外部委託業者の募集

References: IO/MS/24/HCR/JLE

"ITER Hot Cell Facility Market Survey"

（ITER ホットセル施設の市場調査）

IO 締め切り 2024 年 9月 15日(日)

〇エギュゼクティブサマリー

この市場調査は、ITER 機構と ITER のヨーロッパ国内代理店（Fusion For Energy - F4E）によって共同で開始されました。調査は、F4E 産業ポータルと IO ウェブサイトの両方に公開されており、企業は以下のハイパーリンクを通じて調査に回答することができます：

https://ec.europa.eu/eusurvey/runner/HCF_V2

この市場調査は、ITER のいずれかの加盟国の地域内に設立された企業や組織を対象としています。今後の ITER ホットセル施設（HCF 建設）の設計および建設に向けた入札呼び出しの調達戦略を策定するための情報収集を目的としています。

この調査の目標は以下の 4 つです：

目標 1 : HCF 建設の契約に関する 2 つの可能なシナリオについて業界からフィードバックを求めること。シナリオ 1 は HCF 全体のスコープに対する単一契約、シナリオ 2 は 2 つの契約（セクション 3 を参照）です。

目標 2 : 競争的対話の原則に従う次の競争段階について業界に通知すること。これは、概念設計段階（早期設計段階）で行われ、HCF 建設プロジェクトの主契約者を選定するための競争を支援します（セクション 3 に記載）。

目標 3 : ITER プロジェクトが公に伝えている過去のシナリオに比べての主な進展について業界に通知すること。以下は現在の計画の主な指標です：

1)複数の契約ではなく、契約構造を 1 つまたは 2 つに限定します。

2)設計と建設の目標費用を定義する。コンペティション中に明確なコストとスケジュール目標が定義されます。

3)HCF 全体のスコープに対する 1 つのクライアントのみ。

4)契約者に対するより大きな自律性と責任：

- 契約者が核安全に対して主要な役割を果たす：安全デモンストレーションの正当性を積極的に提供します。
- 要件に準拠して施設の一般配置、設計原則、ステージングを定義するための契約者への大きな柔軟性が許可されます。

5)作業の仮定：

- 施設に適用される機能要件、放射性物質インベントリ、高レベルの安全要件が確定していま

す。

○ 外部インターフェースが明確に定義され、限定されています。

<u>目標 4：</u>このコンテクストを考慮した HCF 建設プロジェクトへの業界の関心と能力を確認すること。

〇調達対象の範囲

Fusion For Energy（F4E）とITER機構（IO）は、ホットセル施設（HCF）に関連する入札呼び出しの準備のために市場調査を共同で開始しています。

HCFは、ITERプロジェクトにおける核維持管理および放射性廃棄物管理の能力を提供する施設です。この施設には、建屋（土木工事）、それに伴う建屋およびプロセスサービス、内部に収容されるプロセスシステムが含まれます。

HCFの運用開始は2030年代後半を予定しています。

現在の文書は、業界の回答を促進するための背景情報を提供します。このため、HCFの範囲はここで簡略化され、以下の4つの主要な分野に分けられます：

(1) プロセス（リモートハンドリングおよび放射性廃棄物処理 - 固体および液体）

(2) 建屋の土木工事

(3) 機械システム（ライナー、扉、ハンドリング機器、クレーンなど）

(4) 建屋のサービス（電気配布、核ヒーティング・換気・空調など）

本文書は、HCFプロジェクトを紹介し、以下を説明しています：

- 調達段階で契約者に提供される文脈と入力データ：
  - 厳格な要件
  - 事前概念解決策
- 予定されている詳細な範囲は以下の通りに要約されます：

作業

- 概念設計から製造設計、建設設計、実行設計までの設計活動
- 統合活動
- 供給品の製造
- 供給品の取り付け
- 建設
- システムの試運転
- 原子力オペレーターとの調整での統合試運転

- 構成

- ホットセル施設はデュテリウム・トリチウム初期段階に対応し、建屋およびそれに収容されるサービスおよびシステムを提供します。

- プラントレイアウト統合

- **プロセス/システム**
  - ホットセルのリモートハンドリング
  - 放射性廃棄物の固体および液体処理
- **建屋**
  - 建屋の土木工事、建屋と高度にインターフェースする機械システム（ライナー、扉、クレーン、ドッキングステーション、トロリー用レール）、建屋のサービス（核換気および冷却のHVAC、空気除塵システムの配布、高圧および低圧の電力配布、液体およびガスの配布、排水、火災検知、火災鎮圧、冷却水、放射性および環境モニタリングシステム、すべてのサービスの計器および制御）。

- **ライセンスと原子力安全任務**
  - 入札者に提供される安全要件は、施設から期待される性能を明確にする独自で統合された安全要件の一覧形式で提供されます。これらの安全要件は、将来の契約者によって施設を構成するサブシステムに伝達されます。
  - 安全分析は契約者によって行われます。検証は原子力オペレーターによって保証されます。原子力オペレーターの役割は委任されません。
  - ライセンスプロセスを支援するための技術ファイルの構成。

【※　詳しくは添付の英語版技術仕様書「**ITER Hot Cell Facility Market Survey Technical note**」をご参照ください。】
ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overview からもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html
では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

To: Potential Candidates

Ref: IO/MS/24/HCR/JLE

Subject: Letter of Invitation for the Market Survey on "ITER Hot Cell Facility"

Dear Madam/Sir,

The ITER Organization (IO), together with the European Domestic Agency (Fusion for Energy-F4E), launches a Market Survey and requests information from companies having the interest, knowledge and capacity related to the **ITER Hot Cell Facility**.

The main purpose of this Market Survey is to evaluate the market situation and to identify candidate suppliers having the potential capabilities to respond to the IO solicitation.

china
eu
india
japan
korea
russia
usa

Please note that this is not a Call for Nomination.

You will find enclosed Technical Note for this Market Survey (Annex I), and it is published on both F4E Industry Portal and IO website and organizations can answer to the survey via the questionnaire in the following hyperlink:
https://ec.europa.eu/eusurvey/runner/HCF_V2

With this letter, we invite all potential companies, institutions or entities to participate to this Market Survey by answering the questionnaire mentioned above. We also kindly invite the Domestic Agencies to publish this Market Survey on their respective DA website or through other advertising methods, which will help to retrieve the requested information from a maximum of potential candidates.

This Market Survey will be closed at 24:00 CEST 31 August 2024.

Thanks in advance for your co-operation.

Sincerely,

Daphne Crowther
Section Leader, Engineering, Science, Operation
and Corporate Section, Procurement Division

Annex I - ITER Hot Cell Facility Market Survey Technical note_2RF2E3_v2.1

Contact: Jong-Eun Lee – Procurement Officer PRD/ESOC – Phone +33 4 42 17 62 81 email hcc@iter.org

ITER Hot Cell Facility

Market Survey Technical note

Table of contents

Disclaimer: For this market survey, sizing assumptions are indicative and described to set up a clear context to the feedback sought from the market. The information provided in this note is not binding and may change during the preparation of the competitive procurement procedure.

1. Executive summary

This market survey is initiated jointly by the ITER International Organization and the European Domestic Agency for ITER (Fusion For Energy - F4E). It is published on both F4E Industry Portal and IO website and organizations can answer to the survey via the following hyperlink: https://ec.europa.eu/eusurvey/runner/HCF_V2

This market survey is open to organizations established in the territory of one of the ITER Parties. It is published to collect information that will be used to develop the procurement strategy for future Calls for Tender for the design and construction of the ITER Hot Cell Facility (HCF construction).

The Survey targets 4 objectives:

Objective#1: request feedback from industry about two possible scenarios for contracting HCF construction; Scenario#1 with one single contract for the whole HCF scope, or scenario#2 with two contracts (see section 3).

Objective#2: Inform industry of the forthcoming competition phase following the principles of a competitive dialogue (described in section 3) planned to take place in early design phase, i.e. conceptual design. The competition will help select the main contractor(s) for the implementation of the HCF construction project.

Objective#3: Inform industry of the main evolutions compared to past scenarios that ITER project has communicated publicly. Here-after the main indicative elements of the present plan:

1) **Limit contracting architecture to 1 or 2 contracts only instead of multiple contracts**

2) **Define a Target cost for Design and Construction**. Clear cost and schedule objectives will be defined during the competition.

3) **One Client for the whole HCF scope, instead of two.**
4) **Greater autonomy and responsibilities to contractors**:
   - **Major rol**e of the contractors towards nuclear safety: the contractor will actively deliver the justification to the safety demonstration.
   - **Greater flexibility** allowed to the contractor to define the general arrangement, design principles and the staging of the facility in compliance with the requirements
5) **Working assumptions:**

- Functional Requirements + Radiological inventories + High Level Safety requirements[1]applicable to the facility are fixed.
- External Interfaces are clearly defined, limited and fixed.

Objective#4: Confirm industry' interest and capacity for the HCF construction project considering the context reminded here-in.

2. Scope to be procured.

Fusion For Energy (F4E) and ITER Organization (IO) are jointly launching a Market Survey in preparation of Call(s) for Tenders related to the Hot Cell Facility (HCF).

The HCF is a facility that will provide to the ITER project the capacity of Nuclear Maintenance & Radwaste management. The facility is including the buildings (civil works) with corresponding buildings and process services and process systems hosted inside.

The HCF is expected to be operational in the late 2030's.

The current document provides some background information to facilitate industry response.

To this extent, the scope of HCF is simplified here-in and broken down in 4 main disciplines:

(1) Processes including Remote Handling and Radwaste processing –*solid and liquid*,

(2) Buildings Civil Works,

(3) Mechanical Systems (liners, doors, handling equipment, cranes, ..) ,

(4) Buildings Services (Electrical distribution, Nuclear Heating Ventilation Air Conditioning, etc).

The current document introduces the HCF Project and describes:

- The context and the input data that will be provided to the contractors during the procurement phase:
  - firm requirements
  - a pre-conceptual solution[2]

The detailed scope foreseen to be assigned is summarized here-after:

- **Activities**

[1] *note: the safety requirements provided to the bidders at the start will be in the format of a unique, consolidated, and consistent list of safety requirements clarifying the quantified performances expected from the facility. These safety requirements will then be propagated by the future contractor(s) to the sub-systems constituting the facility.*

[22] This pre-conceptual solution is at very preliminary stage of maturity and is provided only for information, highlighting the required autonomy of the potential contractor(s) to develop a design solution for the HCF.

- Design activities from conceptual design to manufacturing design, construction design, execution design
- Integration activities
- Manufacturing of supplies
- Installation of supplies
- Construction
- Systems commissioning
- Integrated commissioning in coordination with the nuclear operator

-
- **Configuration**
  - Hot Cell Facility serving Deuterium-Tritium first phases, i.e. The building with corresponding services and systems hosted inside.
  - Plant Layout Integration
- **Processes/Systems**
  - Hot Cell remote handling
  - Radwaste solid and liquid process
- **Buildings**
  - **Building Civil Works, Mechanical Systems highly interfacing with the buildings** (Liner, Doors, Cranes, docking stations, rails for trolleys, lifts), Buildings Services (HVAC i.e. nuclear ventilation and cooling, Air Detritiation system distribution, Electrical Power distribution i.e. high voltage and low voltage, Liquid & Gas distribution including drainage, Fire detection, Fire suppression, Chilled Water, Radiological and Environmental Monitoring System, Instrumentation and Control of all services).
- **Licensing and nuclear safety duties**[3]
  - The safety requirements provided to the bidders at the start will be in the format of a unique, consolidated and consistent list of safety requirements clarifying the quantified performances expected from the facility. These safety requirements will then be propagated by the future contractor(s) to the sub-systems constituting the facility.
  - The safety analysis are performed by contractor. Validation is ensured by the nuclear operator. The nuclear operator role is not delegated.
  - The constitution of technical files for supporting the licensing process.

3. Envisaged contractual schemes.

Competitive dialogue is planned with industry, aiming at selecting the best conceptual design compliant with the objective to design and build towards a target cost, as per section 4. During this tendering phase, tenders will be asked to provide / develop a simplified conceptual design.

Two scenarios of contractual scheme that F4E and IO wish to submit to the assessment of the industry:

[3] Although the Contractor may have a significant role regarding Nuclear Safety demonstration duties, a close collaboration with the Nuclear Operator will be required.

- **Scenario#1**: 1 contract for the whole scope described in section 2. The contractor is committed to deliver a complete Engineering Procurement and Construction (EPC) of HCF ready to start operations, in compliance with the target cost and by a fixed date. The single contractor or consortium will perform design and integration of all trades, supply and construction of the facility.

Through this market survey, IO and F4E are aiming to understand if the market can offer to deliver the scenario#1, assuming the relative risks in a proportionate way.

In case of agreement on Scenario #1, can this be assumed by a single contractor (single company or join venture) or if this is perceived as being only achievable by a consortium[4] of companies.

- **Scenario#2:** 2 contracts
  - Contract A to deliver:
    - Most of the design and integration of all trades included in the HCF, i.e. Design and integration of the 4 main disciplines: Processes, Buildings Civil Works, Mechanical Systems, and Buildings services.
    - From manufacturing, supply and installation perspective, the scope is limited to the Processes only, i.e. Remote Handling and Radwaste processing.
    - Works coordination and supervision of all trades, included the scope of Contract B.
  - Contract B to deliver:
    - Most of supply and construction for Buildings Civil Works, Mechanical systems and Buildings services.
    - The manufacturing design of the buildings services, due to the intricate link between design of buildings services and supply.

  Contract A and Contract B are contractually linked and compelled to collaborate thanks to a tripartite agreement with the Client.

  Contract A and contract B are constrained by target costs defined for design phases and for construction phase.

  Contractor(s) involved in Contract A **can** bid for Contract B.

[4] IO and F4E will in any case require a strong accountability on all the scope subject to the future tender not only from the consortium lead but also from all members, although some might act on a minority of the scope. IO and F4E will strengthen obligations from all members to ensure a fully liable consortium.

Based on the scope described here-in, the purpose of the Market Survey is to collect from companies detailed feedback on the 2 scenarios for contractual schemes described here-after. After collecting the industry assessment, the final scheme will be defined, and a procurement process will be launched accordingly.

In both scenarios contract(s) will be placed after a competitive dialogue, aiming at selecting the best conceptual design compliant with the objective to design and build towards a target cost.

3.1. Purpose of the competitive dialogue

The competitive dialogue is a procurement tendering procedure whereby IO and F4E will create the opportunity to interact with tenderers until a conceptual design solution and the project proposal (including the financial proposal) that meet the expectations are satisfactorily selected.

Together with the selected tenderer at the end of the negotiations, IO and F4E will engage for scenario#1, scenario#2 described here-after, or any other appropriate scenario.

The competitive dialogue appears to be an appropriate format due to the complexity of the HCF project. It shall be considered that the bidders will be provided only with:

i. functional and safety requirements applicable to the HCF
   note: the safety requirements will be in the format of a unique, consolidated and consistent list of safety requirements clarifying the quantified performances expected from the facility. These safety requirements will then be propagated by the future contractor(s) to the sub-systems constituting the facility.
ii. functional and physical interfaces
iii. Target cost(s)
iv. Target delivery date(s) with intermediate milestones
v. One pre-conceptual solution for information only

IO and F4E would be using these dialogues with potential contractors to

- help them understand the HCF requirements,
- work collaboratively to clarify or develop acceptable assumptions for the unknowns,
- benefit from industry experience to define new possible alternative solutions to reach the expected performance required to HCF and within the target cost and lead-time.

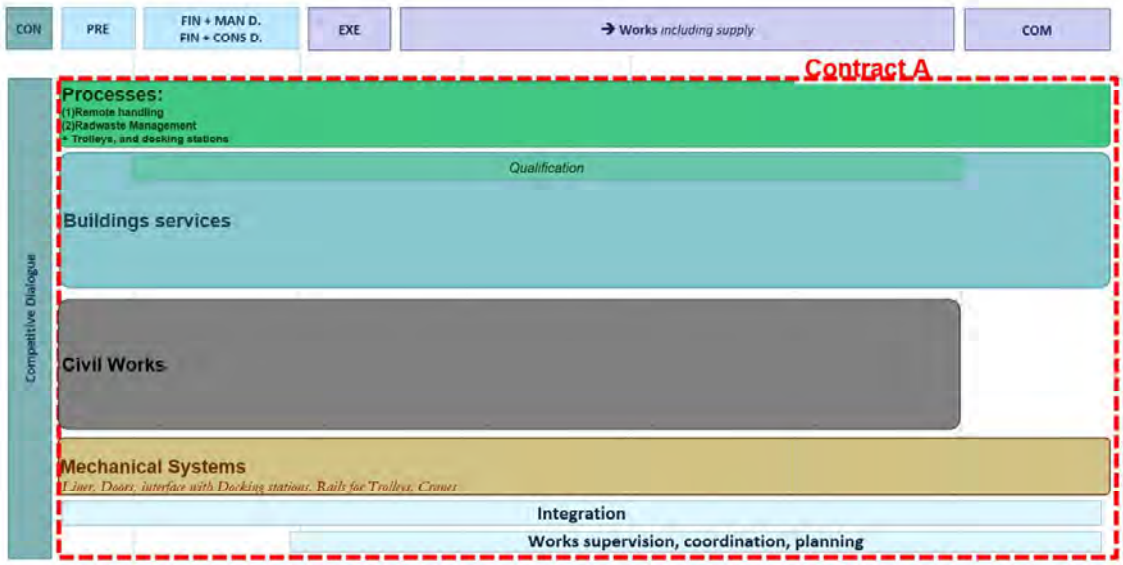
This approach is necessary to align understandings and limit or avoid change to the requirements after start of the contract(s) implementation.

The competitive dialogue is expected to ensure to start the project with a solution being fit for purpose. It will help fix the target cost (broken down by design phases and construction phases) and delivery schedule. IO and F4E foresee some form of compensation for the tenderers selected to provide / develop a simplified conceptual design, to cover at least in part the costs incurred during the competitive interaction: in this respect industry can suggest in their answer to this survey which form of compensation would be considered appropriate.

3.2. Description of the two scenarios proposed for HCF contractual scheme:

Note: The charts used to illustrate the 2 scenarios are reflecting roughly the proportion in cost of the different disciplines and also the different phases of the project.

(1) <u>Scenario#1</u>: One contract committing to deliver complete facility to IO and F4E ready to start operations of the facility.



Contract A = 1 Designer for all trades of the Hot Cell facility + Supply and installation for processes + Construction for Buildings, Mechanical Systems and Buildings services + transverse duties.

The principle of the Scenario#1 would be that the (single) Contract A is entrusted to engineer, procure and construct the required works – all trades/disciplines considered - and then, once ready for operations, to hand over the facility to the client who will operate it. The Contract A will have to prove the reliability and performance of the plant and equipment supplied, built and installed. Time for Completion of the works includes not simply completing the works so that the client can take them over, but also achieving the passing of the Tests and commissioning.

The Contract A will have full autonomy on the supply chain organization to deliver all scope covered by HCF (limited to the section described in section 2).

By engaging into this Scenario#1, IO and F4E would require appropriate certainty that the project is completed:

- Within the agreed target cost;
- Within the agreed time scale programme;
- To the required performance quality, that has been tested, commissioned, performance-tested and is ready for start-up.

The contractor will have responsibility to control each of these elements of completion risk.

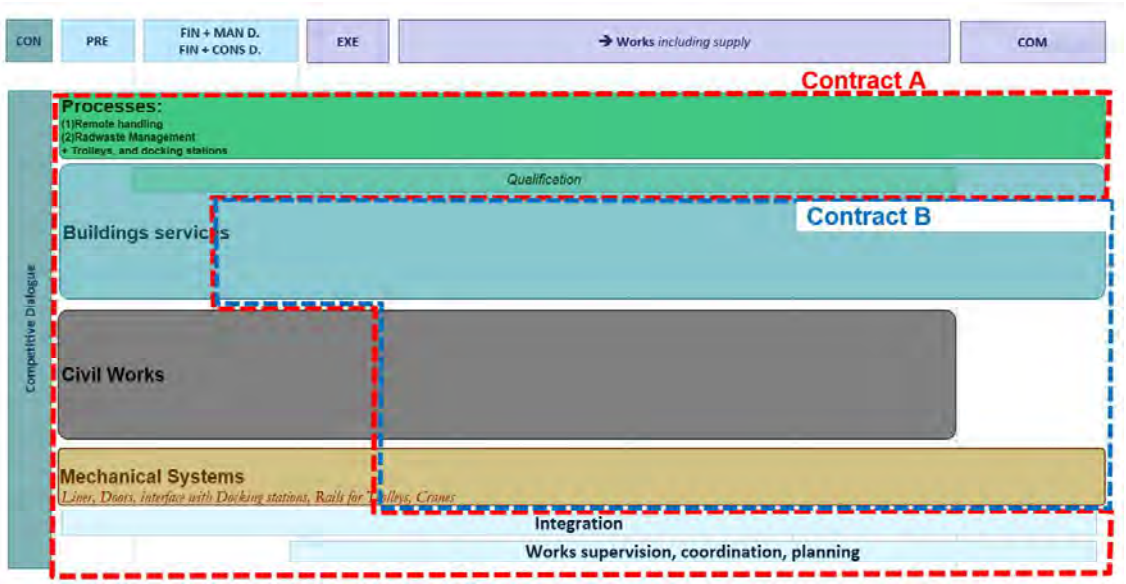
Regarding the design, the contractor will accept the responsibility of the client's requirements and would have had opportunity during the conceptual design (or simplified conceptual, depending on maturity, delivered during competitive dialogue phase) to verify their validity, feasibility and completeness. This said, due to the long period of design required to finalize the detailed design and the complexity of the HCF, it is expected that each design phase gate allows to confirm the

viability of the project and the ceiling cost of project. Each phase gate preceding the Final Design constitutes a possible contract termination point if the design and cost objectives are not achieved.

After the last detailed design phase, i.e. final design (FIN D. in the above figure) for the Processes, Buildings services and Mechanical systems in the figure here-above, and Construction Design (CONS D. in the above figure) for the Civil Works, the contract A will take full responsibility on a target cost for the supply and construction of the plant.

It is not yet defined which contract type will be selected for scenario#1, although the philosophy is explained above..

(2) <u>Scenario#2</u>: Two main contracts. The main purpose of the Scenario#2 is one hand to offer the opportunity to cost estimate the construction based on a detailed design produced by the contract A, on the other hand to have the opportunity of a competition for a significant part of the construction scope.



►Contract A = 1 Designer for all trades of the Hot Cell facility + qualification for Buildings services + Supply and installation for processes + transverse duties.
►Contract B = Manufacturing design for Buildings services + Construction for Buildings, Mechanical Systems and Buildings services.
►Contract A & Contract B have 2 separate contracts with a single client (IO or F4E), with a tripartite collaboration agreement signed with each other and the client.

The Contract A is committing to deliver most of the Design for all trades but also the supply and installation of the processes, whereas a second Contract B will be implemented to deliver the construction of the Civil Works, Mechanical systems and Buildings services, with a design engagement on manufacturing design of Buildings services.
Contract A keeps the responsibility of the transverse duties for all trades (Design integration, Works supervision, coordination and planning of the scope delivered by Contract B) and would also deliver the qualification activities as they are due to start during the Final Design (summarized FIN D. in the scheme here-after).
After the last detailed design phase for the processes, i.e. Final design, the Contract A will then take full responsibility on a ceiling cost for the supply and construction of its scope.

It shall be noted that the Contract B will start at later stage, with obligation to collaborate with Contract A to confirm that Contract B accepts the design and accompanying documentation produced by the Contract A on Buildings, Mechanical Systems, Buildings services and interfaces with Processes. In other words, the Contract B will have the obligation to accept the results of the final design (FIN D. in the above figure) and would be given sufficient time during the procurement process to scrutinize the design produced by Contract A and validate its validity, feasibility and completeness. The Contract B will then take full responsibility on a ceiling cost for the supply and construction of its scope.

In addition, Contract A, and Contract B are contractually linked and compelled to collaborate thanks to a tripartite agreement with the client.

Considering that Contract A will have the duty of design integration on top of being the main designer of the facility, the good collaboration between Contract B and Contract A will be a key factor of success. There will be no possibility for claims on the final design (FIN D.) once the Contract B enters into force.

For the execution design, both contracts are fully responsible for their execution design. Any contract producing execution design will be fully in charge of its validation.

By engaging into this scenario#2, IO and F4E would require:

- From Contract A:
  - appropriate confidence that the project is designed to cost, all trades considered.
  - Appropriate confidence on the overall target cost (which will later become a ceiling cost), target programme and required performance quality for the delivery of the Processes.
  - Committment to deliver design for the Civil works, Mechanical system and Buildings services that fulfils the target cost imposed by the client.
  - Committment to a good collaboration with contract B to deliver an integrated design and construction.
  - Contract A will have the coordination of all trades including those under contract B responsibility. Therefore, IO and F4E will request a commitment to deliver all trades to the required performance quality, that has been tested, commissioned, performance-tested and is ready for start-up.
  - Contract A is responsible for the facility overall performance.

- From Contract B:
  - Delivery of the Works within the agreed target cost (which will later become a ceiling cost), within the agreed time scale programme, and to the required performance quality, that has been tested, commissioned, performance-tested and is ready for start-up.
  - Committment for a good collaboration with contract A which will be in charge of the global coordination of all trades.

It is not yet defined which contract type will be selected for scenario#2, although the philosophy is explained above.

4. HCF project context and description

4.1. ITER

The ITER project aims at building a tokamak fusion device, significantly larger than the current worldwide fusion devices, with the goal of demonstrating the scientific and technical feasibility of fusion energy. It is a joint project between the European Union, China, India, Japan, South Korea, the Russian Federation and the United States of America. The ITER Members contribute to the ITER Project with contributions in cash to the budget of the ITER International Organisation (ITER IO) and with contribution in kind (buildings and/or equipment) through legal entities of each participating countries called “Domestic Agencies”. Fusion for Energy (F4E) is the European Union domestic agency. ITER is currently under construction at Cadarache site, in the south of France.

The ITER IO is the nuclear operator, complying with the relevant French Laws and regulations, authorization, codes and standards applicable to Basic Nuclear Installation (INB).

4.2. ITER organization & F4E organization to deliver the HCF

A joint Project Team constituted of IO and F4E resources will act on behalf of the One Client (either IO or F4E, depending on the final arrangements between the two contracting authorities) and will represent the Client towards the contractor(s). Any administrative arrangement between IO and F4E will be dealt with outside the relationship with the contractor(s).

The One Client Project Leader will be empowered to take most of the decisions for the daily implementation of the Design and Construction Works. All changes approval will be under the responsibility of the Project Leader. The Project Leader will be empowered to make decisions related to safety duties if risks of disruption to the contract(s) arise.

4.3. Technical description of the Hot Cell Facility functions

The HCF is a service in support of the fusion operations. It provides a secure environment for the processing, repair or refurbishment, testing, and disposal of the ITER components that have become activated by neutron exposure and exposed to Tritium contamination.

The HCF is a nuclear facility and shall address two main safety functions:
(1) Limitation of external exposure to ionizing radiation,
(2) Confinement of radioactive substances, i.e. dust and tritium contamination.

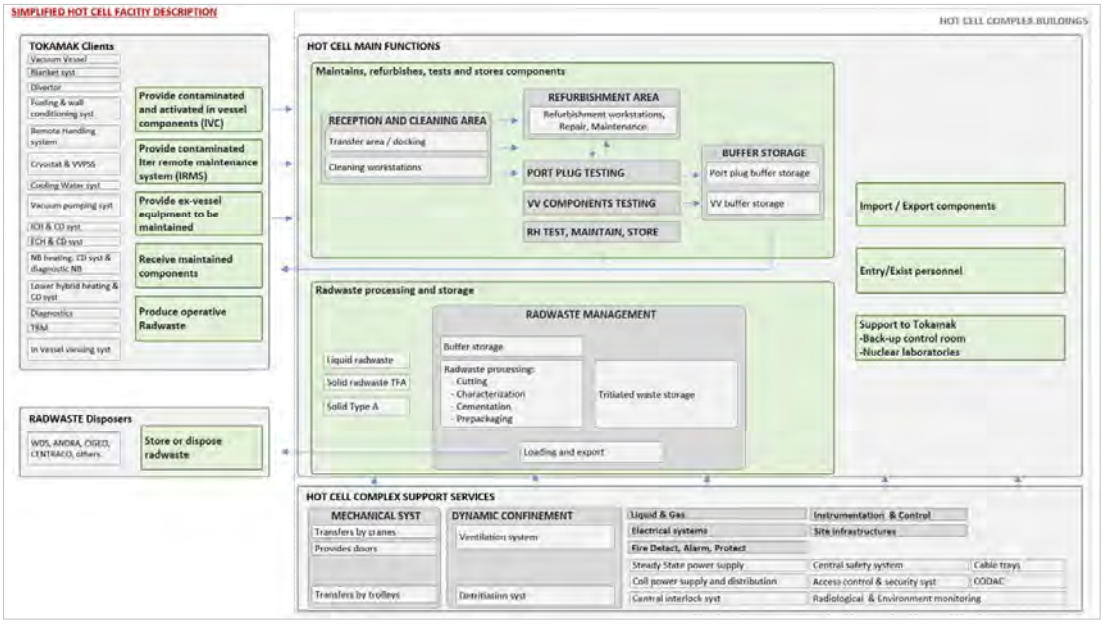
As indicative values, the expected contact dose rate for each plasma campaign planned across Deuterium-Tritium plasmas phases, focusing on plasma facing components, will be in the order of magnitude of 1Sv/h.

In addition, the particularity of the HCF lays in size and weight of the components to be processed. Here-below some samples of the size of components to be handled:

- **Equatorial Port Plug 50t** *(L 3.2m x l 1.9m x H 2.4m)*
- **Upper Port Plug 25t** *(L 5.5m x l 1.5m x H 1.3m)*
- Blanket Shield Block 3t
- Blanket First Wall Panel 0.6 to 0.8t
- **Divertor 8t**
- Cassette body 4,6t
- Dome 0.8t
- **Cryopumps 8t**

4.4. Illustration of Hot Cell Facility clients, main functions and services

Here-after a summary of the HCF clients, main functions and services:



Figure#1 – Summary of the HCF clients, functions and services

5. Overview of the Scope of the future Call for Tender for HCF

5.1. Main features of the Hot Cell facility in its current pre-conceptual design

Here-after the overview and main features of the Hot Cell facility in its current pre-conceptual design:

- Figure#2: Site Layout with location of the Hot Cell Facility Worksite area,
- Figure#3: Main features of the building assumed so far,
- Figure#4: Surfaces vs functions table assumed so far.

Figure#2: Site Layout with location of the Hot Cell Facility Worksite area[5].

Assumptions for the Hot Cell Building

- Building = reinforced concrete structures
- ≈ 50,000 m³ of concrete
- 15,000 tons of reinforcements
- Footprint : ≈67.1 x 74.5 m² and ≈ 29 m height
- 5 levels (B2,B1,L1,L2 and L3) with an average of 6 meters of level height
- Thick walls and thick slabs with an average of 0.8 m (≈ 0.6m to 1.30m)
- Building supported by Rock soil, excavation and all karst treatment done

Figure#3: Hot Cell Facility Pre-Concept – Main features of the Building, [indicative]

[5] *The Hot Cell Worksite will take place aside a nuclear plant, which will be partially in operation.*
The North area will allow for sufficient laydown areas for Hot Cell Works.
There will be co-activity to deal with, also with the buildings still with construction on-going in parallel.
A fence will separate the worksite from most of the operational plan. Separate accesses to the worksite will be granted.

				2023 pre-concept
LEVEL	MAIN FUNCTION	SUBFUNCTION	DETAIL	≈ Net surface m2
L1/L2	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-1 To transfer In Vessel Components	2,900
	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-2 To clean / Decontaminate IVC	
	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-3-1 To Refurbish In Vessel Components	
	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-3-2 To support Refurbish In Vessel Components	
	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-4 To buffer store IVC and tooling	
B1	1 - To Maintain Components	1-1 To Maintain In Vessel Components (IVC)	1-1-5 To Test IVC (PPTF)	450
L1	1 - To Maintain Components	1-2 To Maintain ITER Remote Handling Systems	1-2-1 To transfer IRMS	600
	1 - To Maintain Components	1-2 To Maintain ITER Remote Handling Systems	1-2-2 To Decontaminate IRMS	
B2/B1	1 - To Maintain Components	1-3 To Maintain and buffer store Ex-Vessel Equipment	1-3-1 TBM Ancillary Equip. Unit and Pipe Forest	800
B2/B1	2 To Treat and store Radwaste	2-1 To Treat and store Liquid Radwaste	2-1-1 process	1,200
	2 To Treat and store Radwaste	2-1 To Treat and store Liquid Radwaste	2-1-2 support	
B2/B1	2 To Treat and store Radwaste	2-3 To Treat Type A Radwaste		700
	2 To Treat and store Radwaste	2-5 To Treat Large size Type A Radwaste		
B2/B1	2 To Treat and store Radwaste	2-8 To Store Purely Tritiated Radwaste		150
L1	3 Import / export	3-1 Import / Export of components		1,000
	3 Import / export	3-2 Entrance / Exit personnel		
B2	4 Support to Tokamak	4-2 Nuclear Laboratories		200
	SUB-TOTAL PROCESSES			8,000 m2
L2/L3	A Supporting systems	A-1 Detritiation System		1,000
L2/L3 and all	A Supporting systems	A-2 HVAC		3,000
L2/L3 and all	A Supporting systems	A-3 Electrical and I&C		1,200
all	A Supporting systems	A-5 Personal corridors - network routing		4,800
all	A Supporting systems	A-6 Staircase and vertical shafts		2,000
	SUB-TOTAL SERVICES			12,000 m2
	TOTAL SURFACE			20,000 m2

Figure#4: Hot Cell Facility Pre-Concept - net surfaces vs functions [indicative]

5.2. The project phases subject to the Market Survey

The span of scope covered by the market survey is the entire steps from Conceptual design to commissioning.

Figure#5: Project Phases and transverse duties covered by the Contracts

Please answer to the F4E Market Survey by clicking on this link:
https://ec.europa.eu/eusurvey/runner/HCF_V2

Annexes

Designs steps and expectations

Here-after a summary description of each design phase and integration duties:

(1) Simplified Conceptual Design

Main objectives:

- To produce the documents for the considered subsystems' scope and maturity relevant to achieve the Functional Baseline for this scope.
- To consolidate design inputs, giving evidence that they are fully identified in:
  - Systems Requirements Documents (SRDs),
  - Functional and physical external Interfaces versus Hot Cell boundaries,
- To outline at least one design solution, aiming at limiting the cost investment:
  - New proposal for the General Arrangement of the Hot Cell,
  - Description of the proposed concept solution for the processes,
  - Justification of the proposed concept solutions,
  - Design Compliance Matrix of the proposed concept, versus requirements (in particular functional, safety, operability), constraints, and interfaces,
  - Schedule and cost estimate of the design solution,
- To establish a risk, opportunity and issue Log with an associated actions plan to address them.

(2) Preliminary Design

Main objectives:

- At the beginning of the Preliminary Design phase, to select a design option if alternative solutions were defined during Conceptual Design,
- To increase the maturity level of the Conceptual Design, refining the solution, the cost and schedule aspect, aiming to keep the investment cost as low as reasonably possible, versus operability and operational cost. Evidence is given in:
  - An update and completion of the Design Description (DD) with detailed set of schematics and component definition,
  - An update and completion of the System Load Specification,
  - An update of the definition justification documents, referring to a first consistent set of justification notes demonstrating that the technical objectives of the systems requirements will be met (analyses, return of experience, tests, simulations) and that manufacturability, transfer, assembly, qualification/start-up and operability of the system have been addressed.

- General architecture (Functional, Physical) is consolidated, and the main (or critical) components described adequately:
  - To allocate system requirements to the participating subsystems in order to comply with the general architecture of the system.
  - To complete Interface specifications (assumptions, ranges, actual data) once the level of detail of the design allows the production of Interfaces Sheets (IS) and relevant CMMs and room book. All the Interface sheets should be agreed and defined either by a fixed value or by allocation of ranges,
  - Functional Specifications and outline drawings are available.

- Refined cost estimate, schedule, risk and opportunity register, versus the maturity of the Preliminary design,

(3) Final Design

Main objectives:

- To produce the documents for the considered subsystems' scope and maturity relevant for the Final Design phase to achieve the Production Baseline for this scope.
- To refine the design to a level where the final definition of the product is sufficiently complete (final calculations) to allow starting the manufacturing design & preparation phase (subsystem/component specifications are detailed enough to be "understandable" by the manufacturer) – in particular the Engineering- Bill of Material (BOM) and a preliminary Manufacturing-BOM are available.
- To freeze interfaces with civil works allowing to decouple the design for civil Works construction.
- To update and complete all Interface Sheets according to refined design definition,
- To build a complete set of justifications demonstrating that:
  - Component specifications and design are justified (supporting analyses, return of experience, tests and explanations)
  - The specification of the qualification process is fixed (test objectives, logical sequencing, expected results, etc.)
  - The manufacturability, transfer, assembly and qualification/start-up of the system are defined and agreed with the stakeholders.
- To update and complete all Interface Sheets according to refined design definition,
- Refined cost estimate, schedule, risk and opportunity register, versus the maturity of the Final design,

(4) **Manufacturing Design** (Processes, Buildings services, Mechanical systems)

Main objectives for electromechanical components: detailed drawings according to manufacturer documentation, installation methods and procedures and the materials approval request including all necessary certificates.

(5) **Construction Design** (Civil Works dedicated phase)

Main objectives:

- final sizing and loads of the elements considering manufacturing information of equipment and final information from other systems (final calculations, detailed drawings,…)
- Based on the sizing done in Final Design and final interfaces with equipment as supports, fastening systems (embedded plates or anchoring) and openings are finalized and frozen.
- Design is justified (calculations, supporting analyses),
- Legal inspection has reviewed favourably all drawings and calculation report.

The approval of the Construction Design will give authorization to the Contractor to start the construction and manufacturing activities of the civil Works, based on the execution design (see (6) here-after).

(6) **Execution Design** (Civil Works & Buildings services)

Main objectives: workshop detailed drawings considering the final calculations and information of the Construction Design and the final design, the construction methods and procedures, and the materials approval request including all necessary certificates.
Any contract producing execution design will be fully in charge of its validation.

(7) **Integration**

Main objectives: to steer and coordinate the requirements imposed upon a set of interfacing systems. The integration task aims at demonstrating coherence of the overall set of systems developed in a concurrent manner. It looks for satisfying the overall facility requirements and that the design of each system can proceed with a controlled level of risk.

Cost aspect shall be embedded into the design, in the same way than nuclear safety, for which the requirements will be refined from high level safety requirement at start of the concept to detailed safety requirements that will be refined during preliminary and Final design.

More practically, the tasks concerned are:

- Design Control,
- Nuclear safety analyses and support to nuclear licensing,
- Requirements management,
- functional and physical interfaces management,
- 3D-4D (planning)-5D(cost) Configuration model management,
- Configuration and change control,
- Design control, following up concurrent engineering across the various trades to be designed,
- Integration (including accessibility, inspection and maintenance of the components)

Notes across all design phases and duties:

(1) it is expected that the contractor will support actively the nuclear operator for the safety demonstration of the Hot Cell overall facility towards the regulator.

(2) The safety requirements provided to the bidders at the start will be in the format of a unique, consolidated and consistent list of safety requirements clarifying the high level safety requirements. These safety requirements will then be propagated and refined by the future contractor(s) to the sub-systems constituting the facility, all along the design development phase, ensuring a full traceability of the propagation up to the integrated commissioning.

(3) The nuclear safety analysis are performed by contractor, in line with the design maturity of each design phase.

(4) Any deviation requested by the contractor/consortium to the high-level safety requirements will be formalized and submitted to the client for approval. The client assessment must take place without impact to the contractors' schedule.

(5) If any dialogue with the safety authority is required to obtain a formal approval, the contractor/consortium will provide all necessary justification required by the client.