

Document Title	Document Number
TFS SPECIFICATION	AEOS-FEET-EZK-RE-0001 Rev B



Ministry of Economic Affairs and  
Climate Policy of the Netherlands

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# TECHNICAL FEASIBILITY STUDY

## SCOPE OF WORK & DELIVERABLES

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## 1. Preamble

The Dutch government launched the development of a Nuclear New-Build Project composed of 2 Nuclear units on the same location. As of today, the main characteristics are as follows:

- Commercial Operation Target Date: 2035 (1<sup>st</sup> unit),
- Technology: PWR state of the art Gen3+,
- Net Power: 1000MWe to 1650 MWe (or above) per unit,
- Location: Borssele municipality (exact plot to be determined as part of this study)
- Client: the current client EZK (ministry of Economics and Climate affairs) is creating a Special Purpose Company (SPC) which will take over the project development from 2024 on (hereafter also referred to as “the Owner”),
- The Scope of Work is expected to be on an EPC turnkey basis.

The Dutch government pre-qualified 3 reputable Vendors and designated Borssele as preferred location (over Maasvlakte I and Eemshaven).

The ministry of economic and climate affairs (EZK) is inviting each Vendors to participate in a (paid) Technical Feasibility Study (TFS).

## 2. Purpose of the Technical Feasibility Study

The purpose of the Technical Feasibility Study (TFS) is to provide the following:

- Confirmation of Vendors ability to supply a new NPP in compliance with all applicable rules and regulations and identify, if any, all deviations to those rules and regulations,
- Confirmation of Vendors ability to install a new NPP at the Borssele site in compliance with all geotechnical, licensing, environmental and stakeholders constraints provided by the Owner,
- Framing of the overnight costs and duration of the construction of the plant respecting the above constraints,
- Inputs for EZK to prepare a BIS enabling each Vendor to participate with minimized deviations and exclusions,
- Support to permitting, licensing and stakeholder management,
- Inputs for EZK to obtain from parliament a mandate to proceed with the Nuclear New-Build Project.

The expected benefits of this TFS for EZK are the following:

- Acceleration of the tendering process (rather parallel than sequential),
- Reduction of uncertainties and risks (early change detection),
- Improvement of competition through non-exclusionary specifications,
- Enabling political decision-making and stakeholder engagement.

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For the sake of clarity, the TFS is not designed to preselect or eliminate Vendors.

### 3. Terms & Definitions

TERM	DEFINITION
AIL	Abnormal and Indivisible Loads
ANVS	Dutch Authority for Nuclear Safety and Radiation Protection
ASY	Assystem Company or any representative of Assystem
BAT	Best Available Technology
BIS	Bid Invitation Specification
BOP	Balance Of Plant
CAPEX	CApital Expenditure
CI	Conventional Island
CIW	Commission for Integral Water Management (Belgium)
COL	Commissioning and Operation License
Deltares	Dutch Research Institute specialized in geo- and hydrology
DBE	Design Basis Earthquake
DBEH	Design Basis External Hazard
DGCE	Directorate General Climate & Energy
DNE	Directorate of Nuclear Energy (The Hague)
EIA	Environmental Impact Assessment
EZK	Ministerie van Economische Zaken en Klimaat (“the Owner”)
EPC	Engineering Procurement Construction (Contact)
EPZ	Operator of existing Borssele NPP
FC	First Concrete
FEED	Front End Engineering & Design
FFS	Full Scope Simulator
FID	Final Investment Decision
GIS	Geographical Information System
HAT	Highest Astronomical Tide
HSE	Health Safety & Environmental
IAEA	International Atomic Energy Agency
IID	Intermediate Investment Decision
KNMI	Royal Netherlands Meteorological Institute
LAT	Lowest Astronomical Tide
MER	Milieu Effect Rapportage / Environmental Impact Assessment
MHWN	Mean High Water Neap
MHWS	Mean High Water Spring
MLWN	Mean Low Water Neap
MLWS	Mean Low Water Spring
MSL	Mean Sea Level
NCEA	Dutch Commission for Environmental Assessment
NDA	Non Disclosure Agreement
NI	Nuclear Island
NNB	Nuclear New Build
NPA	Nature Protection Act
NPP	Nuclear Power Plant
NSPA	North Sea Port Authority
OPEX	Operational Expenditure
PGA	Peak Ground Acceleration
Project	EZK NNB Project

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PSAR	Preliminary Safety Analysis Report
RFG	Requirements For Generators
RFI	Request For Information
RSEH	Rare and Severe External Hazard
RWS	Ministry of Infrastructure and Water Management
SEA	Strategic Environmental Assessment
SITO	Subsidy regulation for applied research
Site	Site designated for NNB (Borssele)
SSC	Structures, Systems and Components
SSE	Safe Shutdown Earthquake
TenneT	TSO for Netherlands
TFS	Technical Feasibility Study
TSO	Transmission System Operator
Technology Vendor	Technology Vendor means EPC contractor
WENRA	Western European Nuclear Regulators' Association

## 4. Scope of the Technical Feasibility Study

The scope of the TFS is to cover the topics required for the intended purpose exposed in 2§.

It shall address main technical, environmental, licensing and economical aspect of the future EPC contract to confirm Vendor's ability to adapt its Reference Plant on the Borssele location, enable EZK to write a BIS compatible with the Vendors specifics, and provide cost and schedule certainty which is critical for political decision making.

It is divided in 3 main workstreams detailed in dedicated appendixes:

- 1) Technology and Licensing
- 2) Site specifics
- 3) Delivery Model and Economics

The TFS will cover the Scope of Supply as defined in Appendix 3 "Battery Limits & Scope of Supply".

## 5. Proposed and Reference Plant definitions

### Reference Plant

It is the licensed plant designated by the Vendor as a benchmark for all implementation issues (CAPEX, OPEX, duration, licensing...).

### Proposed Plant

It is the plant proposed for the TFS study and for the future tender. The Proposed Plant design may be subject to updates between the start of the TFS and the Final Investment Decision, such as:

- Potential modifications and design changes that may be required by the Dutch Nuclear Regulator;
- Changes induced by International Organizations (WENRA, IAEA, etc.);

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- Changes that are considered applicable to the Netherlands (Grid Impact, i.e. 50 Hz frequency, etc.);
- Changes to adapt to the site conditions;
- Lessons learned from on-going construction projects and/or existing operating NPPs.

#### Reference Design (if applicable)

Subject to specific definition by the Vendor, it designates the Vendors state of the art design. It is based on the Reference Plant and incorporates all lessons learned and known improvements. It is the basis of the Proposed Plant for the TFS.

The Vendor shall identify the main changes and innovations between the Proposed Plant and its Reference Design (or Reference Plant, whatever is more convenient to Vendor). For each those deviations, the Vendor shall assess:

- The risk to the Owner (“unproven deviation”, partial First of a Kind, additional licensing, unknown costs, no available feedback...).
- The benefit to the Owner (return of experience, improvement of the state of the art, compliance to new safety regulations...).

Based on the risk/benefit comparison, the Owner might reject “unproven deviations” during the TFS, without prejudice of the Regulators decision at the issuance of the PSAR nor the future BIS.

As far as practical, the impacts (time, cost) of the changes to the Reference Design (or Reference Plant, whatever is more convenient) identified in the workstream 1 and 2 (Technology & Licensing, Site Specifics) shall be reported in the costing in workstream 3 (Delivery Model).

## 6. Methodology and acceptance criteria

### Methodology:

During the TFS, the Vendor shall optimize time and resources to meet the expected level of quality and accuracy.

- For Technology & Licensing and Delivery Model, the Vendor is expected to rely on his Reference Plant and recent execution experience, and recourse as much as practical to analogical reasoning.
- For Site Specifics, the Vendor is expected to understand the site specific data by taking into account the Site Information Package data provided by the Owner for the TFS and recourse as much as practical to analytical reasoning.

### Acceptation criteria:

The acceptance criteria for each deliverable are, unless otherwise specified, to be “fit for purpose” in accordance with paragraph §2 “Purpose of the TFS”. The deliverables should be self-explanatory for easy usage and understanding by all stakeholders. The deliverables shall enable EZK to proceed to the next project step.

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## 7. TFS execution plan

The Vendor shall issue a TFS execution plan for review to EZK within 3 weeks of starting the study. It shall contain the elements of a Project Execution Plan, as per good engineering practice (Prince2, PMP or IPMA). It shall complete and detail the following topics:

### Key Performance indicators

The performance of the project is based on respecting the schedule, the manhour budget and the level of quality. The parties shall endeavor to limit reworks, non-quality and reach a “first time right”.

The Vendor shall implement the following KPI's for monthly reporting: timely submittal of deliverables, on-time response to queries, manhour consumption per work package, first time right/ rate of reworks, rate of personnel turnover.

### Key success factors

The success of the study is based on factors within the control of each party as well as the quality of the collaboration. This includes, but is not limited to:

From EZK:

- Timely issuance of additional data, if any.
- Timely treatment of clarification requests.

From Vendor:

- Mobilize the right level of experienced resources.
- Rise at soonest any concerns or inconsistencies.

### Communication

The Vendor and EZK shall each nominate a Representative, acting as single point of contact during the study.

The Vendor and EZK can designate experts or technical leads entitled to communicate directly with their counterparts on their field of expertise, under the delegation of the Representative.

The EZK Representative ensures the mobilization of a subject matter expert if and when required for the progress of the Study by the Vendor.

The Vendors shall not communicate directly with local authorities without prior approval of EZK. Any communication requirement with local authorities shall primarily be addressed by the Vendor to EZK.

Vendor response time to Owner queries: 2 weeks.

Owners response time to Vendors clarification request: 2 weeks

### Progress reporting

The Vendor shall issue a monthly progress report comprising at least the following documents:

- Document List  
The Vendor shall keep to date and issue monthly to the Owner the Vendors Document

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List. It shall describe all documents issued by the Vendor to the Owner, with their revision number, their status and issuance date.

- Cost control  
The Vendor shall report the hours spent per work package on a monthly basis as well as the estimated “hours to complete” Any risk of exceeding the original hour budget shall be highlighted as soon as apparent to the Vendor.
- Schedule and mobilisation control  
The Vendor shall indicate any risk of exceeding the latest agreed delivery date to the Owner. The Vendor shall update his mobilisation plan on a monthly basis and indicate if a specific expertise will be required on the Owner side.
- KPI  
The Vendor shall report the KPI’s defined above.
- Clarification and instruction log  
The Vendor shall maintain a log per workstream of all clarifications and instructions received from the Owner. This log will indicate when and how the clarification and instruction was transmitted (meeting, correspondence...).  
To ensure level playing field, the Owner might share a clarification or answer to a request to all other Vendors after mutual agreement.
- Risk management  
The Vendor shall report any risk affecting the TFS project (quality, cost, duration).

#### Design review / collaboration protocol

A comprehensive kick-off meeting with site walkdown will be held within a month after start of the TFS.

Design reviews will be held on regular basis (monthly by default, subject to mutual agreement between the Parties). By default, the design reviews are held by videoconference. However, subject to further agreement, in-person meetings can be scheduled every 2 months.

For deliverables requiring involvement on many stakeholders and experts (such as determining the future exact location of the NPP), EZK will ensure inputs for competent experts. EZK might appoint expert consultants for each topic to assist the Vendor during the TFS in compliance with all confidentiality undertakings between Owner and Vendor.

For each deliverable received from Vendor, the Owner shall maintain and update a Comment Sheet summarizing all observations, comments, questions raised by its experts to the attention of the Vendor.

By default, and without prejudice of later mutual agreement, proposed exchanges are as per attached questionnaire / list of deliverables:

Lay out: review after 2 weeks, then every month

Constructability: review every month

Cooling system: review after 2 weeks, then every month.

A collaborative engineering protocol shall be developed.

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### Document management

Work Packages are subject to following issues:

- 1<sup>st</sup> issue “for comment”

This issue is based on all SIP and regulatory information (and subsequent clarification). As a 1<sup>st</sup> issue, the Vendor is not expected to resolve all interfacing issues between deliverables.

- 2<sup>nd</sup> issue “for provisional acceptance”

This issue incorporates the comments from EZK (and its affiliates), the results of design reviews and interfacing between Work Packages.

- 3<sup>rd</sup> issue “for final acceptance”

This issue incorporates the answers to the questions arising from the 3d Party Review, if any.

Documents will be subject to incremental revision numbering following comment, additions and progress.

The acceptance criteria for all phases are validated through the Comment Sheet (absence of blocking points). Provisional acceptance is granted when documents have reached a “fit for purpose” maturity (see TFS spec).

For the sake of clarity, the provisional acceptance shall be reached with the TFS implementation period (6 months) and the final acceptance shall be reached during the 3d Party Review (additional 3months).

### Final Acceptance of the TFS

Once final acceptance status has been reached on all Work Packages, the Vendor shall update the Document List accordingly, issue it to the Owner to request Final Acceptance of the TFS.

### Data room management

The following issues shall be clarified between the Parties within one month after TFS contract signature:

- IT systems
- Storage and recording
- Access control
- Filing structure

### Management of options (“design freeze”)

The Vendor shall propose a lay-out taking in account the current plot plans. The Vendor shall highlight any necessary rerouting or alteration to existing infrastructure (dikes, roads, pipelines...), as well as additional land requirements.

EZK will evaluate the possible cost and time impact of such requirements (dike works, land acquisition...). Such impacts will be integrated in the final economic and schedule valuation (see Appendix 3).

In case of different technical options in the Vendors scope, the Vendor shall assess the

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technical and commercial optimum.

## 8. List of Deliverables

### LIST OF WORK PACKAGES

				methodology
Workstream 1		WP 01	Conceptual Safety Document (as per ANVS) Changes to the reference plant (compliant and non-compliant)	
	Technology	WP 02	NPP Technology and design specs	ref doc
			Performance: Output, efficiency, availability, load following compliance to Dutch grid code	ref doc
Workstream 2		WP 01	Site Information Package Due Diligence and Gap Analysis	
	Site specifics	WP 02	NPP Preliminary Layout	
		WP 03	Platform Level	
		WP 04	Deep Excavations & Constructability Study	
		WP 05	Site Infrastructure Interfaces & Logistics	
		WP 06	Integrated schedule from Early Works till First Concrete	
		WP 07	Cooling system Preliminary Design	
		WP 08	Changes in Design due to Site and Dutch specifics	
		WP 09	Construction Permits Data	
		WP 10	Mobilisation Plan (Project Management, Engineering, Construction and Commissioning)	
Workstream 3	NPP delivery	WP 01	Project Execution Strategy	
		WP 02	Capex	
		WP 03	Opex (fuel, operations, maintenance)	
		WP 04	Level 1 milestone schedule	
		WP 05	Qualitative risk register /contingencies	
		WP 06	Lessons learned /continuous improvement / value engineering	
		WP 07	Potential subcontractors & local content	

### 8.1 Technology and Licensing

As further detailed in relevant Appendix 1 “Technology & Licensing”, the Vendor is requested to:

- Prepare the Conceptual Safety Document requested by ANVS, to assess how the Proposed Plant can obtain a construction license and be built,

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- Present its technology, the extend and the costs of changes to the reference design, provide design and operation data relevant for economical modelling under Appendix 3 “NPP delivery model economics”.

## 8.2 Site Specifics

As further detailed in the relevant Appendix 2 “Site Specifics Deliverables”, the objective of this workstream is to:

- Propose a lay-out compatible with all the site constraints (geotechnical, environmental, industrial, human induced events...),
- Issue a constructability plan,
- Propose a cooling system (avoiding the usage of a cooling tower)
- Provide design and operation data relevant for economical modelling under Appendix 3 “NPP delivery model economics”.

## 8.3 NPP Delivery model and economics

As further detailed in the relevant Appendix 3 “NPP delivery model economics”, the objective of this workstream is to establish the preliminary economical case of the project.

## 9. List of Appendixes

- Workstream 1 - Technology & Licensing
- Workstream 2 - Site Specifics, Site Information Package
- Workstream 2 - Site Specifics, deliverables
- Workstream 3 - NPP delivery model, Battery limits & Scope of Work
- Workstream 3 - NPP delivery model, Economics