotiation phase with the TSO on behalf of the Employer until signature of the interface agreements.

4.11.3. Interface agreements with 1520 mm railway

The ENE Engineer shall assist the DTD designers and the Employer in the discussions and the preparation of the technical conditions and draft agreements with 1520 mm railway infrastructure managers, for locations with gauge crossing at gauntleted track, but also for locations where both infrastructure are parallel (maintenance organisation, EMC effects). Draft agreement shall include technical, legal, operational and maintenance conditions. The ENE Engineer shall lead the negotiation phase with the 1520 mm railway infrastructure managers on behalf of the Employer until signature of the interface agreements.

4.11.4. Interface agreements with PKP-PLK

The ENE Engineer shall assist the designers and the Employer in the discussions and the preparation of the technical conditions and draft agreements with PKP-PLK (Polish railway infrastructure manager), for interface at LT-PL border. Draft agreement shall include technical, legal, operational and maintenance conditions. The ENE Engineer shall lead the negotiation phase with PKP-PLK on behalf of the Employer until signature of the interface agreement.

4.12. Review and finalisation of Procurement strategy for Works contract

4.12.1. As reference solution, the ENE Engineer shall consider that the implementation of ENE subsystem will be procured as a single Design and Built contract, for the entire geographical scope of Rail Baltica Global Project (refer to 2.2) and for the entire ENE system scope (refer to 2.3). This reference solution was justified by the implementation of Rail Baltica as a *greenfield* project, by the criticity of ENE susbsytem for Interoperability and by the economy of scale it delivers both in CAPEX and OPEX. Procurement of ENE subsystem as a single Design and Built contract is stipulated in the Contracting Scheme [3], Clause 4.

4.12.2. The ENE Engineer shall analyse single Design and Build contract (including equipment delivery, testing and commissioning) for whole Rail Baltica railway ENE subsystem excluding High Voltage connections as prefered solution covering at least:

a. Market research on similar scope of ENE susbsystem deployment, including consultation meetings with suppliers;

b. Critical review of possible procurement strategies;

c. Risk analysis;

d. Economical analysis;

e. Market competition analysis.

4.12.3. The ENE Engineer shall review and analyse the argumentation provided in the Work Package 7 of the ENE Strategy study and provide his opinion on the different options proposed.

4.12.4. Finally, the ENE Engineer shall assess if the solution of a single Design and Built Works contract is justified in the context of Rail Baltica Global Project and can be reconfirmed as the reference solution. Supporting argumentation shall be provided in case an alternative solution is seen as more advantageable by the ENE Engineer.

4.12.5. The ENE Engineer shall analyse and propose the most effective approach for Overhead Contact System (OCS) technology (including licence) procurement, i.e. to analyse and justify whether OCS technology shall be procured separately from Works implementation procurement or remain included. Advantages and drawbacks in terms of LCC, risks, schedule and deployment management shall be analysed, and clear way forward proposed.

4.12.6. Additionally, the ENE Engineer shall analyse if it would be advantageous in any way that ENE subsystems implementation would be procured together with other subsystems.

4.13. Preparation of Technical Specifications

4.13.1. The ENE Engineer shall prepare full Technical Specification for Works contract procurement for ENE subsystem, on the basis of the approved Concept Design and of the approved Procurement strategy.

4.13.2. The Technical Specifications shall follow a clear and structured plan. All the requirements in the specifications shall be structured in order to be easily implemented in the Employer requirements management system.

4.13.3. Functional requirements regarding operation and maintenance of ENE susbsystem, necessary functionalities including the interworking with interfaces subsystem shall be described.

4.13.4. Non-functional requirements should be also addressed: EMC, Earthing and Bonding, RAMS, etc. Each specification shall include a range of sections, in particular:

a. Requirements for design;

b. Functions and performance to be achieved, including RAMS objectives;

c. Material and workmanship requirements;

d. Operations requirements;

e. Monitoring and Control requirements;

f. Normal and Reserve modes;

g. Presentation of Concept Design and flexibility left to the tenderers;

h. Maintenance requirements;

i. EMC;

j. Safety;

k. Construction and installation works;

l. Testing and commission operations;

m. Software quality.

4.13.5. A set of interface specifications shall also be produced for every interface case, describing respective responsibilities of the Contractor in terms of scope, design, procurement, installation, testing and commissioning (e.g. between catenary and civil works).

4.13.6. Operation and Maintenance specifications shall be prepared to define general rules and requirements for the ENE subsystem.

4.13.7. The ENE Engineer shall prepare the Technical Specification for BIM application and the required attribute information for "ENE Detailed Technical Design" which shall be included in the BIM Models. The required geometrical and attribute information shall serve the purpose for the design, construction and maintenance of the ENE systems. All the prepared documents, tables and lists shall be agreed with the Employer and implemented by "ENE Detailed Technical Design" Works contractor.

4.13.8. DG BIM relevant documents must be used as basis for the preparation of the Technical Specification for "ENE Detailed Technical Design".

4.13.9. The Technical Specification as minimum, but not limited to, must include:

a. Detailed BIM use cases and application;

b. Detailed LOD definition tables (LoG and LoI) for the design, construction and maintenance phases;

c. Detailed data and asset codification tables;

d. Model, drawing and data native and exchange formats;

e. Asset Management and Asset Register strategy;

f. The Asset Data Dictionary Definition Document (AD4) documents shall be prepared as additional information to Obejct attribute (LoI) matrix;

g. Roles and responsibilities of the involved parties of the project;

h. Data exchange and sharing strategy.

4.13.10. The ENE Engineer shall review the existing GIS system implementation and use cases in RB Rail and prepare the Technical Specification for the GIS use cases during the design, construction and maintenance phases of the project. The Technical Specification as minimum, but not limited to, must include:

a. GIS use cases during the design stage of the ENE systems;

b. GIS use cases during the construction stage of the ENE systems;

c. Data representation and data vizualizations using GIS system during the design and construction stages;

d. Construction work status and progress reprensetation using GIS system.

4.14. Assistance to Works' Contract preparation

4.14.1. The ENE Engineer shall assist the Employer's staff for the preparation of the Works' Contract template to be included as part of the Works' Contract procurement documentation. Taking into account that Works' Contract will be based on "Conditions of Contract for Plant & Design-Build, edition, 2019 Contract Conditions for Design and Built (Yellow Book), the ENE Engineer shall be actively involved in the preparation of the following documents:

a. Particular Conditions;

b. Payment Conditions;

c. Performance Warranty, Retention Bond;

d. Insurance requirements;

e. Other contract related appendixes to the Contract.

4.15. Assistance during Works contract procurement process

4.15.1. The ENE Engineer before the announcement of the Works contract procurement shall provide assistance in the organisation of market consultations.

4.15.2. The ENE Engineer shall provide at least following recommendations as set of requirements for the Works contract procurement:

a. Technical qualification requirements;

b. Legal qualification requirements;

c. Proposals evaluation methodology and criteria (weighting factors).

4.15.3. These requirements shall be delivered in full respect of EU and national public procurement legislation.

4.15.4. The ENE Engineer shall provide at least following assistance during ongoing Works contract procurement procedure:

a. Providing assistance in preparation of the answers to received questions during procurement process;

b. Providing assistance in the supplier meetings;

c. Providing assistance in the negotiation process;

d. Providing assistance in evaluation of the applications and proposals and providing recommendations;

e. Providing and assistance in procurement claims resolution process

f. In case it will be decided to procure OCS technology separately, the ENE Engineer shall provide assistance for OCS technology procurement at Preparatory Phase of the Services.

5. WORKS IMPLEMENTATION PHASE

5.1. General

5.1.1. During the Works implementation phase, the ENE Engineer shall fullfill the entire role and duties of the Engineer, as defined by the Works Contract (e.g, FIDIC "Conditions of Contract for Plant & Design-Build, 2nd edition 2017 ("FIDIC Yellow Book") the Particular Conditions of the Works contract, all annexes to the Works contract, and by the present Agreement.

5.1.2. The ENE Engineer shall verify at any opportunity that the Works implementation of the ENE susbsystem is in full compliance with the eligibility conditions edited by INEA. During any auditing or claim processes from INEA, ECA or any other entitled authority, the ENE Engineer shall provide technical assistance to the Employer in the preparation of any supporting argumentation or by producing and assembling required documentation.

5.1.3. In particular, the duties of the ENE include:

a. The management of the Works contract;

b. The Project Management Office as described in chapter 3;

c. The review and approval of the Contractor's documents;

d. The supervision of the Design;

e. The supervision of the manufacturing, the delivery and installation of the of equipment, as well as the supervision of all construction works;

f. The supervision of the testing and commissioning operation, including Tests on Completion;

g. The issuance of the Taking-Over Certificates;

h. The supervision of thre Defect Notification Period;

i. The issuance of the Performance Certificates;

j. All measures needed until Works contract closure.

5.2. Management of the Works contract

5.2.1. The ENE Engineer shall organize, perform, and complete all assignments on behalf of the Employer, as well as advise the Employer on all technical, administrative, and finance management aspects related to implementation of the Works Contract.

5.2.2. The ENE Engineer shall ensure continuous exchange of information with the Employer concerning prompt performance of the Works.

5.2.3. The ENE Engineer shall review the Contractor's Payment Plan, considering:

a. Compliance with Works contract, Global Project Schedule and objectives;

b. Compliance with applicables rules related to asset management, taxes and accountancy;

c. Breakdown in Permanent and Temporary Works;

d. Reasonable cashflow for the Employer and Contractor during whole execution of the Works contract.

The approval of the Contractor's Payment Plan requires prior approval by the Employer.

5.2.4. Accepting and reviewing Contractor's Applications for payment certificates and related invoices (invoice formats and content shall also be approved by the Employer);

5.2.5. Management of variations and claims in accordance with the provisions of the Works Contract deemed necessary and/or unavoidable and corresponding to the Contractor's proposals. This include the review of technical, financial and implementation aspects of the variations or claims by the ENE Engineer, and production of corresponding assessment reports;

5.2.6. Advise and consult on any complaints from stakeholders or third parties, or issues relating to the contract that arise during performance of the works, as well as identifying of prospective delays and prevention of complaint whenever feasible.

5.2.7. The ENE Engineer shall issue all necessary Instructions, Notices and Determinations necessary to the proper execution of the Works contract, according highest professional standards and on a timely manner.

5.2.8. The structure and content of every deliverable for Works implementation phase Service Package shall be agreed with the Employer before provision of a deliverable.

5.2.9. Advising the Employer on all aspects of technical, administrative, and financial management aspects related to complete execution of the Works Contract;

5.3. Project Management Office for Works implementation phase

5.3.1 The ENE Engineer shall provide Project Management Office services as described in chapter 3., including organization and chairing of monthly progress meetings attended by the Employer, Contractor, Project Manager and other stakeholders. Preparation and distribution of the minutes of meetings.

5.3.2 The ENE Engineer shall prepare and deliver to the Employer the "ENE Engineer Monthly progress report" integrating information from Contractors' progress report together with the related Review/Approval statuses of Contractors documents and of supervision activities.

5.3.3 Review and approval of the Contractor's work programmes and monthly progress reports to ensure conformity of the Works and Sections thereof with the Rail Baltica deployment programme and ultimately, the completion of the Works in accordance with the Works Contract;

5.4. Review and approval of the Contractor's documents

5.4.1 The ENE Engineer shall ensure that all notices issued by the Contractor and "Contractor's Documents" are verified and confirmed professionally and in a timely manner for the purpose to ensure performance of the Works in accordance with the Programme.

5.4.2 The ENE Engineer shall in particular review, amongst others, the following Contractor's documents:

a. Project management documentation (as described in chapter 3)

b. Performance Security documents;

c. Environmental plan

d. Documentation plan;

e. Insurance certificates;

f. Documents linked to Contractor's personnal: qualification, medical certificates, professional certificates, work permits…;

g. Documents linked to Contractor's subcontractors;

h. Health and Safety plans.

5.4.3 Examination of the Contractor's quality control documents and procedures to ensure that they comply with requirements of the Works Contract;

6.4.3 The ENE Engineer shall ensure that the Contractor's insurance documents, Subcontractors' documents, Performance Security documents, and any required documents or certificates remain adequate and valid to cover the Contractor's liabilities at all stages. Follow-up table shall be prepared and kept updated.

5.5. Supervision of the Design

5.5.4. The ENE Engineer shall ensure that the Design documentation issued by the Contractor are in conformity with the Technical Specifications and other annexes to the Works Contract, with quality and quantities requirements of Works contract, with European and local regulations and standards. The conformity of the Design shall be verified and confirmed professionally and in a timely manner for the purpose to ensure performance of the Works in accordance with the Programme.

5.5.5. The scope of the ENE Engineer services related to all design activities shall include design review of documents for each of the following design stages:

a. Generic Design: includes all technical specifications, conceptual or typical solution, design, architecture principles, general schematic etc. applicable to the ENE subsystem in general, but not linked to a particular site or section;

b. Master Design (MD) of every section (see below);

c. Detailed Technical Design (DTD) of every section;

d. Operation & Maintenance manuals;

e. As built Detailed Technical Design of every section (As-Built).

5.5.6. The ENE Engineer shall be aware that meaning of the term "Master Design" is different in each of three countries:

a. In terms of Lithuania construction legislation, Master Design corresponds to Principal Design Documentation ("Techninis projektas" in Lithuanian) together with all requirements specified in DTD technical specifications;

b. In terms of Latvia construction legislation, Master Design ("Būvprojekta pamatrisinājumi" in Latvian) is not applicable in Country's construction legislation, however required by RBR as separate stage during provision of the Design Services to align Global project solutions and at the early level of Detailed technical design preparation together with all requirements specified in DTD Technical Specification;

c. In terms of Estonia construction legislation, Master Design corresponds to Principal Design Documentation ("Põhiprojekt" in Estonian) together with all requirements specified in DTD Technical Specification.

5.5.7. The ENE Engineer shall be aware that meaning of the term "Detailed Technical Design" is similar in the three Baltic states, as it is the final stage of the design process in accordance with relevant Country's construction legislation and it gives right to start construction works. Denomination in each of three countries is as follows:

a. For Estonia, Detailed Technical Design corresponds to Operational Building Design documentation ("Tööprojekt" in Estonian);

b. For Latvia, Detailed Technical Design corresponds to Building design ("Būvprojekts" in Latvian);

c. For Lithuania, Detailed Technical Design corresponds to work's design ("Darbo projektas" in Lithuanian).

5.5.8. Design review shall include (but is not limited) to following tasks:

a. Review and approval of the Contractor's documents to determine their compliance with requirements of the Employer, relevant standards Directives and Regulations. The ENE Engineer shall bring to the immediate attention of the Employer any changes in the design or in respect to technical issues, which potentially may lead to time and cost overruns, or otherwise have a significant impact on the project. The authorization of the Employer is not required before the approval of the Contractor's documents by the Engineer, however the Employer shall be kept informed in detailed and timely way of all issues. If deemed necessary, the Employer reserve the right to block approval of any Contractor's documents. **Full content of the deliverables of the Generic Design shall be subject to joint consolidated review by the Employer and the ENE Engineer.**

b. Review and approval of the Contractor's Operation & Maintenance manuals for ENE subsystem, according ENE Engineer experience of best practise in similar railway infrastructure. The review process shall include consolidation of opinion of relevant stakeholders (Employer, Shadow Operator, Infrastructure Manager etc.).

c. Verification of "as built drawings", and delivery of all reports, records, certificates and addenda prepared by the Contractor upon completion of the works to the Employer.

5.5.9. Compliance with BIM and Asset Information policies

a) The ENE Engineer shall carry out the review of the BIM deliverables of the ENE Detailed Technical Design (ENE DTD). For this task the ENE Engineer shall allocate the appropriate knowledgeable experts. All BIM models shall contain attribute data embedded within the models (LoI) and shall follow the DG and specifically "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document, RBDG-TPL-016 Codification Tables, RBDG-TPL-019 BIM Objects Attributes Matrix.xlsx.

b) As minimum, but not limited to, the ENE Engineer shall review and check the following deliverables according to the requirements of DG from ENE Detailed Technical Design:
   a. Inception report (including the BIM Execution plan, TIDPs/MIDPs, mock-up models, Object attribute (LoI) matrix, object LoG matrix);
   b. Site investigation reports including Laser scanning and Geotechnical BIM models (if any additional prepared prepared);
   c. All design BIM and 3D models for all stages of the "ENE Detailed Technical Design" (ENE DTD);
   d. BIM models in native file formats;
   e. BIM models (including attribute information) in exchange file formats;
   f. QEX and QTO and their compliance with information in the BIM models;
   g. Clash check reports;
   h. BIM QA/QC reports;
   i. 4D (construction scheduling) simulations;
   j. Codification tables;
   k. BIM objects attribute matrix;
   l. BIM delivery reports;
   m. 2D drawing and 3D/BIM (geometry compliance) check;
   n. 2D drawing and BIM information compliance check.

c) The review of BIM models also includes the attribute review according to the requirements set out in the DG and in the technical specification for the ENE Detailed Technical Design.

d) All the discovered issues shall be reported to the Employer and to Works Contractor preparing ENE Detailed Technical Design. The Contractor shall amend and correct the design according to the remarks and comments and the ENE Engineer shall verify the solutions in BIM environment.

The ENE Engineer shall review, verify and approve the information within the Asset Register system according to the agreed requirements with the Contractor.

e) All design information from ENE DTD, Detailed Technical Design (DTD) design projects of the mainline, stations and terminals of the project including the BIM models, drawings and data shall be made available for the ENE Engineer for review. The ENE Engineer shall be able and have the knowledge, hardware and software capability to review all the models, drawings and other data.

General approach is for design deliverables are:

a. For BIM models – IFC 2x3 (IFC4), XML and native file formats;

b. For 3D models – DWG/DGN and native file formats;

c. For drawings – DWG/DGN and PDF file formats;

d. For text documents – docx and PDF file formats;

e. For spreadsheet type documents – xlsx and PDF file formats;

f. For scheduling and planning documents – xer and PDF file formats;

g. For PointClouds – LAS/LAZ/XYZ/PTS/PTX/E57/RCP file formats.

5.6. Supervision of manufacturing and delivery of the equipment, supervision of construction and installation works

5.6.4. The manufacturing of any equipment shall be initiated by the Contractor only once all the design documents related to this equipment are approved. Serial manufacturing of any equipment shall be initiated by the Contractor only once the corresponding Factory Acceptance Tests[16] are passed. During manufacturing phase, the ENE Engineer shall:

a. Monitor the progress of the manufacturing and assess the compliance with the Programme;

b. Report any risk related to the manufacturing and take necessary actions to mitigate these risks.

5.6.5. The ENE Engineer shall consider in his proposal that costs related to attendance to Factory Acceptance tests, except if FAT are taking place in Baltic states, are covered by Contractor. These costs include transportation and accommodation costs, necessary testing equipment, and on-site offices. However, Per Diem or other salary element linked to travel conditions for ENE Engineer's employees according the relevant legislation will remain borne by the ENE Engineer.

5.6.6. The ENE engineer shall consider in his proposal that costs related to establishment, operation, supplies, furniture, maintenance and dismantlement of construction site offices for ENE Engineer will be provided by Works Contractor. Generally, it means that in all construcion site offices adequate dedicated space and equipments will be available free of charge for the ENE Engineer.

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[16] The ENE engineer shall allocate FAT`s travel costs in Works contractor`s agreement.

5.6.7. The schedule of the deliveries of the equipments in the Contractor's warehouse or on site shall be monitored by the ENE Engineer:

a. Following invitation from the Contractor's or on his initiative, the ENE Engineer shall perform and inspection of the delivered equipments, their compliance with the approved Design documents and with the deliverable bills;

b. The ENE Engineer shall inspect the equipment storage site, assess its conditions and report any deficiency or risk;

c. Prepare a delivery report stating type and quantities of equipments delivered, and all necessary;

d. In the case the delivered documents are subject to payment, review and approve the related documents.

5.6.8. The supervision of construction and installation works by the ENE Engineer shall allow to warranty high level of quality and timely completion of the Works. During this phase, the ENE Engineer is responsible for:

a. Detect any defect or unconsistencies between ongoing work and design documentation;

b. Follow relevant regulation for Construction supervision (in Latvian: *būvuzraudzība*; in Lithuanian: *techninė priežiūra*; in Estonian: *ehitusjärelevalve*) as defined in applicable laws of the Country, and in the Agreement, also ensuring required certified experts according to Country legalisation;

c. Verifying and approving that Contractors construction site offices are in conformity with the Works contract requirements.

d. Monitoring and evaluation of volume of the Works performed by the Contractor, including accurate record of the actual progress of the Works compared to the theoretical progress mentioned in Works Programme. The monitored Works shall be splitted in the following categories:
   (a) Permanent Works;
   (b) Non-Permanent Works;
   (c) Covered works (also know as hidden Works);

e. Organising of weekly site meetings with the Contractor, and reparation and distribution of the corresponding minutes.

f. Daily supervision of the activities of the Contractor on the works sites ensuring that all the construction and installation works, methods and technology comply with the approved Design, with the Technical Specifications and other annexes to the Works Contract, with quality and quantities requirements of Works contract, with European and local regulations and standards and with the Programme.

g. Monitoring the effective availablility of Contractor's ressources toward approved Programme;

h. Monitoring the Contractor's record keeping (daily reports, site diaries etc.), examining accuracy of these records. Preparing Engineer's weekly report of Contractor's activities progress.

i. Performing inspections and audits confirming that local Health and Safety standards are respected and implemented on the work sites;

j. Examine construction methods, review test documentation and perform site inspection to assess compliance with the requirements;

k. Coordinate with the Contractor scope, equipment, configurations and locations of tests which shall be carried out;

l. Require appropriate examinations and tests, which haven't been carried out by contractors;

m. Monitor the quantities implemented on site during construction and installation against Contractors records of construction works. Verification of correctness of such documents is necessary to prepare taking-over and asset management;

n. Inspect sample materials and testing of manufactured products to establish compliance thereof with required certificates and guarantees. Perform Routine inspections, examination and testing of materials and workmanship on the site. Perform inspection of plants and materials to be supplied under the Works Contract at their manufacturing facilities to determine their compliance with requirements of the Project Beneficiary and documents of the Contractor;

o. Covered works: the Covered works (mast foundations, pipes and cable trenches, earthing & bonding systems, technical building foundations etc.) shall be supervised on an exhaustive manner and their compliance with the approved drawings and standards shall be confirmed, prior the covering or backfilling of such equipment. Compliance report with georeferenced pictures and/or video shall be prepared by the ENE Engineer.

5.6.9. The supervision of training of ENE subsystem operation and maintenance staff to warranty their adequacy with the ENE susbsytem actual O&M conditions. The ENE Engineer shall perform prior approval of training manuals and course supports.

5.7. Supervision of the testing and commissioning operation, including Tests on Completion

5.7.4. The ENE Engineer shall ensure that the testing and commissioning activities, at any stage of the ENE subsystem implementation and for any scope of test, are consistent and exhaustive with the Technical Specifications and other annexes to the Works Contract, with quality and quantities requirements of Works contract, and with European standards and legislation. In this regard, the ENE Engineer shall:

a. Cover testing at factory and at building sites, witnessing and reporting on Factory Acceptance Tests, auditing production processes in factory ascertaining the quality of the delivered components, reviewing and witnessing site static and dynamic tests and System integration tests;

b. During the Generic design stage, establish with the Contractor the list of type components which shall pass Factory Acceptance Testing subject to the ENE Engineer's and Employer's approval before their deployment on Rail Baltica;

c. For all test stages, review all testing and commissioning plans and procedures submitted by the Contractor, provide relevant comments, request correction or supplementation when required;

d. In case of not satisfying testing and commissioning documentation, send appropriate instruction to the Contractor to remedy to the defects in the documentation, and to reschedule the corresponding testing and commissioning operations;

e. Establish a test supervision plan and supervise the testing and commissioning operations as performed by the Contractor by providing appropriate Experts attendance. Provide any comments or instruction to the Contractor during the testing and commissioning operations;

f. Inspect and assess that Health and Safety standards are respected during the testing and commissioning operations on construction sites;

g. Deliver ENE Engineer Test supervision reports following supervision of testing and commissioning operations, including observations noted during supervision and providing status on acceptability of the tests results after review of the Contractors test reports;

h. In the case of Tests on Completion of a Works section, provide statements about the status of the tests (Passed or Failed), covering all stages related to the Works section acceptance, operational and technical restrictions, recommendations for tests after completion and conditions in order to proceed to following steps shall be summarized as part of the related taking-over certificate;

i. As part of the Railway Systems dynamic tests, contribute along with the ENE Contractor and under the leading of the Railway System Integration test leader in the preparation and execution of the dynamic tests, including:
   (a) Definition of the ENE operational scenario and test runs;
   (b) Coordination of the test train set-up for the ENE part of the test equipment;
   (c) Contribution to specific safety analysis;
   (d) Definition of organization and procedures;
   (e) Witnessing and reporting on test execution on-board.

j. Liaise and coordinate with Conformity Assessment Bodies in activites related to interoperability and safety certifications.

5.8. Issuance of the Taking-Over Certificates

The issuance of the Taking-Over Certificates shall be performed by the ENE Engineer for every Service Section according conditions mentioned in the Works contract. The Taking-Over Certificates shall include:

a. The exact scope of Taking-Over Certificate and corresponding items in relevant Payment Plan. This shall include detailed quantities taken over, and corresponding list of assets;

b. The effective date and time of Taking-Over;

c. An explicit mention if Taking-Over Certificate is issued as per Works completed in accordance with the Contract (FIDIC 10.1 "Taking Over the Works and Sections") or per discretion of the Employer (FIDIC 10.2 "Taking Over Parts");

d. The detailed lists of all defects to be solved during Defect Notification Period, and schedule to remedy to every defect;

e. The necessity of Tests after Completion, if relevant;

f. The identification of application conditions, operational and technical restrictions derived from Contractor's reports, the summary of status of design and test documentation and the identification of open items;

g. The detailed list of As-built documentation and other documentation linked to the Taking-Over Certificates;

h. The maintenance conditions including list of relevant maintenance manuals and procedures,

i. Any other relevant conditions or elements.

5.9. Supervision of the Defect Notification Period

The tasks of the Consultant shall include (but not be limited to):

a. Identifying and assessing the status or every defect – whether they were included in the Defect list annexed to the Taking-Over Certificate, or whether they are notified to the Contractor during the DNP;

b. Establishing procedures for defect identification, registration and monitoring of remedied defects;

c. Submission of a notification on discovered defects to the Contractor for remedial actions;

d. Technical support in improvement of the ENE subsystem`s functionality issues;

e. Assessment of RAMS issues;

f. Monitoring of the ENE subsystem during operation and maintenance phase;

g. Quantity survey of additional works, if any;

h. Monitoring of the spare part stock;

i. Monthly site meetings with the Contractor at the sites of discovered defects and sites of remedied defects, preparing minutes of the meetings;

j. If deemed necessary, the ENE Engineer shall prepare a report to the Employer detailing the rationales to extend the DNP, and the proposed duration of such extension. DNP extension is a decision under the responsibility of the Employer.

k. Other tasks, necessary to ensure effective Defect Notification Period.

5.10. Issuance of Performance Certificates

5.10.4. The ENE Engineer shall issue the Performance Certificate for a Service Section when all required conditions are met. Unfullfilled obligations, if any, shall be mentioned on the Performance Certificate.

5.10.5. As per the split of the Works in Service Sections, only the latest Performance Certificate shall constitute acceptance of the Works.

5.11. Measures needed until Works contract closure

5.11.4. Following issuance of the the latest Performance Certificate, the ENE Engineer shall notify the Contractor regarding his remaining liabilities (unfulfilled obligations, clearance of work site, warranties, liabilities part of the Design Supervision…) and the expiry dates of these liabilities.

5.11.5. The ENE Engineer shall procees all necessary formalities and actions in order the Works Contract closure to be effective as earlier as possible.

5.12. Works implementation phase is structured with the following Service Packages:

Table 10. Works implementation phase Service packages

Works implementation phase Service package[17]	Milestones	Completion condition
Generic Design supervision	According to ENE Deployment Management Plan	Approved Generic Design documents
Design supervision for Service section 2.1. – 2.11	According to ENE Deployment Management Plan	Approved Service section Detailed Technical Design documents
Manufacturing, equipment deliveries, construction and installation works supervision for Service section 2.1. – 2.11	According to ENE Deployment Management Plan	Approved Tests on Completion & Approved As-Built Detailed Technical Design documents & Taking-Over Certificate issued for Service section
Defect Notification Period supervision for Service section 2.1. – 2.11	According to ENE Deployment Management Plan	Performance Certificate issued

[17] Minimum mobilization requirements on Works implementation phase services set out in Annex No 4 to the Invitation.

6. EXPERTS

6.1.1 Required Lead-Experts for provision of Services are stated in Table 11.

6.1.2 Required additional Experts for provision of Services are stated in Table 12.

6.1.3 The ENE Engineer shall be responsible for ensuring, that all proposed Lead-Experts and additional Experts have necessary certificates or/and other legal recognition documents in accordance to the European Union law and have at least B1 (B2 recommended) English language skill[18].

6.1.4 Lead-Expert and additional expert roles cannot be combined, i.e., for each expert's role must be designated separate person, except only Project manager and Contract manager (FIDIC Engineer representative) could be combined.

6.1.5 The ENE Engineer and all involved Lead-Experts and additional Experts shall not have any relation or connection to the designated Contractor(s) for the respective design sections Rail Baltica Global project. A performer (Expert) of Services shall certify in the opinion of the expert-examination that personal or material interests of neither expert, nor his or her relatives or transaction partners will affect the opinion of the expert-examination.

6.1.6 Lead-Experts and additional Experts stated in Tables 11 and 12 could be replaced only in justified cases. The ENE Engineer has no right to change the Lead-Experts or additional Experts stated without the Employers approval. To get the Employers approval, the ENE Engineer shall submit a formal written request which shall include all documents necessary for the Employer to make sure that the proposed Lead-Expert or additional Expert complies with the qualification requirements (if applicable) included in the procurement regulations and Lead-Expert gets at least the same points according to evaluation criteria included in the procurement regulations.

6.2.6 ENE Engineer shall upon Employer's request provide to the Employer certified copies of such certificates or/and other legal recognition documents and other evidence as required by the Employer verifying that such documents exist.

6.1.7 The Employer reserves the right to request the ENE Engineer to replace any Lead-Expert or additional Expert in case of any of the following reasons:

a. Non-timely performance of duties;

b. Repeated careless performance of duties;

c. Incompetence or negligence;

d. Occurance of conflict of interest;

e. Non-fulfilment of obligations or duties stipulated in the Contract;

f. Poor knowledge of English language or Local language if it is required;

g. Termination of employment relations with the ENE Engineer.

6.1.8 The Employer shall approve or reject the replacement of a Lead-Expert or additional Expert as soon as possible, but not later than after 10 (ten) days after receipt of all information and documents mentioned in chapter 6. The Employer is responsible for provision of clear justifications in each case of rejection.

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[18] Language skill level is based on Common European Framework of Reference for Languages (see http://europass.cedefop.europa.eu/resources/european-language-levels-cefr)

6.1.9 The ENE Engineer shall identify Lead-Experts and all additional experts and their roles for each Service package.

6.1.10 Lead-Experts

Table 11. Lead-Experts roles, responsibilities and required experience

No	Experts Designation	Responsibilities	Required minimum experience
1	**Project manager**	a) Manage Project management office; b) Coordination with internal and external stakeholders to set up project in international environment; c) Application of quality management principles and processes; d) Development and maintaining an agreed project plan; e) Planning and managing resources to meet project milestones; f) Leading delivery and quality of Services.	**6.1.11.1. Project manager** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience as Project manager in at least 1 (one) reference projects, scope of the Project managers responsibilities in each reference project covered at least: a) Leading of Project management office; b) Coordination with internal and external stakeholders to set up project in international environment; c) Application of quality management principles and processes; d) Development and maintaining an agreed project plan; e) Planning and managing resources to meet project milestones; f) Leading delivery and quality of Services.
2	**Technical manager**	a) Coordinating and approving technical work of Technical Team; b) Technical coordination for all phases of the project, from design to construction, testing and commissioning; c) Technical interface management; d) Organisation of construction works: set-up, logistics, control, supervision; e) Supporting the Employer in meetings according to Scope of the services; f) Providing expert knowledge of ENE subsystem and legislation and processes, applicable	**6.1.11.2. Technical manager** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience[19] in at least 2 (two) reference projects and Technical managers responsibilities in each reference project covered at least: a) Leading electrical simulation[20] of object which afterwards has been constructed; b) Leading development of a functional and technical specification of ENE subsystem for design and construction

[19] Required experience will be recognized as compliant in case if performance of the requested design phase responsibilities in the reference project has been finished, but construction and/or testing phase responsibilities can be ongoing.

[20] Hereinafter as simulation shall be understood as a combined mathematical modelling at detailed technical level by a single dedicated software tool of the railway infrastructure elements, including ENE subsystems, railway alignment, rolling stock and train operation parameters. The software shall consider all elements influencing electrical traction of train and use advanced electrical and physical modelling on time dynamic basis. Outputs of the simulation shall be optimisation of the ENE subsystem parameters, including TPS location and sizing, grid connection parameters, OCS technical features and compliance with RAMS requirements.

No	Experts Designation	Responsibilities	Required minimum experience
		international standards and a sound understanding of engineering management; g) Developing a functional and technical specification using a structured requirement management for a Works contract.	works by using requirement management[21]; c) Leading supervision[22] of railway energy subsystem detailed technical design[23], including design review and approval; d) Leading supervision of railway energy subsystem construction, including construction work acceptance **or** leading supervision of railway energy subsystem testing, including testing documentation review and approval.
3	**Contract manager (FIDIC Engineer representative)**	a) Ensure that organization of internal Works contract documents are accurate and well maintained; b) Provide advice and guidance related to Works contract management; c) Maintain the Employer expectations d) Create, prepare, review and edit Works contract; e) Accept Works invoices; f) Works contract claim management; g) Folow-up deadlines and Works contract requirements; h) Works contract variation management.	**6.1.11.3. Contract manager (FIDIC Engineer representative)** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has been Contract manager on Engineers side of at least 2 (two) railway project FIDIC yellow or FIDIC red book contracts and each project investment value of at least 50 000 000,00 EUR.
4	**Systems integration manager**	a) Technical interface between Systems engineering and integration, including interface management; b) Leading development of a functional and technical specification of ENE subsystem	**6.1.11.4. Systems integration manager** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience in at least 2 (two) reference projects, and Systems integration manager responsibilities in each reference project covered at least:

[21] Requirement management system is database for managing, capture, prioritisation, categorisation, and allocation of the Employer's Requirements in the design phases. The Requirements database is also to be used for compliance management, including product verification and system validation in the system integration phases of the project life cycle.

[22] Hereinafter as supervision shall be understood as a delegated responsibility to review and monitor all documents and actions during design, construction and testing phases, to give necessary instructions to relevant parties, and ultimately deliver acceptance of the completed object.

[23] Hereinafter as detail technical design shal be understood a final stage of the design process in accordance with Country's construction legislation and it gives right to start construction works. Furthermore, the Detailed Technical Design shall provide complete detailed technical solutions for future suppliers and construction companies/personnel to execute the work without further additional detalization, with all the constructive solutions and materials.

No	Experts Designation	Responsibilities	Required minimum experience
		for design and construction works.	a) Technical interface between Systems engineering and integration, including interface management; b) Development of functional and technical specification using a structured requirement management for ENE subsystem.
5	**Catenary system discipline manager**	a) System engineering work in all phases of the project; b) Development of technical specifications, Works supervision, requirements management, acceptance of Works, testing and commissioning; c) Supervise the manufacturing, factory tests, installation, testing and commissioning for catenary, masts and related equipment; d) Develop Concept Design; e) Develop technical specifications for the Works procurement; f) Supervise Catenary installation work organisation.	**6.1.11.5. Catenary system discipline manager** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience[24] in at least 1 (one) reference project, and Catenary system discipline manager responsibilities in each reference project covered at least: a) Development of functional and technical specification for an Overhead contact system (OCS)[25]; b) Leading supervision of OCS detailed technical design, including design review and approval; c) Leading supervision of OCS construction, including construction work acceptance **or** leading supervision of OCS testing, including testing documentation review and approval.
6	**Catenary system designer**	a) Develop Overhead contact system Concept Design; b) Supervise Overhead contact system Design; c) Supervise Overhead contact system Construction; d) Supervise Overhead contact system Commissioning and testing.	**6.1.11.6. Catenary system designer** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience in at least 2 (two) reference projects, and Catenary system designer responsibilities in each reference project covered at least: a) Complete design of detailed technical design of Overhead contact system (OCS) of project which where afterwards constructed.
7	**Power supply discipline manager**	a) Develop system architecture, functional and technical specifications for Works procurement for power supply systems;	**6.1.11.7. Power supply discipline manager** within the previous 15 (fifteen) years (until the date of submission of the Proposal) has gained experience[26] in at least 1 (one) reference projects and Power supply

[24] Required experience will be recognized as compliant in case if performance of the requested design phase responsibilities in the reference project has been finished, but construction and/or testing phase responsibilities can be ongoing.

[25] Hereinafter as overhead contact system (OCS) shall be considered a system that distributes the electrical energy to the trains running on the route and transmits it to the trains by means of current collectors (as COMMISSION REGULATION (EU) No 1301/2014 ENE TSI 2.1 (d) definition).

[26] Required experience will be recognized as compliant in case if performance of the requested design phase responsibilities in the reference project has been finished, but construction and/or testing phase responsibilities can be ongoing.

No	Experts Designation	Responsibilities	Required minimum experience
		b) Develop high voltage, middle voltage, low voltage system requirements; c) Leading simulation of power supply system for the line; d) Supervision of all general contractor works (design, construction, testing & commissioning).	discipline manager responsibilities in each project covered at least: a) Development of ENE subsystem architecture, functional and technical specification for Traction power; b) Leading supervision of Traction power Detailed Technical Design, including design review and approval; c) Leading supervision of Traction power construction, including construction work acceptance **or** leading supervision of Traction power construction testing, including testing documentation review and approval.
8	**Traction power simulation expert**	a) Develop system architecture and electrical stimulation of networks from the high-voltage power intake to the OCS; b) Handling ekectrical simulation of power supply system for the line; c) Supervision of all general contractor works (design, construction, testing & commissioning).	**6.1.11.8. Traction power simulation expert** within the previous 15 (fifteen) years (until the date of submission of the Proposal) in each of at least 2 (two) reference projects has gained: a) Traction power simulation experience with Traction power simulation tool which Tenderer has indicated in its application of 1st stage of the Competition; b) Electrical simulation experience of object which afterwards has been constructed.
9	**Earthing and bonding EMC expert**	a) Ensure that the system conforms to the relevant safety standards; b) Managing Interference between OCS, High voltage, middle voltage electrical lines and grounding systems; c) Electrical simulation to ensure that accessible and touch voltages in excess of acceptable values do not occur.	**6.1.11.9. Earthing and bonding EMC expert** within the previous 15 (fifteen) years (until the date of submission of the Proposal) in each of at least 2 (two) reference projects has gained: ~~a) EMC simulation experience with tool which Tenderer has indicated in its application of 1st stage of the Competition;~~ ~~b)~~ a) EMC simulation experience of object which afterwards has been constructed.

As a reference project (mentioned in Table 11) shall be considered a project where specific services have been provided and the service scope included at least the following TSI[27] compliant[28] railway infrastructure:

a) 80 km of double track line 1435 mm gauge with design speed at least 200 km/h
b) 160 km of OCS
c) AC Electrification system 25kV 50Hz/60Hz or 15kV 16.66 Hz

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[27] The Technical Specifications for Interoperability (TSIs) define the technical and operational standards which must be met by each subsystem or part of subsystem in order to meet the essential requirements and ensure the interoperability of the railway system of the European Union.

[28] TSI certification is not mandatory.

d) 1 traction power substation[29]
e) 1 railway bridge at least 200 meters long.

6.1.11 Aditional experts

Table 12. Aditional experts' roles and responsibilities

No	Experts Designation	Expert's responsibilities
1	Documentation manager	a) Record keeping for all contract-related (both Works conract and the ENE Engineer) documentation and correspondence in the Employers CDE; b) Monitoring contract execution; c) Managing communication, documentation and contract-related information distribution to all stakeholders; d) Following and updating respective information in requirements management; e) Reporting process management (including timesheet preparation, alignment process).
2	Stakeholders and communication managers (at least 1 (one) per each country)	a) Coordination with internal and external stakeholders to set up project in international environment; b) Stakeholder (included in Table No 2 of this Technical specification) management; c) Communication with stakeholders in Country's local language.
3	Construction supervisor in Latvia	a) Supervision of construction works according to legislation of Republic of Latvia; b) Expertise and knowledge of construction related legislation of Republic of Latvia; c) Communication with stakeholders in Latvian language.
4	Construction supervisor in Lithuania	a) Supervision of construction works according to legislation of Republic of Lithuania; b) Expertise and knowledge of construction related legislation of Republic of Lithuania; c) Communication with stakeholders in Lithuanian language.
5	Construction supervisor in Estonia	a) Supervision of construction works according to legislation of Republic of Estonia; b) Expertise and knowledge of construction related legislation of Republic of Estonia; c) Communication with stakeholders in Estonian language.
6	Catenary system expert	a) Supervision of the catenary design; b) Supervision of the catenary installation works; c) Supervision of testing and commissioning of catenary equipment; d) Development of the catenary maintenance programme.

[29] As substation shall be considered a substation connected on the primary side to the high-voltage grid, with transformation of the high-voltage to a voltage and/or conversion to a power supply system suitable for the trains, where on the secondary side, substations are connected to the railway contact line system (as COMMISSION REGULATION (EU) No 1301/2014 ENE TSI 2.1 (a) definition).

No	Experts Designation	Expert's responsibilities
7	Power supply senior expert	a) Expertise and knowledge in high voltage, middle voltage and low voltage networks; b) Development of high voltage, middle voltage, low voltage system requirements; c) Supervise high voltage, middle voltage, low voltage system implementation.
8	Power supply remote control/ signalling/ telecom discipline manager	a) Expertise of the control systems, interface specifications, systems integration, etc.; b) Development of functional and technical requirements for Works contract; c) Monitoring and controling systems, Operating Control Centre requirements, interface management, requirement management, scheduling management.
9	Signalling system expert	a) Control and monitor systems, ergonomics requirements, man-machine interface, hardware architecture, system performance requirements; b) Requirement management.
10	Communication systems expert	a) Manage communication system interface; b) Expertise and knowledge in communication systems.
11	RAMS manager	a) Review existing RBR RAMS baseline documentation; b) Propose adaptation to RBR RAMS documentation baseline; c) Review existing PHA and perform additional analysis; d) Establish RAMS requirements for ENE system; e) Review RAMS deliveries from Contractor(s); f) Liaise with assessment bodies.
12	Risk manager	a) Risk management: - Identify risks - Analyse risks - Evaluate risks - Mitigate risks - Monitor risks
13	Planning manager	a) Cooperate with the Employer planning engineers, provide information and input data; b) Regularly update time schedules (Detailed Technical Design Project Schedule) and development of non-standard time schedules based on specific information needs; c) Development and continuous update of the time schedules, collection of ETC (Estimate To Complete) data for progress report and updating the financial system. Graphic layout design for documentation of actual spent man hours/cost and expenses.
14	Economy expert	a) Cost estimates for ENE deployment; b) Life Cycle Cost analysis; c) Environmental impact analysis; d) Multi Criteria Analysis.

7. ANNEXES

Annex No. 1	Design guidelines [1]
Annex No. 2	Rail Baltica ENE Master programme
Annex No. 3	ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy) [5]
Annex No. 4	Operational Plan study [2][30]
Annex No. 5	Updated Rail Baltica Track Layout
Annex No. 6	BIM use cases for construction and handover stage
Annex No. 7	Technical study for the impact of high voltage line parallel to Rail Baltica line [9]
Annex No. 8	Rail Baltica EMC study [10]

It is hereby certified that Appendix 1 Technical specification with all annexes indicated above are stored in a digital form and will be accessible for both Parties in the RB Rail AS ProjectWise storage cloud service under the link below:

https://[redacted]

No.	*Title of document*	*Availability / Web link*	*Date of creation*
1	Design Guidelines	Provided in ProjectWise	***2021-03-19***
2	Rail Baltica ENE Master programme	Provided in ProjectWise	***2020-09-08***
3	ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy)	Provided in ProjectWise	***2021-03-19***
4	Operational Plan	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/	***2020-09-08***
5	Updated Rail Baltica Track Layout	Provided in ProjectWise	***2021-03-19***
6	BIM use cases for construction and handover stage	Provided in ProjectWise	***2020-09-08***
7	Technical study for the impact of high voltage line parallel to Rail Baltica line	Provided in ProjectWise	***2020-09-08***
8	Rail Baltica EMC study	Provided in ProjectWise	***2020-09-08***

Documents indicated above are a part of the Procurement documents which were submitted to the Consultant with the Procurement excercise and the Consultant confirms that these documents were already downloaded by the Consultant during the Procurement phase, and thus they were shared with the Consultant in a correct and convenient order.

[30] https://www.railbaltica.org/wp-content/uploads/2019/05/RB_Operational_Plan_Final_Study_Report_final.pdf