



## FUSION FOR ENERGY

The European Joint Undertaking for ITER and the Development of Fusion Energy  
The Governing Board

### **DECISION OF THE GOVERNING BOARD ADOPTING THE SINGLE PROGRAMMING DOCUMENT (SPD) OF THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY**

THE GOVERNING BOARD OF FUSION FOR ENERGY,

HAVING REGARD to the Statutes annexed to Council Decision (Euratom) No 198/2007 of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy (hereinafter "Fusion for Energy") and conferring advantages upon it<sup>1</sup> (hereinafter "the Statutes") and in particular Article 9 (a) thereof, last amended on 10 February 2015<sup>2</sup> by Council Decision Euratom 2015/224;

HAVING REGARD to Council Decision (Euratom) No 198/2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it, last amended on 22 February 2021 by Council Decision (Euratom) No 2021/281<sup>3</sup>;

HAVING REGARD to the Financial Regulation of Fusion for Energy<sup>4</sup> adopted by the Governing Board on 10 December 2019 (hereinafter "the Financial Regulation"), and in particular Title III thereof;

HAVING REGARD to the Commission Delegated Regulation (EU) 2019/715<sup>5</sup> of 18 December 2018 on the framework financial regulation for the bodies set up under the TFEU and Euratom Treaty and referred to in Article 70 of Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council, and in particular Title III thereof.

HAVING REGARD to the endorsement by the Governing Board of the draft SPD in accordance with Article 32 (1) of the Financial Regulation.

WHEREAS:

- (1) The Director shall, in accordance with Article 11 of the Statutes, prepare each year the submission of the project plan to the Governing Board, the resource estimates plan and the detailed annual work programme, now merged in the Single Programming Document;
- (2) The Administration and Management Committee shall, in accordance with Article 8a (2) of the Statutes, comment on and make recommendations to the Governing Board on the proposal for the project plan, the work programme, the resource estimates plan, the staff establishment plan, the staff policy plan and other related matters, now part of the Single Programming Document drawn up by the Director;
- (3) The Technical Advisory Panel, in accordance with Article 6 (1) of the Statutes, shall advise the Governing Board on the adoption and implementation of the project plan and work programme, now part of the Single Programming Document;
- (4) The Governing Board, in accordance with Article 6 (3) (d) of the Statutes, shall adopt the project plan, work programme, resource estimates plan, the staff establishment plan and the staff policy plan, now part of the Single Programming Document;

HAS ADOPTED THIS DECISION:

<sup>1</sup> O.J. L 90, 30.03.2007, p. 58.

<sup>2</sup> O.J. L 37, 13.02.2015, p.8.

<sup>3</sup> OJ L 62, 23.2.2021, p. 41

<sup>4</sup> F4E (19) GB45 21.1 adopted on 10.12.2019.

<sup>5</sup> OJ L 122, 10.5.2019, p. 1–38.

*Article 1*

The SPD 2024-2028 of Fusion for Energy annexed to this Decision is hereby adopted.

*Article 2*

The Governing Board hereby delegates to the Director of Fusion for Energy the power to make non-substantial amendments to the annual Work Programme approved by the Governing Board.

Amendments are considered to be "non-substantial" if they do not cause the financial resources allocated to the Action concerned in Table 2 of the annual Work Programme to increase by more than EUR 1 million or 10%, whichever is higher.

In any event, the increase of the financial resource of an action shall not exceed 3% of the total budget of the annual Work Programme for the given year.

In addition, any related changes to the scope of the annual Work Programme shall not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.

Non-substantial amendments shall not lead to any increase in the total operational expenditure for Title 3 of the annual Budget approved by the Governing Board.

*Article 3*

This Decision shall have immediate effect.

Done in Barcelona, 5 December 2023.

For the Governing Board

**Dr. Carlos Alejaldre**

Chair of the Governing Board

[Signed electronically in IDM]

For the Secretariat

**Romina Bemelmans**

Secretary of the Governing Board

[Signed electronically in IDM]



**FUSION  
FOR  
ENERGY**

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# Single Programming Document

Years 2024-2028

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## **Fusion for Energy**

**The European Joint Undertaking for ITER  
and the Development of Fusion Energy**

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## Foreword

Welcome to Fusion for Energy's (F4E) Single Programming Document for the period 2024-2028!

This will be one of the most challenging periods for F4E. For ITER, a new baseline will be presented to the ITER council for a decision by mid-2024 that will impact F4E's contribution to ITER. Additionally, F4E will contribute towards bringing the ITER Organisation and F4E closer together to improve the execution of the project. During this period, F4E should finish most of the buildings and deliver, among others, all the superconducting magnets and the vacuum vessel sectors.

At the same time F4E will continue working closely with Japan on the Broader Approach projects allowing for the operation the JT-60SA tokamak for the benefit of our scientific community and as a preparation to ITER operation.

Last but not least, F4E will put the knowledge gained from its projects to the use of the next phase of its mission – preparing Europe for the construction of a demonstration fusion reactor. Supporting the DONES project is a first step towards this goal that you find in this SPD.

Let me conclude by thanking all our stakeholders for supporting the ambitious plan set on in this document.

Marc LACHAISE  
Director

# Section I. General Context

## Introduction

### Purpose of the Annual and Multi-Annual Programming document

According to Article 32 (Single Programming Document) of the Fusion for Energy (F4E) Financial Regulation (F4E(19)-GB45-21.1 Adopted on 10/12/2019), the F4E Single Programming Document (SPD) contains:

1. The Project Plan (PP),
2. The Financial Resource Estimates Plan (financial REP),
3. The Human Resource Estimates Plan (human REP),
4. The annual Work Programme (WP).

According to the F4E Statutes and Financial Regulation, the final Single Programming Document shall be adopted by the Governing Board (GB). The first step of the adoption process requests the preparation of a draft Single Programming Document for the year N – N+4 to be sent in January of the year N-1 to Commission, GB Chair, EU Parliament and Council.

In line with a recommendation from the MAP Ad Hoc Group adopted by Governing Board 45, the Single Programming Document is built in a modular approach with a “Main text” that is complemented by 4 sets of annexes:



**SPD\_figure 1 . Structure of SPD document**

The reference for the budget data is the MFF 2021-2027 approved by the Council on 22/02/2021.<sup>1</sup>

For year 2028, the budget figures are indicative and in line with the staff paper accompanying the communication of the European Commission (EC) on ITER for the period 2028-2035<sup>2</sup>.

The reference date for the planning information in the present document is end of March 2023.

Due to the above-mentioned cut-off date, the document is not capturing any subsequent evolutions, including the decisions taken at the recent ITER Governance meetings.

### **F4E's vision, overall mission and values**

*"Bringing the power of the sun to earth".*

This vision communicates the active role Fusion for Energy (F4E) takes in advancing fusion towards becoming a reliable source of clean abundant base load energy. F4E is the European centre to develop and build ITER and other facilities to turn fusion into a sustainable source of energy for mankind. F4E bridges the EU research community and the EU industry, to broaden the European industrial base for fusion technology.

F4E's values<sup>3</sup>, as described in "F4E's Charter of Engagement", are the following:

- Value 1: We care for individuals and trust their competence,
- Value 2: We achieve our objectives with uncompromising integrity,
- Value 3: We deliver our projects with respectful teamwork,
- Value 4: We focus on contribution and achievement,
- Value 5: We encourage flexibility and innovation.

### **F4E Projects**

#### ***ITER***<sup>4</sup>

The task of F4E, as the Euratom Domestic Agency for ITER, is to discharge Euratom's obligations to deliver its share of in-kind components and cash contributions to the ITER project, about 45% of the total value of the project in the construction phase and 34% of the cost of operation, deactivation and decommissioning of the facility as well as preparing the site in Cadarache.

#### ***BROADER APPROACH (BA)***

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<sup>1</sup> MFF figures were updated in May 2022.

<sup>2</sup> COMMISSION STAFF WORKING DOCUMENT The ITER Project Status Accompanying the document Communication from the Commission to the European Parliament and to the Council EU contribution to a reformed ITER project - 14.6.2017 SWD(2017) 232 final.(table 3 p 23)

<sup>3</sup> Intensive work is currently ongoing to review how these values fit to the model that the ITER Project will adopt (i.e. The C.A.R.E. model). An evolution may be expected in early 2024 as to ensure that all actors of ITER have a common set of behavioural standards to guide their cooperation.

<sup>4</sup> Info on ITER can be found on [www.iter.org](http://www.iter.org) and <https://f4e.europa.eu/understandingfusion/iter.aspx>

The Broader Approach agreement, concluded between Euratom and Japan, includes activities which support and complement the ITER project by developing and operating some advanced research infrastructures and technologies necessary for future demonstration reactors. The Euratom resources for the implementation of the BA were provided in the past in part by several participating European states (Belgium, France, Germany, Italy, Spain and, Switzerland) as well as EUROfusion<sup>5</sup>. In BA Phase II, the Voluntary Contributors continue to provide personnel, while EUROfusion has an increased role by providing both hardware and personnel.

### **DEMO**

The task of F4E is to prepare and coordinate a programme of activities in preparation for the construction of a demonstration fusion reactor, the successor of ITER.

### **Key Performance Indicators**

F4E is using specific Key Performance Indicators (KPI) in order to measure how effectively the organisation achieves the targets set in different areas (i.e. schedule, cost, quality, budget consumption, etc.). Some of them were developed by F4E, some by its Governing Board and ITER IO. F4E monitors these KPIs and reports internally to the Project Steering Meeting (PSM) to discuss any possible event or risk that could threaten their achievement.

### **Reporting**

Fusion for Energy produces a dashboard on progress and performance against the Project Plan and the Work Programme that is sent monthly to the Governing Board and its committees.

## **General background**

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Since its creation in 2007, Fusion for Energy (F4E) is responsible to provide Europe's contribution to ITER, the Broader Approach (BA) and the Demonstration Fusion Power Reactor (DEMO) projects.

### **2.1 ITER**

ITER aims to produce a significant amount of fusion power to allow scientists to study "burning" plasma (i.e. heated by fusion reactions rather than by external heating systems) and also to test many of the key technologies needed for future fusion reactors. Euratom (represented by the European Commission) is one of the seven parties to ITER that represent half the world's population together with the Russian Federation, Japan, China, India, South Korea and the United States.

ITER is being built near Cadarache in the south of France. F4E's task, as the Euratom Domestic Agency for ITER, is to discharge Euratom obligations to deliver its share of in-kind components and cash contributions to the ITER project, about 45% of the total value of the project in the construction phase and 34% of the cost of operation, deactivation and decommissioning of the facility as well as preparing the site.

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<sup>5</sup> [www.euro-fusion.org](http://www.euro-fusion.org)

The main characteristic of ITER is that the most significant part of the project is built by in-kind contributions distributed among the seven parties through the ITER Agreement to achieve the agreed level of contribution from each of them. The design, coordination, integration, commissioning and operations are managed by the Central Team of the ITER Organization (IO).

The project will reach its ultimate operational configuration [the so-called Deuterium-Tritium (DT) operation] via a series of intermediate configurations of gradually increasing capability. This is referred to as the staged approach and reflects the approach commonly adopted on complex developments with a progressive step-by-step assembly and commissioning process, validating each phase before moving on to the next. The present baseline schedule for ITER was approved in 2016, F4E is working on this basis to date. However F4E highlights that the baseline is at the moment under review by the ITER Organization and the ITER Council taking into account the impacts of Covid-19 and other events and a new baseline will be approved by the ITER parties in the coming months.

The first completion stage in the 2016 baseline is referred to as First Plasma (FP), and it was scheduled for December 2025. The full configuration of DT operation was scheduled 10 years later in 2035.

The two major F4E responsibilities are

- (a) Europe, as host, is providing components (including all buildings) representing 45 % of ITER's nominal value; European industries manufacture and provide them to the ITER Project as 'in kind' contributions. These are progressively delivered in line with the ITER assembly schedule, completing with the final deliveries for the DT phase components.
- (b) the payment of an annual cash contribution to IO to fund the IO internal activities and the tasks subcontracted directly by IO. The cash contributions cover the four major phases of the ITER project:
  - ITER **construction phase** through to the build of the machine for the final DT configuration
  - ITER **operations phase** running from FP through to the scheduled end of operation in 2037<sup>6</sup>
  - ITER **deactivation phase** from 2037 until the end of the ITER Agreement in October 2042. During this phase the ITER machine is returned to a safe state following its operation with the DT fuels.
  - Finally the **decommissioning phase** which starts in 2042, aimed to dismantle the machine and return the ITER site to normal. Since this phase falls outside the timeframe of the ITER Agreement, F4E and the other Domestic Agencies will make the corresponding cash contributions to a decommissioning fund during the ITER operations phase.

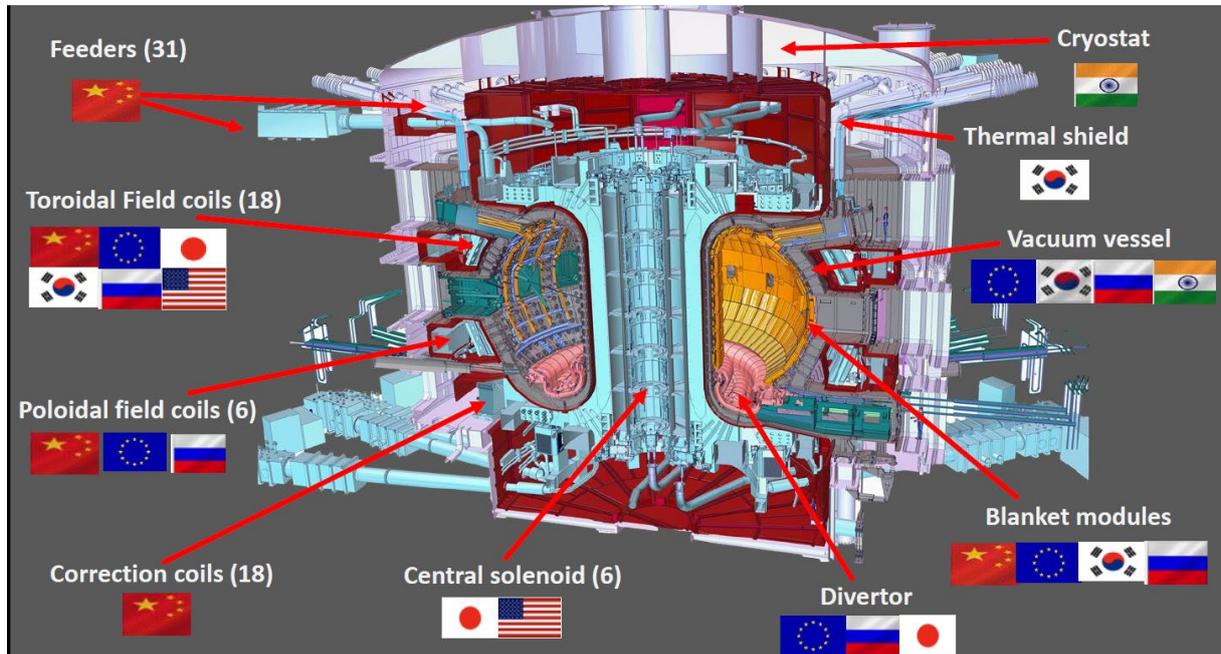
During these phases the F4E role is to provide the agreed cash contribution. However, it is anticipated that F4E will have a role to provide technical support to IO during machine assembly, commissioning and operations. The type and level of support, and mechanism to provide this support is not yet defined.

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<sup>6</sup> To be noted that the ITER parties plan to discuss starting in 2033 a possible extension of the Agreement beyond 2042. Such decision, if taken, would impact the duration of the operation phase and the dates of deactivation and dismantling phases.

ITER Construction Phase	Overall cost IC-31 (kIUA)	EU share (kIUA)	EU share already released (kIUA)
In-kind	2848.10	1114.08	551.74
In-kind cash to Japan	NA	227.65	192.44
In-cash	4898.10	2179.70	1228.32
<b>Total</b>	<b>7746.2</b>	<b>3521.43</b>	<b>1972.49</b>

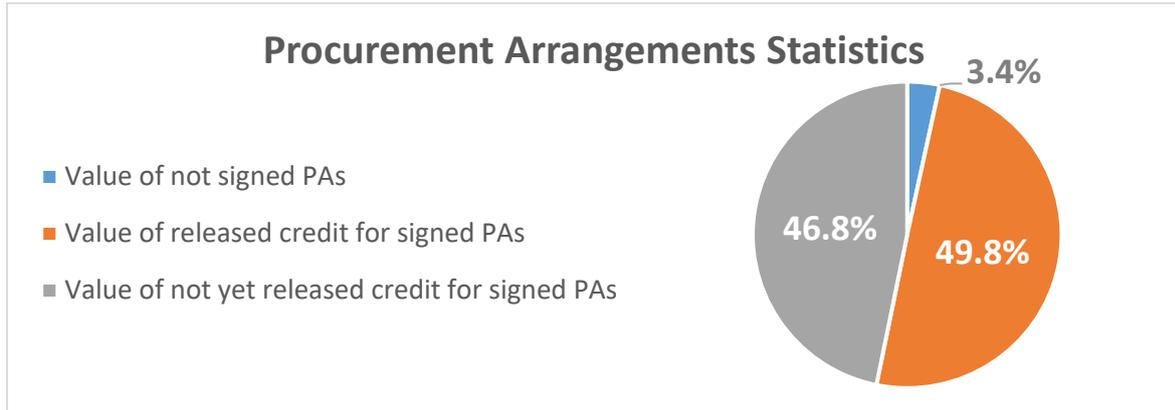
**SPD\_table 1. Summary table of European contribution to ITER (Reference IC-31 contribution end of December 2022)**



**SPD\_figure 2 . Main DAs obligations towards IO**

**IN KIND CONTRIBUTIONS TO IO**

The Procurement Arrangements (PAs), progressively signed between the ITER Organization and each DA, define the specifications of the components to be provided in-kind. The level of detail of those specifications may vary depending on the level of development of the components. In some cases, Build-to-Print specifications will be provided, whilst in others, Detailed Design or only Functional Specifications will be available. These PAs are the basis for F4E to start the procurement procedures to competitively tender for the work. Once a contract is awarded, the work of the supplier can start. Each component has its development and manufacturing process with predefined stages and phase gates when F4E and IO will review and approve the design or manufacturing progress in order to determine the readiness to move to the next stage. The following table provides the state of play of the EU deliverables.

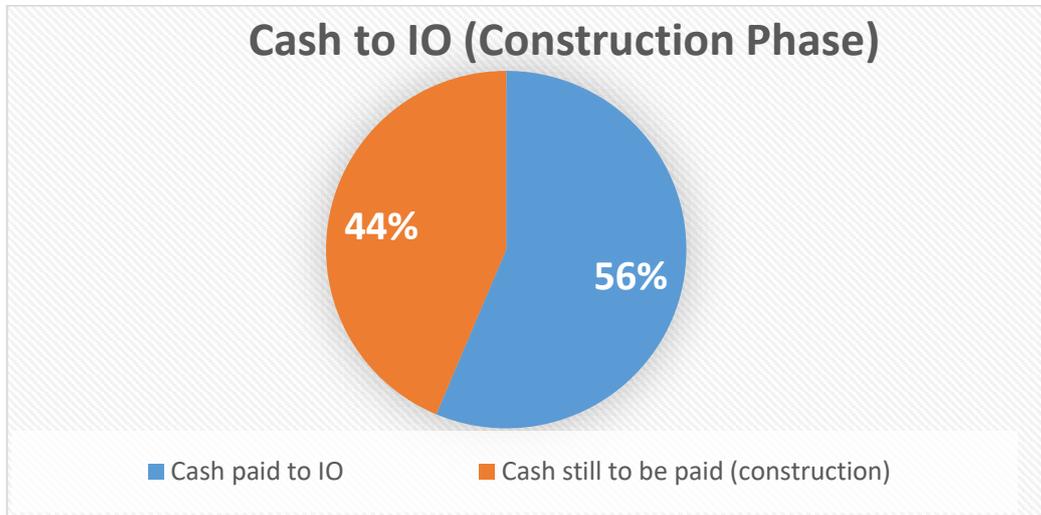


**SPD\_figure 3 . PA Credits of in-kind contribution in percentage:  
value of PA Signed & credit released / PA Signed & credit to be released /  
not Signed EU PA (status end March 2023)**

**CASH CONTRIBUTION TO ITER ORGANIZATION**

F4E is the European Domestic Agency (EU DA) managing the Euratom participation to the ITER Project. F4E delivers to the ITER International Organization (IO) in-kind contributions and annual in cash contributions in accordance with the ITER Agreement<sup>7</sup> and under the terms approved by the ITER Council<sup>8</sup>.

By the end of March 2023, F4E has provided 1,166.96 kIUA credits (excluding “short in-kind contribution”) to the ITER Organization in the form of cash contributions to ITER Construction Phase.



**SPD\_figure 4. Ratio cash paid to IO versus total expected cash contribution  
(status end March 2023)**

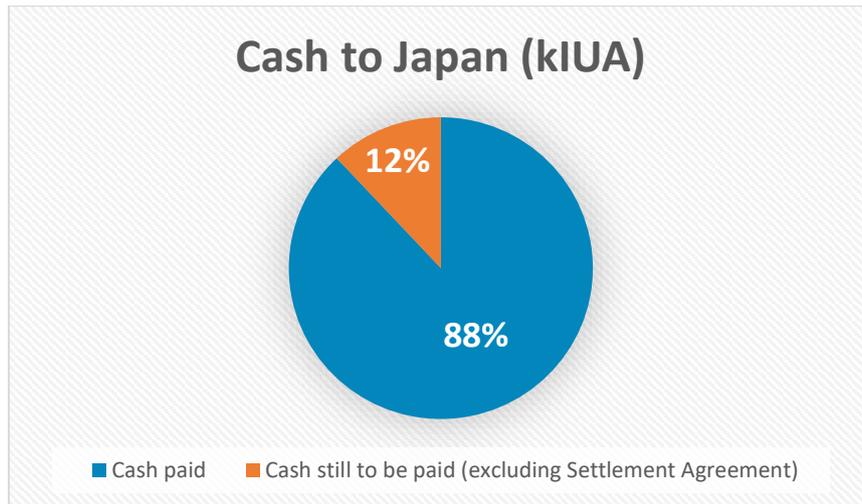
<sup>7</sup> Article 8 "Resources of ITER Organization" (ITER Agreement 2006)

<sup>8</sup> According to Article 9 of ITER Agreement, the ITER Project Resource Management Regulations (PRMR Regulations) shall govern the administration of the resources of the ITER Organization. It provides a detailed description of the applicable rules for contributions in kind, cash income, commitments and payments for the ITER Organization. The final figures are approved or modified by the ITER Council.

## CASH CONTRIBUTION TO JAPAN

According to the ITER Agreement, 10% of in-kind procurement arrangements (PA) equivalent to 227.65183 kIUA credits shall be transferred from Euratom to Japan under the supervision of the ITER Organization<sup>9</sup>. This is financed through cash contributions paid by F4E (EU DA) to the Japanese Domestic Agency (JA DA).

F4E provides a yearly payment based on progress reports and according to the agreed payment schedule.



**SPD\_figure 5. Cash paid to Japan / cash still to be paid to Japan (status end March 2023)**  
(excluding settlement agreement<sup>10</sup>)

## RECENT CHANGES AND DEVELOPMENT AT OVERALL ITER LEVEL WHICH AFFECT F4E'S OPERATIONS

During an extraordinary ITER Council in September 2022, Pietro Barabaschi was appointed as the new ITER Organization Director-General and started his appointment on 16<sup>th</sup> of October.

IO is currently working on the creation of a new ITER project Baseline. It needs to be noted that there are significant uncertainties due to the need for substantial repair works on the Vacuum Vessel and Thermal Shields. This will have an impact on the schedule and budget of the whole project that has not yet been determined. Consequently, this led to a slowdown in some areas of the project, and impacted F4E's 2022 and 2023 work programme and budget execution.

A new baseline (scope, schedule and cost) will be presented to the ITER Council for a decision during the second half of 2024. This will have impacts on some of the F4E in-kind delivery programs. There are also discussions underway between the ITER Director General and ITER Members on possible changes to the scope of the ITER project that impact on some of F4E's in-kind contributions including the First Wall material and the Hot Cell Complex building. At the same time, F4E is devoting significant

<sup>9</sup> Decision 12 of Interim ITER Council, Tokyo, 11-12 July 2007 on transfer of procurement responsibilities from Euratom to Japan

<sup>10</sup> Excluding the settlement agreement signed in 2015 between EU and Japan, under which F4E committed an additional cash contribution to Japan, equivalent to EUR 75 million valued at 10 February 2014.

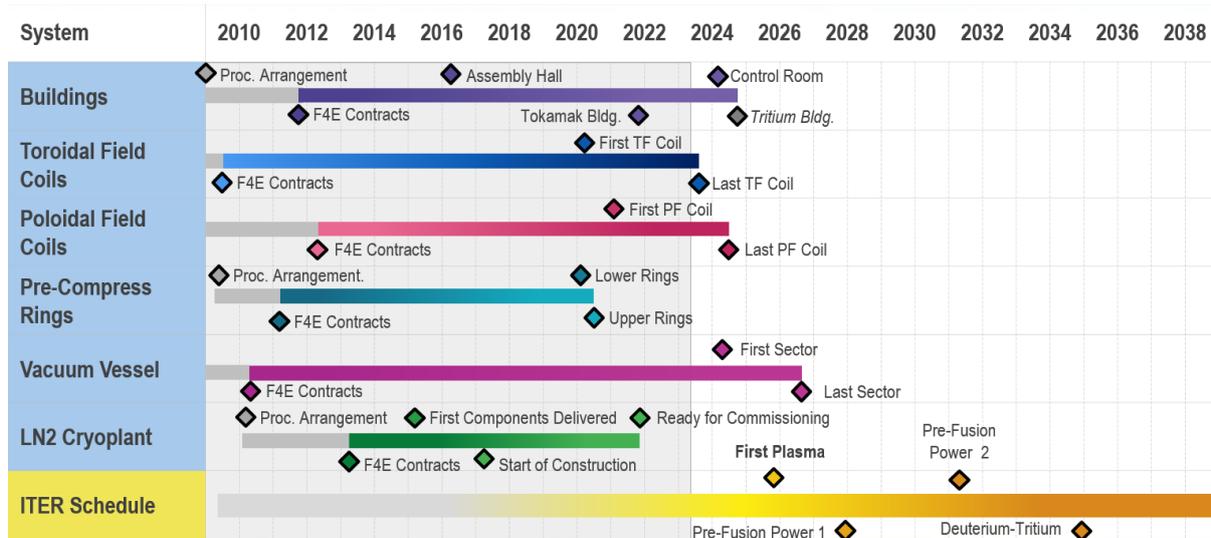
efforts to support the ITER Organization during this challenging period and to support initiatives to bring the two organisations closer together to increase the overall efficiency and performance of the project.

During an extraordinary Governing Board in February 2023, Marc LACHAISE was appointed as the new F4E Director and started his appointment on 16<sup>th</sup> of May. F4E notes that the mission letter from the Governing Board to the new Director asks for action along six axes: (1) One Team, One Objective between F4E and the ITER Organization, (2) a modern, diverse & flexible organisation, (3) a renewed engagement to deliver, (4) transparent & flexible working method, (5) sound & transparent financial management, budget planning & reporting and (6) a renewed engagement with scientific & industrial stakeholders & F4E’s long-term perspective.

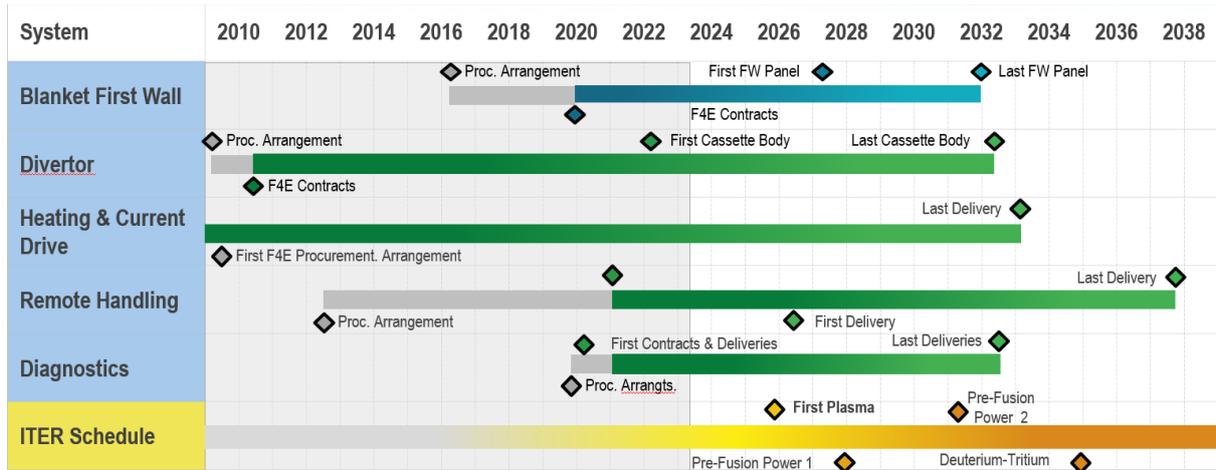
The F4E schedule baseline for period 2024-2028 complies with the ITER master schedule Baseline approved in 2016 targeting First Plasma in December 2025 as adjusted by the Revised Construction Strategy. The F4E schedule baseline will be reassessed once the new ITER Project Baseline will be approved by the ITER Council.

As of the end of March 2023, the EU has achieved a total of 27 IC and GB milestones out of a total of 57. 2 milestones are at risk of experiencing delays with respect to the agreed quarter. 19 milestones show some delays; in some cases these delays will be cancelled once the new Required Arrival Dates (RAD) are implemented into the new baseline. The remaining 9 IC and GB milestones are on track.

Based upon the updated ITER baseline schedule, F4E’s own top-level baseline schedule (fig. 7), known as “Level 0”, outlines the most important ITER and F4E activities.



**SPD\_figure 6 . Top level schedule for First Plasma Systems (2016 baseline, status end of March 2023)**



**SPD figure 7 . Top level schedule for other Systems (2016 baseline, status end of March 2023)**  
 Note that dates are under review with IO for schedule re-planning and that Tritium building & Hot Cell will be planned at a later time.

### 2.2 Broader Approach

Fusion for Energy is the Implementing Agency for the Euratom contribution to the three BA projects, designated by the European Commission to discharge its responsibilities as defined in the BA Agreement. In particular, F4E is the organisation delegated to agree and execute Procurement Arrangements (PAs) with the Japanese Implementing Agency (QST).

The first phase of BA activities covered the construction of facilities and the provision of equipment. All BA Phase I credits have been achieved, except for one creditworthy item pending, amounting to 0.75 kBAUA to be achieved by mid-2023.

The second phase of the BA activities, the so called “BA Phase II”, started from April 2020 on the basis of the Joint Declaration by the representatives of the Government of Japan and the European Atomic Energy Community for the further joint implementation of the Broader Approach activities agreed on 2<sup>nd</sup> March 2020. In this new phase, focussed largely on enhancements as well as operation of the jointly developed infrastructures, resources will largely be provided by Fusion for Energy with a substantial contribution from European Laboratories channelled through the EUROfusion consortium. For BA Phase II, both Parties pledge to contribute a certain amount of credit on an annual basis and subject to budget availability.

The BA Projects, while having some important differences, share the common feature of being based on a collaboration in which the Parties contribute both to the definition of the overall integrated design and to the detailed design and realization.

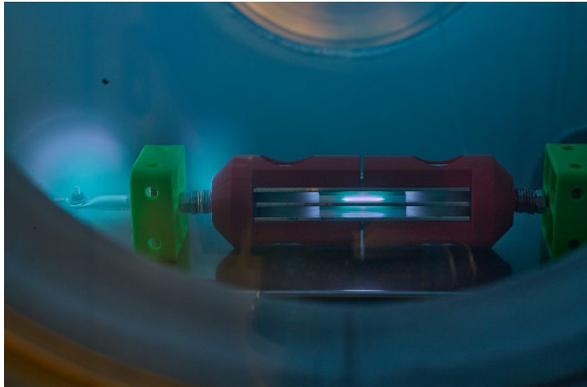
The table below defines the planned contribution in summary and the already released credit for BA Phase II.<sup>11</sup>

Further details are available in PP\_table 8 of Annexes to Project Plan.

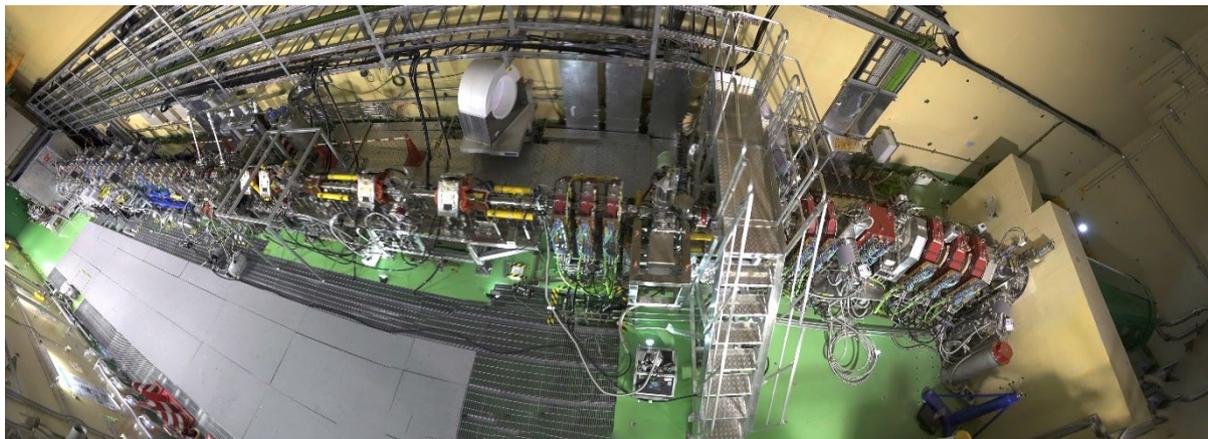
<sup>11</sup> Not all PAs are signed yet.

		BA EU Scope April 2020 - March 2028		
Actions	Name	Commitment Credit (kBAUA)	Of which committed	Of which completed
14- Broader Approach	Satellite Tokamak (JT-60SA)	275.60	89.72	24.22
	IFMIF/EVEDA	73.20	33.76	7.15
	IFERC	23.44	13.42	7.67

**SPD\_table 2 . Correspondence between Actions, WBS and WP ref for BA**

	
<p>JT-60SA - F4E Cold Cathode Vacuum Gage – Under calibration</p>	<p>JT-60SA F4E supplied Booster PS Filter</p>

**SPD\_figure 8 .JT-60SA**



**SPD\_figure 9 . IFMIF/EVEDA - Top view of LIPAc (Linear IFMIF Prototype Accelerator) in the complete phase B+ configuration to demonstrate operation with a deuterium beam of 125 mA at 5 MeV in continuous wave operation**

## CHANGES AND DEVELOPMENT OVER THE LAST YEAR THAT AFFECT BROADER APPROACH OPERATIONS

- **Satellite Tokamak (JT-60SA):**

Most of the activities in the year 2022 and the first quarter 2023, have been devoted to repair and reinforcement of magnets insulation, following the incident in March 2021 which has triggered a vast plan to reduce the risk of arcing during high voltage operation of the magnets.

After completion of the insulations repair of critical locations the Equilibrium Field (EF) and Central Solenoid coils and the Toroidal Field Coil were still not Paschen-tight, so a new strategy for the operation of the machine has been developed, accepting the limitations of voltage holding in Paschen Region and relying on early detection of vacuum deterioration and de-energization of the magnets.

On the front of the power supplies, two critical improvements were designed and implemented till the first quarter 2023: F4E installed an alternative grounding system of the poloidal superconducting magnets, that halves the max voltage of the coils without restricting the design performance. F4E also procured the Booster Power Supply, including voltage ripple reduction filters.

By April 2023, as part of the new strategy for machine protection, F4E has designed, fabricated, and tested a full set of Cold Cathode Gage vacuum-sensors which can identify minimum variations of vacuum level.

While large human resources were focused on machine repair, the planned activities for Machine Enhancement (M/E) have continued unchanged in scope.

- **IFMIF/EVEDA:**

The Engineering Validation and Engineering Design Activities for the International Fusion Materials Irradiation Facility (IFMIF/EVEDA) are focused on the design and validation of key components needed for the future Fusion Neutron Source facilities (FNS) to characterize materials envisioned for DEMO. While the Engineering Validation Activity of the Lithium Target Facility and the Test Facility was completed with the validation of prototypes, it is still on going for the Accelerator Prototype Facility (LIPAc). The primary goal is the full demonstration of the IFMIF accelerator concept, namely, acceleration and transport of a 9-MeV, 125-mA deuteron beam meeting the beam characteristics requirements in Continuous Wave.

In parallel, the refurbishment and improvement of key subsystems based on the operational feedback have started, and are planned to be deployed after the completion of the primary objective of the IFMIF/EVEDA programme. After these objectives have been achieved, LIPAc will be also used as a test stand, to test new equipment, beam operation strategies, improve and demonstrate reliability of key subsystems, as well as train scientists, engineers, and operators, in order to support the design, construction and operation of the future neutron source facilities like DONES and A-FNS.

Fusion Neutron Source engineering design activities and the Lithium Target Facility engineering validation activities have restarted within the BA phase II framework in collaboration with EUROfusion. The activities are devoted to the enhancement of the design of the Lithium loop and the update of the Fusion Neutron Source Design focusing on safety and accidental scenarios. The use of LIPAc as a testing facility is also considered for design validation studies.

- **IFERC:**

The IFERC project comprises three activities, DEMO design and R&D activities, CSC (Computational Simulation Centre) and REC (Remote Experimentation Centre).

- The DEMO Design Activity (DDA) has focused on the definition of joint design work in key issues, which will impact the selection of main machine parameters and technical specifications for pre-conceptual designs of DEMO. In the DEMO R&D activity, the focus is on the compilation of databases and engineering design handbooks.

- The CSC activity aims to provide HPC (High Power Computer) resources for simulation projects in support of the high priority areas defined in the IFERC Project Plan (ITER, JT-60SA and DEMO).
- REC activities support actively the remote participation in the IFMIF/EVEDA and ITER Projects.

## DONES

DONES (DEMO-Oriented Neutron Source) will be a facility to provide a source of neutrons to test materials under conditions expected in fusion reactors so as to evaluate their lifetime. This project aims to build upon the knowledge gained with the IFMIF/EVEDA project in the Broader Approach.

F4E's role in relation to DONES is to support the host state in its preparations for the project and to support negotiations between Euratom and Japan on the possible implementation of this project in the frame of an international collaboration. Fusion for Energy also aspires to contribute to the construction of DONES with the delivery of the main Accelerator System – a component which F4E is currently engaged to test in a full-scale prototype form in the IFMIF/EVEDA project of the Broader Approach (Rokkasho – Japan) and other systems, which F4E is currently developing for ITER, such as remote handling.

An overall budget of EUR 100 million (2008 value) for DONES was foreseen as of 2023 for a period of 5 years under the above assumption. Such plans are clearly still very provisional and any future work by F4E on DONES will need to be approved by the F4E GB once a global plan for the project is concluded with all stakeholders.

The baseline is currently under assessment as per decision of the DONES Steering Committee on 16<sup>th</sup> March 2023.

## 2.3 DEMO

F4E's task is to prepare and coordinate a programme of activities in preparation for the construction of a demonstration fusion reactor and related facilities. F4E is working closely on DEMO with EUROfusion (a European consortium of fusion laboratories) to which it has seconded a person and will increase its involvement as the construction of ITER will be progressively completed.

In particular, as first programmes of ITER in kind delivery will ramp down during the period of this SPD, F4E will ensure that the know-how gained in these programmes will benefit the DEMO research and design activities. F4E will increase its involvement by partly or fully making available a few key persons from those programmes.

## Section II. Project Plan 2024-2028

In accordance with the Financial Regulation of F4E, this programming document is composed of a Project Plan (PP) that lays down an overall strategic programming foreseen to cover five years (i.e. 2024-2028). The Resource Estimate Plan (REP) complements it and covers the same period.

Within the scope of the Broader Approach programme, this document covers three individual projects: Satellite Tokamak Programme, IFMIF/EVEDA and IFCRC (International Fusion Energy Research Centre).

DEMO, still in a far earlier stage if compared to ITER or BA, is also presented here with the provision of high-level information.

### Challenges

F4E is facing a number of significant challenges in technical, procurement, budget and human resource areas.

#### *Technical and Procurement challenges*

The most significant challenges for F4E are related to its major task of delivering the EU in-kind contributions to ITER. The nature of the F4E activities with respect to ITER is changing throughout its lifecycle. While at the beginning the focus was on the launching of the procurement of the EU in-kind components, the work has evolved into the follow-up of the manufacturing activities and will further evolve in the coming years with a higher degree of involvement in the assembly and testing of the machine.

The next years, represent a period of high uncertainty and significant changes for the organisation. Very significant efforts will be required to deliver the remaining IC/GB milestones. An updated F4E schedule baseline will also need to be developed once the new ITER Project Baseline is approved by the ITER Council. F4E will face the parallel activities of launching a large number of new contracts, while at the same time managing the ongoing delivery of the running contracts and supporting ITER IO with assembly.

#### *Budgetary challenges*

F4E faces significant challenges in implementing its budget within the MFF 2021-2027 as the reference profile is based on the now obsolete 2016 ITER baseline. The new ITER baseline is expected to be completed in 2024 and it is projected to include significant changes, both in scope and in timing. In addition, the need for repairs for ITER in-kind components and the temporary halt of assembly contributed to a slowdown in the overall progress of the project and under-execution of F4E's budget in 2022. The forecast for 2023 also indicates similar level of under-execution. This situation is being closely monitored together with Euratom.

Without a clear understanding of the impacts of the new ITER baseline, the scope and timing of F4E's in-kind contributions and therefore also the annual and overall financial needs and outlays of F4E in the medium term are subject to very large uncertainties.

It is also unclear which will be the budget impact of the ongoing integration efforts between F4E and ITER IO. Nature and extent of any possible transfer of scope (or novation of contracts) and other change of responsibilities between F4E and ITER IO are under discussion.

Besides the proposed changes of the ITER first wall material, other project changes resulting from rebase-lining are presently discussed. This includes for example additional heating systems (including the respective housing buildings), postponement of others, or anticipation of remote handling and diagnostic systems. In addition, the need date, scope and phasing of the Hot Cell Facility construction is still unclear: this is a major portion of the European in-kind contribution (and of the ITER IO in cash needs) and this uncertainty may generate high financial impacts already in the present MFF. All these aspects are not yet fully defined, not evaluated, not decided and their financial impact is not yet assessed.

An F4E-ENER(+IO) task-force has been established to examine the situation and make proposals about how to manage the appropriations F4E has not been able to make use of, as well as the risks of their further potential increase. The risks related to (in)ability of F4E to spend the allocated budget are being evaluated.

Examination of the changing commitment forecast data and the associated risks is being performed through scenario analysis, and the situation has been partially addressed through budgetary adjustments in 2023. However work is still ongoing to define proposals for any potential additional adjustments of the future budgets and their timing.

In the same time, the risk landscape together with the financial impact of risks evolves continuously, which requires prudence when it comes to additional budget adjustments until the situation stabilises.

The planned budgetary needs for the years 2025 onwards correspond to the forecasts prepared at the end of September 2023. These forecasts reflect the best (albeit limited) understanding of the project teams about the expected results of rebase-lining, as well as their capacity and timing to sign new contracts and make deliveries. It is highly probable that significant changes of these figures will occur once the rebase-lining results are factored in 2024 and early 2025. For now, the amount of unused appropriations foreseen at the end of the current MFF should be considered as a general risk reserve provision.

### **Human Resources challenges**

Marc Lachaise took up his new duties as F4E's new Director on 16<sup>th</sup> May 2023. This will most likely be the start of a transition period towards a number of new priorities and readjustments.

The establishment plan reinforcement authorised by the budget authority and the natural turnover in 2023 (estimated at 3.3%) will impact the vacancy rate and the selection and recruitment activity. It is also likely to constitute burden on the regular activities of the services as a result of the expected reassignment of staff.

Natural turnover of middle and senior managers is expected to further add to the destabilisation mentioned above.

The implementation of the change agenda started in 2021 and the magnitude and scope of the envisioned changes will continue to tie-up resources in 2023. Roll out of the different changes is also

likely to have a destabilizing impact in terms of mainstreaming and adjusting to the new processes and ways of working.

F4E recognises that it must carry out its activities following its statutes, in particular regarding staff regulations, and the associated implementing rules. Balancing the strict requirements of the regulatory framework with the flexibility needed to efficiently respond to the project's changing HR needs will therefore remain a key endeavor for the organisation.

Looking forward, F4E will continuously need to adapt and rebalance skills following the different phases of its projects.

### ***Schedule challenges***

The dates provided in this document are according to the F4E Detailed Work Schedule (DWS) at the end of March 2023.

# 1. PROJECT EVOLUTION

## 1.1 ITER

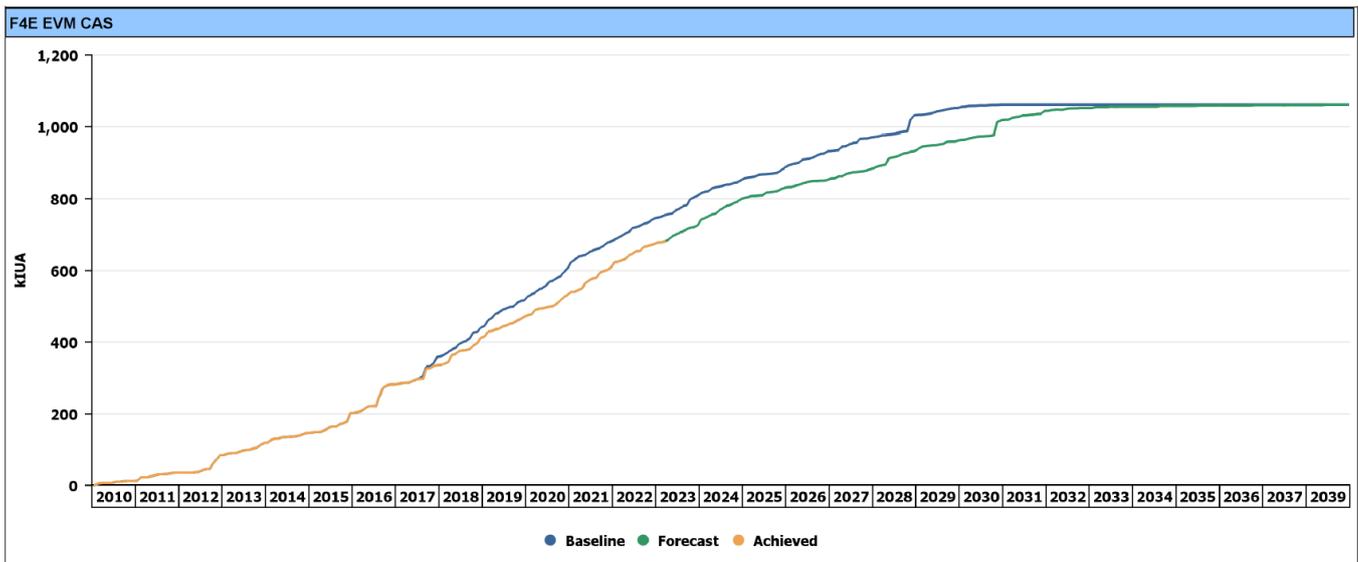
F4E is operating within the classical project ‘iron triangle’ of time, cost and quality, with quality interpreted in the general sense of achieving all the project scope objectives. This requires a continual balance of prioritisations made at management level, and in the daily work of all the staff.

In 2016, the management of the project decided to assign the main priority to those activities that are relevant for achieving a FP. The Revised Construction Strategy with the definition of Required Arrival Dates (RAD) is also in-line with this approach and remains consistent with the Baseline-2016 scheduled dates of Cryostat Closure by December 2024 and First Plasma by December 2025. F4E notes that the overall ITER schedule is under review by the ITER Organization and the ITER Council and these dates will likely change in the coming months.

F4E is progressing with delivery of the various components under its responsibility to IO. The success of this will be critically dependent upon several factors:

- The performance of the various suppliers, and their ability to overcome the inevitable technical challenges and maintain the schedule and quality through the delivery;
- F4E’s management of the suppliers, working with them to ensure a good performance in terms of schedule, quality and cost;
- The avoidance of changes in requirements, design and/or interfaces of the various components to ensure a smooth progression into production and test without perturbations. This has been a significant problem in the past, and considerable efforts have been devoted by both the IO and F4E to achieving a stability in requirements and design.
- In light of the current rebaseline exercise, IO and F4E should focus on reducing complexity.

The graph in Fig. 10 shows the ITER credit achieved until end of March 2023, and the forecast, compared to the 2016 baseline.



**SPD\_figure 10 . Credit Graph for all EU in-kind procurements**

SPD\_table 3 hereafter shows the progress, for all actions for ITER in kind deliveries, in terms of both achieved and released credits against the baseline as well as the forecast of credits for the next five years.

While the total credit value per action is largely stable as modifications would need the approval of the ITER Council through the Overall Project Cost (OPC) document, the credit profile over the years is prone to changes due to many reasons (e.g. delays in the schedule, change of strategy in specific procurements or modification of the IO assembly sequence).

Action*		Baseline to end March 2023 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2024	2025	2026	2027	2028	2029+
Number	Name	755.43566	681.80551	554.31642	73.35065	30.76713	23.01456	30.22597	49.34239	127.84427
Action 1	Magnets	177.92881	174.87481	156.71281	2.39500	0.00000	0.00000	0.00000	0.00000	0.00000
Action 2	Vacuum Vessel	86.26629	65.71200	47.01400	8.88594	5.89535	3.00000	0.00000	0.00000	0.00000
Action 3	In Vessel- Blanket	0.50000	0.35000	0.20000	1.27000	0.35000	0.77000	10.14201	8.66600	23.06100
Action 4	In Vessel- Divertor	3.70000	3.70000	3.62000	0.02500	0.92000	0.38000	1.16000	3.42000	16.05500
Action 5	Remote Handling	13.52974	5.14000	2.90000	2.70000	2.50000	2.19000	3.20000	3.51000	20.30055
Action 6	Cryoplant and Fuel Cycle	38.91857	31.26673	26.84473	6.51848	0.17000	1.40223	1.45319	0.30000	0.60000
Action 8	Heating & Current Drive	50.01812	47.38240	40.53840	11.71314	7.47617	9.73107	4.96372	7.27782	3.60376
Action 9	Diagnostics	8.46957	5.98368	4.04500	3.09726	2.66961	1.12572	1.55517	8.03509	6.73336
Action 11	Site and Buildings and Power Supplies	376.10457	347.39589	272.44148	36.74583	10.78600	4.41554	7.75188	18.13348	57.49060

\* Action 7 Plasma Engineering & Operations, action 10 TBM, action 12 Cash Contributions, action 13 Technical Support Activities and action 15 DONES are not listed in the above table since no kIUA are associated to these actions. Action 14 Broader Approach uses kBAUA instead of kIUA (see full table under PP\_table 8).

**SPD\_table 3 . Credit per Action<sup>12</sup>**

The maturity of each component evolves through a series of phases from design to delivery as normal for any development project. The transition from one phase to the next is authorized through gates where the maturity of the component to move to the next phase is analysed by an independent panel. Approval of starting the next phase is granted only after resolution of the class 1 chits raised during the review.

While the design phases and the related reviews could be competence of either the ITER Organization or F4E, depending on the agreed level of detail of the specific Procurement Arrangement (i.e. functional specifications, detailed design, build-to-print), the reviews for cost and manufacturing are always a F4E responsibility. A policy for the management of the phase gates across F4E has been approved and is being implemented.

<sup>12</sup> **Achieved credit** corresponds to milestones completed by F4E. **Released credit** corresponds to milestones for which F4E received the associated credits (in IUA) from IO.

Figures in column **Baseline** correspond to “Total credit initially planned to be achieved at the end of March 2023”.

Figures in column **Achieved Credit** correspond to “Total achieved credit at the end of March 2023”.

Figures in column **Released Credit** correspond to “Total released credit at the end of March 2023”.

Figures in columns **Forecast** correspond to the “yearly credit to be achieved”.

## 1.2 Cash contribution to Japan

According to the ITER Agreement, there is a transfer of 10% of in-kind procurement responsibility from Euratom to Japan under the supervision of the ITER Organization. This is financed through a cash contribution from EU to Japan paid by F4E.

## 1.3 Broader Approach

All BA projects are now in an advanced implementation stage. The early defined strategy to implement these projects has proven to be successful and hence continues to be employed. This is underpinned by the very close collaboration with the Japanese Implementing Agency QST and all other European stakeholders. The management model follows an agreed Common Quality Management System, defining resources and processes crossing the lines between all involved organisations. Such an approach has allowed to control costs and hence will continue to be pursued.

For **JT-60SA**, the same strategy is planned for the period when the facility will be jointly operated and enhanced by the EU and JA. The return of experience of the activities following the EF incident has indicated the need for F4E to take a wider role for on-site maintenance & repair in support of QST, in the overall interest of the project.

For **IFMIF/EVEDA**, the R&D results planned to be achieved by the beam commissioning of the LIPAc accelerator will provide solid grounds for its full experimental phase, to follow after 2022, as well as for the design and specification, manufacturing, assembly, check out tests, and commissioning of the DONES accelerator.

For **IFERC**, F4E will continue to rely on the full support of EUROfusion for DEMO design activities, R&D activities in materials, and High Power Computing exploitation.

F4E will continue to take the lead in Remote Experimentation (REC) activities with IFMIF-EVEDA, ITER and JT-60SA.

## 1.4 DONES

Considering the possible F4E contribution to the DONES Programme, it is important to plan at an early stage the procurement of essential equipment for DONES for risk mitigation using LIPAc as testing facility.

These procurements are essential to validate the final design of key components, integrating the design improvement as feedback of the ongoing LIPAc engineering validation phases, and also to increase the availability of LIPAc during the commissioning phases with the availability of spare parts.

It is worth to underline that:

- these commissioning phases are identified in the DONES Programme milestones as interface points with the construction phase of the IFMIF-DONES facility (i.e. validation of the RFQ in high duty cycle and SRF Linac at low duty cycle),
- the activities will be performed within the commonalities/interfaces programme agreed between the two projects in complement of the enhancement activities already planned within the IFMIF/EVEDA Project (BA),
- the engineering activities will be performed through insourcing contracts.

The scope of the equipment to be procured and manufactured early will be of the same nature (if not with the same components) as the potential new in-kind contribution. During the procurement and manufacturing of the early components, F4E will focus in acquiring the preparatory knowledge to limit as much as possible setbacks for the future contribution (e.g. RF couplers, SC Cavities, etc.). F4E will then be able to monitor progress and swiftly assess whether the procurement and manufacturing of the future contribution will need to be modified. Hence, the risk of overcosts and schedule slippage will be minimized substantially.

## 1.5 DEMO

EUROfusion is currently carrying out the DEMO-related activities. It is foreseen that F4E will play a stronger role once ITER activities decrease. A continued and strengthened coordination between F4E and the EUROfusion DEMO activities has been suggested in recent reviews<sup>13</sup>. In particular, it is desirable that F4E gradually becomes more involved on key design decisions, and cost & schedule parameters during the DEMO conceptual design phase. F4E should be linked to the EUROfusion Project Governance of the DEMO design activities and other associated supporting technology projects (e.g., ITER TBM and DEMO breeding blanket work packages).

As a step in this direction, a DEMO Programme Steering Board has been established at the end of 2017, to coordinate the DEMO Programme between EUROfusion and F4E, ensuring consistency between design activities and high-level milestones (i.e. IFMIF/DONES, DEMO Design, TBM/BB, BA etc.). F4E is represented by its Director and the Chairman of the Governing Board and EUROfusion is represented by the Programme Manager and the Chair of the General Assembly. In addition, the two Directorates of the EU Commission that are involved in Fusion, namely Research & Technology Development (RTD) and Energy policy (ENER) are represented in this Board together with Industry.

## 1.6 Collaboration with EUROfusion

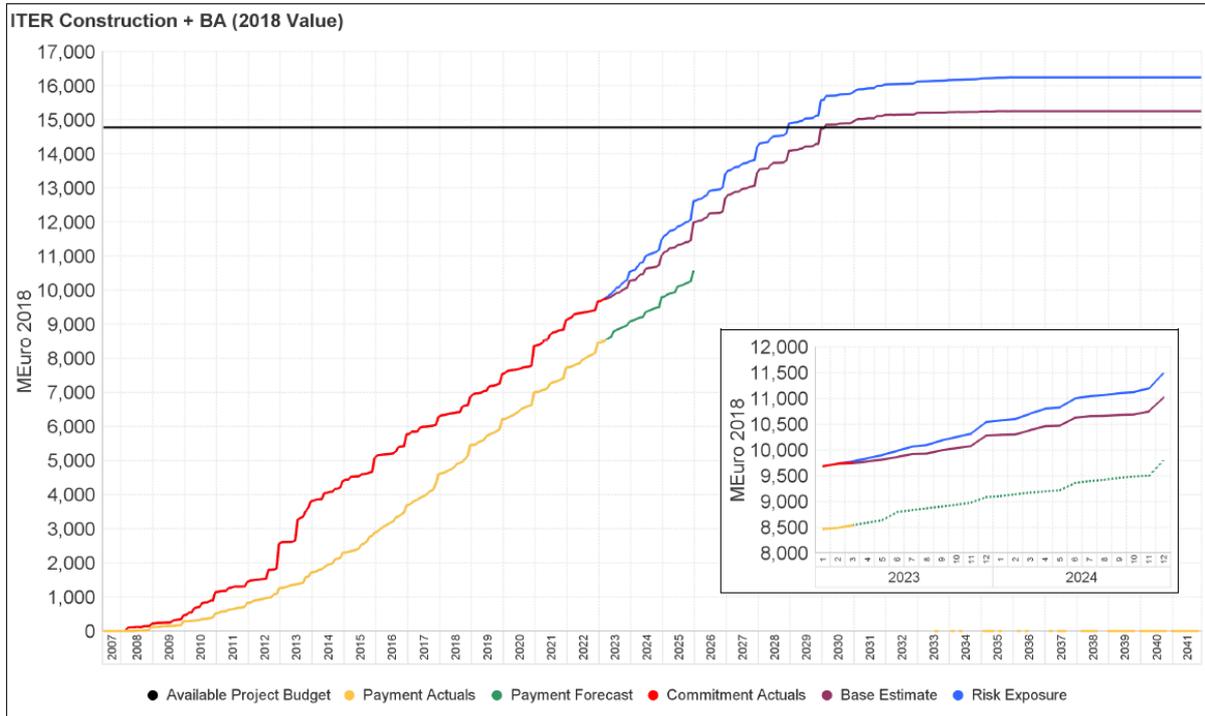
A collaboration with EUROfusion has been implemented on the activities of the ITER Test Blanket Module (TBM) Systems and the BA Projects (i.e. the Satellite Tokamak Programme JT-60SA, IFMIF/EVEDA and IFERC). A Memorandum of Understanding (MoU) between F4E and EUROfusion was signed in the areas of their respective fusion research and development activities, on the basis of mutual benefit and overall reciprocity. The collaboration activities within each specific fusion research and development area are further specified in a Multiannual Programme Plan, drawn up and agreed by the Parties.

## 1.7 F4E financial evolution

The F4E financial evolution is described in the below chart, with achieved values up to March 2023.

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<sup>13</sup> Management / Governance Assessment of EUROfusion & Industry Engagement, 11/07/2016, Ernst & Young.



**SPD\_figure 11. Project Budget, Payments, Actual commitments and EAC.**

The Allocated Project Budget is the portion of the Total Project Budget allocated to individual PAs, ITAs, TBs and Other funded activities.

The “available budget” is the budget that F4E assumes will be made available for all activities (including Broader Approach, F4E administration and Cash Contributions to IO and Japan) through to the end of the ITER construction phase in 2035.

The Payment Actuals represent the cash disbursement to honor legal obligation.

The Payment Forecast represents the most likely value of all payments in period to be done.

The Commitment Actuals represent the total amount of legal obligations already signed.

EAC Base is computed as the sum of Actual Commitments and the Estimate to Complete Base. Within F4E it does not include Risk Exposure.

The “Estimate to complete Base” are the future planned Commitments.

The “Risk Exposure” is the possible Commitment impact of the risks(s) multiplied by the probability of the risk(s) associated to a given activity.

## 2. Multiannual Objectives

This section of the document describes the strategic medium-term objectives of F4E and the way the progress in their achievement is monitored.

F4E has a number of key corporate objectives covering important areas, in particular Health & Safety, nuclear safety and some related to stakeholder satisfaction. The ones included here are the most relevant ones to measure the progress of the projects.

F4E's operative objectives are divided in two types:

- Multiannual objectives;
- Annual objectives.

### 2.1 Selection Criteria

It is important to select objectives which are not only top-level ones but also representatives of the work to be performed in the forthcoming years. Therefore milestones relevant to design, manufacturing, assembly and commissioning are the ideal candidates.

At the same time, it is important to establish a link between the long-term (i.e. Project Plan) planning and the short-term (i.e. work programme) activities, Therefore, as it can be seen in the work programme annex of this document, the multiannual objectives are mirrored on the annual milestones selected as the predecessors of the long-term ones. Such milestones in the short-term will act as an alert against the increasing risk of missing any critical and near-critical path milestones in the longer term.

Regarding the annual objectives, F4E has selected them to monitor those activities that have been identified during the last years as being most relevant for F4E stakeholders, both external (Commission, EU Member States, IO, etc.) and internal. Some of them have been defined after specific request from the Commission.

### 2.2 Multiannual objectives for ITER project

There are 3 multiannual objectives for the ITER Project:

AREA	Objective
GB/IC milestones	Achieve the GB and IC milestones within "agreed quarters"
EVM-CAS SPI <sup>14</sup>	SPI above a defined value
Overall Costs	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.

The GB/IC milestones have been selected by the ITER Council and the F4E Governing Board to represent at best critical achievements for the project and therefore their completion is very important

<sup>14</sup> A new EVM-CAS indicator will start being used once the new ITER Project baseline is approved at the ITER Council.

for the progress in the construction of the machine. They are defined with a rolling wave approach with new ones added to the list as the project progresses. They encompass activities required for the first plasma as well as activities covering later phases of the project (see PP\_table 2 in Annex to Project Plan).

The GB/IC milestones concern the in-kind procurements and do not include the Test Blanket Module (TBM) for which the work is not covered by a standard Procurement Arrangement, but by specific TBM Arrangements (TBMA) signed by F4E in 2014. TBM milestones complement the GB/IC milestones as technical objectives and are presented in PP\_table 3 of the Annexes to the Project Plan.

### **2.3 Multiannual objectives for Broader Approach**

Since 2020, the Broader Approach focuses on enhancing, operating and exploiting the facilities that have been jointly developed with Japan. As ITER is approaching its own tokamak assembly and commissioning phases, teams working on the Broader Approach will work ever more closely with ITER to ensure that it moves forward as smoothly as possible – the collaboration has been underpinned by an agreement between IO, F4E and QST concluded in 2019.

The technical objectives defined for the period up to March 2028 are listed in PP\_tables 4, 5, and 6 of the Annexes to the Project Plan. These simplified tables are largely based on the grouping of the relevant project milestones, originally defined and valorized in the EU (draft or already signed) relevant Procurement Arrangements.

### **2.4 Multiannual objectives for DEMO**

The revised DEMO development plan foresees three phases:

- (i) a Pre-Concept Design Phase;
- (ii) a Conceptual Design Phase; and
- (iii) an Engineering Design Phase.

Specific activities have been identified to be carried out by EUROfusion up to 2025. Some of them are also partially conducted as part of the BA effort.

## 2.5 Annual objectives

In addition to the multiannual objectives, annual objectives are identified and are constantly monitored by F4E and are reported upon during the year. The annual objectives are the following ones:

AREA	Objective <sup>15</sup>
Annual M-SPI	Reach a minimum SPI value by end of the year
Annual commitment budget	Implement a defined percentage of Commitment Appropriations by end of the year
Budgeted forecast of the Work Programme	Implement a defined percentage of allocated commitment appropriation to Work Programme Actions, without reserves, by end of the year
Annual payment budget	Implement a defined percentage of Payment Appropriations by end of the year
Quality – NCR closure time	Ensure Nonconformity Reports (NCR) closure in due time
Quality – NCR closure rate	Close a minimum percentage of NCR annually
Phase gate – Annual implementation	Execute a minimum number of phase gates planned during the year
Human Resources	Vacancy rate to be less than a defined value by end of the year

## 2.6 Key Performance Indicators

A Key Performance Indicator (KPI) is defined for each of the annual and multiannual objectives. The RAG status (Red, Amber, Green status) associated to each of these KPIs is described in the Project Plan.

On request of the Commission the following 2 Key Performance Indicators are also monitored:

- Turnover rate
- Absenteeism rate

## 2.7 Implementation of the F4E strategy to achieve the objectives and define recovery plans

The achievement of the objectives is based on defined strategies. The schedule has been reorganized so as to minimize the risks of delay for the delivery of the components on the critical path. Furthermore, resources have been redistributed to better support the areas where more effort is needed.

The forum for reviewing project progress and taking any necessary actions/decisions to maintain or recover the project status is the Project Steering Meeting (PSM), held once a month with the participation of both senior and middle management. On top of scheduled presentations on progress, KPIs and milestones trend analyses, the Programme managers who have identified a specific issue in their areas

<sup>15</sup> Targets are defined in the Project Plan under section “Objectives and KPIs”.

are requested to present the reason of the issue and to propose a strategy to recover it. The proposal is discussed and an immediate decision is taken.

Actions are assigned to support the decision taken and due dates for the actions are agreed.

The record of recovery plans and issues arising from KPIs are the Record of Decisions (RoD) of the PSM.

#### ***“Red-flagging” and KPI Control Process***

The Project Management KPI process runs on a monthly basis in the background of the PSM.

In the case that a KPI is either amber or red, the Programme Manager may propose one of the following alternatives:

- **Accept:** The Programme Manager proposes in the PSM that the KPI value is accepted. This may be, e.g. because the milestone is not critical, a global commitment is allowed instead of an individual one, etc. If the Director accepts the proposal, the Programme Manager will continue to monitor the KPI and either he/she or the Project Planning and Controlling Group may raise the issue again at a subsequent PSM if the situation regarding the KPI changes or worsens.
- **Recover:** The Programme Manager presents in the PSM the recovery actions launched to bring back the KPI within the accepted range. A due date is also assigned for the completion of the action.

The Programme Manager will report on its progress in subsequent PSMs. When reporting on a recovery plan, the Programme Manager may propose the following alternatives:

- **Close:** The Programme Manager demonstrates in the PSM that the KPI has returned within the agreed range;
- **Accept:** The Programme Manager proposes in the PSM that the current KPI value is accepted. If the Director accepts this proposal, the Programme Manager will continue to monitor the KPI and either he/she or the Project Planning and Controlling Group may raise the issue again at a subsequent PSM if the situation regarding the KPI changes or worsens;
- **Continue to recovery:** The Programme Manager presents the progress on the existing recovery actions in the PSM and updates the PSM on the time period in which the recovery will be complete.

In the case that the Programme Manager has exhausted all available actions to solve the issue, it should be escalated to the next level of management.

# Section III. Resource Estimates Plan

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The Resource Estimates Plan (REP) sets out the indicative human and financial resources deemed necessary for the implementation of the Project Plan and the Annual Work Programme of the Joint Undertaking for the following five financial years<sup>16</sup>.

## FINANCIAL RESOURCE ESTIMATES PLAN

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The EURATOM contribution to ITER for the whole period 2021 to 2027 amounted to EUR 5 614 million of which EUR 5 560 million (in current prices) for F4E authorised by the last amendment to F4E Constituent act in 2021<sup>17</sup>. This amount has been revised downwards in the 2023 and 2024 budgets.

The figures for 2028 are indicative and are based on the Commission staff working document (CSWD) accompanying the communication on EU contribution to a reformed ITER project<sup>18</sup>.

The ITER Host State and Membership contributions are complementing the EURATOM contribution to F4E budget.

## 1. Overview of the past and the current situation

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### 1.1 Execution of Budget 2022

F4E's final available budget for 2022 represents execution rates of 72% in commitments and 91% in payments.

The implementation was impacted by external factors largely outside of F4E control and in particular:

- EUR 112.40 million reduction of the Cash Contribution to ITER,
- EUR 14.68 million extra EURATOM contribution from the European Fusion Research programme,
- EUR 14.95 million extra ITER Host State contribution from balancing calculations for years 2007-2020,

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<sup>16</sup> Article 32 of the F4E Financial Regulation and Communication from the Commission on the Guidelines for Programming Documents for decentralised agencies

<sup>17</sup> COUNCIL DECISION (Euratom) 2021/281 of 22 February 2021 amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it (OJ L62/41 of 23.2.2021)

<sup>18</sup> COMMISSION STAFF WORKING DOCUMENT(CSWD) The ITER Project Status accompanying the Communication from the Commission to the European Parliament and to the Council EU contribution to a reformed ITER project, SWD(2017) 232 final from 14 June 2017.

- EUR 60.5 million in commitments and EUR 58.5 million in payments cashed from ITER Organization for ex-post reimbursement of cost of changes,
- EUR 30 million non-executed commitments: delays in contracts impacted by the international situation.

Following the conservative approach to use global commitments requested by Euratom based on commitment forecasts for 1st quarter of 2023 (and not the full year of 2023), F4E globally committed only EUR 8.13 million covering four well advanced procurement procedures. Without the factors above F4E would have reached the 95% of budget implementation in both commitments and payments.

Commitments	<b>72% execution of the final available budget</b>	Final Budget: 981.18	Execution: 703.98	EUR million
	<b>82% compared to the original budget</b>	Original Budget: 854.49	Execution: 703.98	EUR million
	<b>77% without additional revenue from ITER IO</b>	Standard Budget: 887.74	Execution: 679.93	EUR million
	<b>99% in individual commitments</b>	Execution: 703.98	Ind. Commit: 695.85	EUR million
Payments	<b>91% execution of the final available budget</b>	Final Budget: 844.02	Execution: 765.72	EUR million
	<b>91% compared to the original budget</b>	Original Budget: 845.45	Execution: 765.72	EUR million
	<b>99% without additional revenue from ITER IO</b>	Standard Budget: 760.73	Execution: 749.89	EUR million

**SPD\_Figure 12 Main facts on Budget Execution in 2022**

## 1.2 Budget 2023

F4E budget 2023 was originally adopted on 2 December 2022, amounting to EUR 1 018.6 million in commitment and EUR 820.6 million in payment appropriations. The Original Budget is aligned with the Euratom contribution to F4E set in the EU general Budget 2023.

A first amendment to F4E Budget 2023 was adopted via written procedure on 16 May 2023 with the purpose to (i) decrease Euratom contribution by EUR 10 million in commitment and payment to cover urgent needs of other EU projects and (ii) increasing ITER Host State contribution by EUR 93 670 in commitments due to the corrections in the calculation methodology.

A second amendment to F4E Budget 2023 was adopted by the Governing Board in its meeting in July 2023 with the purpose to approve (i) the decrease in ITER Host State contribution by EUR 30 million in payments due to the lower budget execution and forecast for 2023.

A third amendment to F4E Budget 2023 is proposed to the Governing Board for its meeting in December 2023 with the purpose to approve (i) the decrease in Euratom contribution by EUR 280 million in commitments and by EUR 254 million in payment and (ii) the decrease in ITER Host State contribution by EUR 70 million in commitments.

By the end of September 2023, F4E still faces a significant challenge in implementing its Budget 2023. This challenge is mainly caused by external factors such as the reduced IO cash needs, the on-going discussions on changing the First Wall (FW) armor material, the delay of IO inputs and design maturity on the TB21 and others.

## 2. FINANCIAL OUTLOOK FOR 2024 – 2028

### 2.1 Assumptions

For the period 2024-2027, the figures until 2027 for EURATOM contribution to F4E are in line with the last amendment to F4E's Constituent act in 2021 revised downwards by EUR 370 million in 2024, out of which EUR 120 million following the agreement reached by the European Parliament and the Council on the EU budget for 2024 (and a prior reduction of EUR 470 million in 2023, out of which EUR 280 million proposed in the amendment 3). The totals are in line with the 2024 EC Statement of Estimate published in June 2023<sup>19</sup>. However, the internal allocation of EURATOM operational and administrative contributions does not correspond to the updated MMF figures to ensure that the administrative expenditure is covered by the administrative EURATOM contribution and F4E's membership contributions.

The figures for 2028 are purely indicatives according to the Commission staff working document accompanying the communication on EU contribution to a reformed ITER project for the period 2028-2035. As of the end of September 2023, F4E's funding requirements extend beyond these indicative figures.

The figures used in the Financial Outlook for 2024-2028 are the commitments forecast submitted by the Project Teams by the end of September 2023 without annual allocation of risks and without annual allocation of reserve for operational commitments not forecasted.

The F4E administrative expenditure for 2024 will be covered by the dedicated EURATOM contribution, and by the membership contributions to the Joint Undertaking. The forecast for administrative expenditure 2024 is based on the following main assumptions:

- Annual salary adjustment<sup>20</sup> for 2024: 3.4% based on cost of living in Brussels as reference with a correction coefficient for Spain,
- Vacancy rate in 2024: 7.6%<sup>21</sup>,
- Inflation coefficient on other administrative expenditure: 2.0%,
- Other salary factors: allowances, annual travel expenses, promotions, advancements in step.

The F4E operational budget for 2024 is based on the EURATOM contribution for the MFF 2021-2027, the contributions from the ITER Host state and the F4E members for 2024.

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<sup>19</sup> SEC(2023) 250 Statement of Estimates of the European Commission

<sup>20</sup> Includes already salary adjustment for 2022 of 6.9% and for 2023 of 2.0%

<sup>21</sup> The vacancy rate used for the budget 2024 calculated at the beginning of 2023 was 3.4%. However the 2024 forecast calculated in October 2023 used a higher vacancy rate of 7.6%

The main F4E operational activities in 2024 will be covered under two budget chapters: ITER construction including the site preparation and ITER Host State (IHS) contribution for the ITER construction that complements the first chapter for the ITER construction. The biggest part of the operational budget for 2024 will be spent for the provision of the cash contribution to ITER due for year 2025, followed by Buildings and Power supplies for the ITER site in Cadarache, In Vessel, Broader Approach, and Heating and Current Drive.

It shall be noted that the F4E operational activities in 2024 include activities related to the F4E participation to the Technology for DONES. The figures provided in the present SPD are preliminary assuming that a decision to proceed with DONES will take place by 2023.

The F4E Financial Regulation foresees the possibility to make the unused appropriations available again as revenue in subsequent budgetary years according to the project needs. By the end of September 2023, the amount of EUR 505.6 million<sup>22</sup> of commitment appropriations was cancelled. F4E introduces in the present SPD a forecast of budgetary surplus/deficit based on the commitment forecast without taking into account annual allocation of risk provision. Based on the above, the forecasted unused appropriation at the end of the MFF 2021-2027 is estimated to be EUR 458.6 million for the EU contribution. This amount serves as a safeguard to cover F4E's potential risk exposure, especially pending the conclusion of the revised ITER baseline.

For years 2024-2028, the figures are indicative and subject to the outcome of the respective budgetary procedures of the F4E contributors (EURATOM, ITER Host State and Members).

The key underlying assumptions for the 2024-2028 needs are as follow:

- The ITER construction phase will continue, and the EU Cash Contribution will gradually and predictably increase starting in 2024, in accordance with the information received from the ITER Organization in 2023.
- The main contract for the Hot Cell Complex is forecasted to be signed in 2029 with costs corresponding to the original scope.

It is assumed that there will be no interruption in activities due to actions taken by the nuclear safety authority. The tables below show the execution for 2022, the budget 2023, including Amendment 3 to Budget 2023 proposed to F4E Governing Board, and the Estimates of Revenue and Expenditure for the next five years, from 2024 to 2028. The explanatory notes of the Estimates for revenue and expenditure are provided in the annexes.

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<sup>22</sup> the details are provided in the Annex to Section III "Resource Estimates Plan"

## 2.2 Estimate of Revenue in Commitment Appropriations for next five years

REVENUE  Commitment appropriations (EUR)	2022		2023		2024			2025		2026		2027		2028	
	Execution	Budget AM3	Forecast	VAR 2023/22	Budget	Forecast	VAR 2024/23	Planned needs	VAR 2025/24	Planned needs	VAR 2026/25	Planned needs	VAR 2027/26	Planned needs	VAR 2028/27
<b>1 REVENUE FROM FEES AND CHARGES</b>															
<b>2. EU CONTRIBUTION</b>	<b>718 675 514</b>	<b>591 984 584</b>	<b>591 984 584</b>	<b>-17.6%</b>	<b>428 960 169</b>	<b>428 960 169</b>	<b>-27.5%</b>	<b>680 755 579</b>	<b>37.0%</b>	<b>846 554 592</b>	<b>19.6%</b>	<b>657 049 051</b>	<b>-28.8%</b>	<b>526 880 000</b>	<b>-24.7%</b>
<i>Administrative (To Title 1 and 2)</i>	65 043 221	65 347 477	65 347 477	0.5%	72 781 757	72 781 757	11.4%	76 683 900	5.1%	81 109 000	5.5%	83 278 000	2.6%	85 800 000	2.9%
<i>Operational (To Title 3)</i>	652 623 722	476 781 095	476 781 095	-26.9%	355 220 669	355 220 669	-25.5%	604 071 679	41.2%	765 445 592	21.1%	573 771 051	-33.4%	441 080 000	-30.1%
<i>Recovery from previous years administrative</i>	1 008 571	726 813	726 813	-27.9%	957 743	957 743	31.8%								
<i>Recovery from previous years operational</i>		49 129 199	49 129 199												
<b>3 THIRD PARTIES CONTRIBUTION</b>	<b>165 450 574</b>	<b>115 886 340</b>	<b>115 886 340</b>	<b>-30.0%</b>	<b>91 311 912</b>	<b>91 311 912</b>	<b>-21.2%</b>	<b>134 684 880</b>	<b>32.2%</b>	<b>180 089 597</b>	<b>25.2%</b>	<b>124 947 254</b>	<b>-44.1%</b>	<b>141 120 000</b>	<b>11.5%</b>
<i>Of which ITER Host State contribution</i>	158 750 574	108 586 340	108 586 340	-31.6%	83 111 912	83 111 912	-23.5%	126 184 880	34.1%	171 289 597	26.3%	115 947 254	-47.7%	131 720 000	12.0%
<i>Of which Membership contribution</i>	6 700 000	7 300 000	7 300 000	9.0%	8 200 000	8 200 000	12.3%	8 500 000	3.5%	8 800 000	3.4%	9 000 000	2.2%	9 400 000	4.3%
<i>Of which Other contributions</i>															
<b>4 MISCELLANEOUS REVENUE</b>	<b>156 570</b>	<b>281 462</b>	<b>281 462</b>	<b>79.8%</b>											
<b>5 ADMINISTRATIVE OPERATIONS</b>															
<b>6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT</b>															
<b>7 CORRECTION OF BUDGETARY IMBALANCES</b>														<b>387 788 419</b>	
<b>8 INTERESTS GENERATED</b>															
<b>9 UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - CARRIED OVER</b>	<b>3 226 238</b>	<b>48 423 190</b>	<b>48 423 190</b>	<b>1400.9%</b>		<b>61 909 293</b>									
<b>9 BIS UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - MADE AVAILABLE AGAIN</b>					<b>150 000 000</b>	<b>176 048 225</b>		<b>74 071 664</b>		<b>-46 622 419</b>		<b>-23 128 604</b>			
<b>TOTAL REVENUE</b>	<b>887 508 897</b>	<b>756 575 575</b>	<b>756 575 575</b>	<b>-14.8%</b>	<b>670 272 081</b>	<b>758 229 600</b>	<b>-11.4%</b>	<b>889 512 122</b>	<b>24.6%</b>	<b>980 021 770</b>	<b>9.2%</b>	<b>758 867 701</b>	<b>-29.1%</b>	<b>1 055 788 419</b>	<b>28.1%</b>
<b>ADDITIONAL REVENUE</b>	<b>93 674 409</b>	<b>48 674 842</b>	<b>48 674 842</b>	<b>-48.0%</b>	<b>p.m.</b>	<b>36 322 585</b>		<b>p.m.</b>		<b>p.m.</b>		<b>p.m.</b>		<b>p.m.</b>	
<i>Revenue from ITER Organization</i>	79 213 457	29 197 696	29 197 696	-63.1%	<i>p.m.</i>	<i>p.m.</i>		<i>p.m.</i>		<i>p.m.</i>		<i>p.m.</i>		<i>p.m.</i>	
<i>Revenue from ITER Organization carried over</i>	14 231 772	19 173 461	19 173 461	34.7%		36 322 585									
<i>Other Assigned Revenue</i>															
<i>Recoveries</i>	195 552	294 935	294 935	50.8%											
<i>Recoveries carried over</i>	33 628	8 750	8 750	-74.0%											
<b>TOTAL REVENUE AVAILABLE</b>	<b>981 183 305</b>	<b>805 250 418</b>	<b>805 250 418</b>	<b>-17.9%</b>	<b>670 272 081</b>	<b>794 552 185</b>	<b>-16.8%</b>	<b>889 512 122</b>	<b>24.6%</b>	<b>980 021 770</b>	<b>9.2%</b>	<b>758 867 701</b>	<b>-29.1%</b>	<b>1 055 788 419</b>	<b>28.1%</b>

Note 1: the 2024-2028 breakdown is only indicative subject to the outcome of the budget procedure

Note 2: The EU contribution - recovery from previous years operational in 2023 corresponds to the regularisation of extraordinary assigned revenue from ITER Organization

Note 2: the 2024 forecasted figure of unused appropriation from previous year under point 9 correspond to the carry over of the 2023 ITER Host State contribution to 2024 (based on the WP 2023 Amendment 2) plus the adjustment of the French contribution for the year 2022

Note 3: the plan for reabsorption/cancellation of appropriation under the point 9 bis for the years 2024-2028 is based on the commitment forecast with end of September 2023 data (excluding risks)

Note 4: The 'correction of budgetary imbalances' represents the additional contribution that would be needed to cover F4E needs compared to the Commission Staff Working Document SWD(2017)232

VAR: Variation compared to the previous budget

**SPD\_Table 4 Revenue in Commitment Appropriations for 2022-2028**

## 2.3 Estimate of Revenue in Payment Appropriations for next five years

REVENUE	2022		2023			2024			2025		2026		2027		2028	
	Execution	Budget AM3	Budget AM3 (including admin carry over)	Forecast	VAR 2023/22	Budget	Forecast	VAR 2024/23	Planned needs	VAR 2025/24	Planned needs	VAR 2026/25	Planned needs	VAR 2027/26	Planned needs	VAR 2028/27
<b>1 REVENUE FROM FEES AND CHARGES</b>																
<b>2. EU CONTRIBUTION</b>	<b>597 940 017</b>	<b>455 012 774</b>	<b>455 012 774</b>	<b>455 012 774</b>	<b>-23.9%</b>	<b>502 059 500</b>	<b>502 059 500</b>	<b>10.3%</b>	<b>667 683 900</b>	<b>24.8%</b>	<b>723 930 000</b>	<b>7.8%</b>	<b>617 739 000</b>	<b>-17.2%</b>	<b>564 829 000</b>	<b>-9.4%</b>
<i>Administrative (To Title 1 and 2)</i>	65 043 221	65 347 477	65 347 477	65 347 477	0.5%	72 781 757	72 781 757	11.4%	76 683 900	5.1%	81 109 000	5.5%	83 278 000	2.6%	85 800 000	2.9%
<i>Operational (To Title 3)</i>	531 752 975	334 161 525	334 161 525	334 161 525	-37.2%	428 091 497	428 091 497	28.1%	591 000 000	27.6%	642 821 000	8.1%	534 461 000	-20.3%	479 029 000	-11.6%
<i>Recovery from previous years administrative</i>	1 008 571	726 813	726 813	726 813	-27.9%	957 743	957 743	31.8%								
<i>Recovery from previous years operational</i>	135 251	54 776 959	54 776 959	54 776 959	40400.4%	228 503	228 503	-99.6%								
<b>3 THIRD PARTIES CONTRIBUTION</b>	<b>155 500 000</b>	<b>120 700 000</b>	<b>120 700 000</b>	<b>120 700 000</b>	<b>-22.4%</b>	<b>134 600 000</b>	<b>134 600 000</b>	<b>11.5%</b>	<b>137 500 000</b>	<b>2.1%</b>	<b>144 800 000</b>	<b>5.0%</b>	<b>143 000 000</b>	<b>-1.3%</b>	<b>129 400 000</b>	<b>-10.5%</b>
<i>Of which ITER Host State contribution</i>	148 800 000	113 400 000	113 400 000	113 400 000	-23.8%	126 400 000	126 400 000	11.5%	129 000 000	2.1%	136 000 000	5.4%	134 000 000	-1.5%	120 000 000	-10.4%
<i>Of which Membership contribution</i>	6 700 000	7 300 000	7 300 000	7 300 000	9.0%	8 200 000	8 200 000	12.3%	8 500 000	3.5%	8 800 000	3.4%	9 000 000	2.2%	9 400 000	4.3%
<i>Of which Other contributions</i>																
<b>4 MISCELLANEOUS REVENUE</b>	<b>156 570</b>	<b>281 462</b>	<b>281 462</b>	<b>281 462</b>	<b>79.8%</b>											
<b>5 ADMINISTRATIVE OPERATIONS</b>																
<b>6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT</b>																
<b>7 CORRECTION OF BUDGETARY IMBALANCES</b>																
<b>8 INTERESTS GENERATED</b>																
<b>9 UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - CARRIED OVER</b>	<b>78 902 229</b>	<b>3 379 263</b>	<b>10 290 802</b>	<b>10 290 802</b>	<b>-95.7%</b>											
<b>TOTAL REVENUE</b>	<b>832 498 816</b>	<b>579 373 498</b>	<b>586 285 037</b>	<b>586 285 037</b>	<b>-30.4%</b>	<b>636 659 500</b>	<b>636 659 500</b>	<b>9.9%</b>	<b>805 183 900</b>	<b>20.9%</b>	<b>868 730 000</b>	<b>7.3%</b>	<b>760 739 000</b>	<b>-14.2%</b>	<b>694 229 000</b>	<b>-9.6%</b>
<b>ADDITIONAL REVENUE</b>	<b>84 255 699</b>	<b>25 096 113</b>	<b>25 110 644</b>	<b>25 110 644</b>	<b>-70.2%</b>	<b>p.m.</b>	<b>23 991 730</b>		<b>p.m.</b>		<b>p.m.</b>		<b>p.m.</b>		<b>p.m.</b>	
<i>Revenue from ITER Organization</i>	76 973 579	6 884 475	6 884 475	6 884 475	-91.1%	p.m.	p.m.		p.m.		p.m.		p.m.		p.m.	
<i>Revenue from ITER Organization carried over</i>	6 315 804	17 107 255	17 107 255	17 107 255	170.9%		23 991 730									
<i>Other Assigned Revenue</i>	736 528	736 528	736 528	736 528	0.0%											
<i>Recoveries</i>	195 552	294 935	294 935	294 935	50.8%											
<i>Recoveries carried over</i>	34 236	72 921	87 452	87 452	113.0%											
<b>TOTAL REVENUE AVAILABLE</b>	<b>916 754 515</b>	<b>604 469 612</b>	<b>611 395 681</b>	<b>611 395 681</b>	<b>-34.1%</b>	<b>636 659 500</b>	<b>660 651 230</b>	<b>5.3%</b>	<b>805 183 900</b>	<b>20.9%</b>	<b>868 730 000</b>	<b>7.3%</b>	<b>760 739 000</b>	<b>-14.2%</b>	<b>694 229 000</b>	<b>-9.6%</b>

Note 1: The 2024-2028 breakdown is only indicative subject to the outcome of the budget procedure.

Note 2: The EU contribution - recovery from previous years operational in 2023 corresponds to the recovery of the outturn plus the regularisation of extraordinary assigned revenue from ITER Organization

**SPD\_Table 5 Revenue in Payment Appropriations for 2022-2028**

## 2.4 Expenditure in Commitment Appropriations for next five years

EXPENDITURE In Commitment Appropriations (EUR)	2022	2023			2024			2025		2026		2027		2028	
	Execution	Budget AM3	Forecast	VAR 2023/22	Budget	Forecast	VAR 2024/23	Planned needs	VAR 2025/24	Planned needs	VAR 2026/25	Planned needs	VAR 2027/26	Planned needs	VAR 2028/27
<b>Total Title 1 &amp; Title 2 Administrative Expenditure</b>	<b>76 614 529</b>	<b>73 402 193</b>	<b>74 319 141</b>	<b>-4.19%</b>	<b>81 939 500</b>	<b>81 348 400</b>	<b>11.63%</b>	<b>85 183 900</b>	<b>3.96%</b>	<b>88 730 000</b>	<b>4.16%</b>	<b>90 739 000</b>	<b>2.26%</b>	<b>94 229 000</b>	<b>3.85%</b>
<b>Title 1 Staff Expenditure</b>	<b>67 856 938</b>	<b>62 556 772</b>	<b>63 375 900</b>	<b>-7.8%</b>	<b>70 551 000</b>	<b>68 241 000</b>	<b>12.8%</b>	<b>71 859 400</b>	<b>1.9%</b>	<b>75 141 000</b>	<b>4.6%</b>	<b>76 879 000</b>	<b>2.3%</b>	<b>80 094 000</b>	<b>4.2%</b>
Salaries & allowances	61 445 541	54 737 000	56 060 000	-10.9%	62 380 000	60 045 000	14.0%	63 273 000	1.4%	66 395 000	4.9%	67 960 000	2.4%	70 998 000	4.5%
Establishment plan posts	47 030 727	43 005 000	42 739 000	-8.6%	49 470 000	47 187 000	15.0%	49 845 000	0.8%	52 148 000	4.6%	53 579 000	2.7%	55 971 000	4.5%
External staff	14 414 814	11 732 000	13 321 000	-18.6%	12 910 000	12 858 000	10.0%	13 428 000	4.0%	14 247 000	6.1%	14 381 000	0.9%	15 027 000	4.5%
Expenditure relating to Staff recruitment	712 232	836 500	738 000	17.4%	964 000	984 000	15.2%	988 000	2.5%	1 008 000	2.0%	1 028 000	2.0%	1 048 000	1.9%
Mission expenses	381 000	647 000	700 000	69.8%	650 000	700 000	0.5%	700 000	7.7%	714 000	2.0%	728 000	2.0%	743 000	2.1%
Socio-medical infrastructure	502 000	666 900	636 400	32.8%	592 000	665 000	-11.2%	699 000	18.1%	713 000	2.0%	728 000	2.1%	743 000	2.1%
Training	668 069	850 000	850 500	27.2%	807 000	804 000	-5.1%	818 000	1.4%	834 000	2.0%	851 000	2.0%	868 000	2.0%
External Services	960 000	830 000	650 000	-13.5%	800 000	800 000	-3.6%	850 000	6.3%	867 000	2.0%	884 000	2.0%	902 000	2.0%
Receptions, events and representation	5 274	5 000	5 000	-5.2%	5 000	5 000	0.0%	5 000	0.0%	5 000	0.0%	5 000	0.0%	5 000	0.0%
Social welfare	62 200	50 000	63 000	-19.6%	60 000	67 000	20.0%	68 000	13.3%	69 000	1.5%	70 000	1.4%	71 000	1.4%
Other Staff related expenditure	3 120 623	3 934 372	3 673 000	26.1%	4 293 000	4 171 000	9.1%	4 458 400	3.9%	4 536 000	1.7%	4 625 000	2.0%	4 716 000	2.0%
<b>Title 2 Infrastructure and operating expenditure</b>	<b>8 757 590</b>	<b>10 845 421</b>	<b>10 943 241</b>	<b>23.8%</b>	<b>11 388 500</b>	<b>13 107 400</b>	<b>5.0%</b>	<b>13 324 500</b>	<b>17.0%</b>	<b>13 589 000</b>	<b>2.0%</b>	<b>13 860 000</b>	<b>2.0%</b>	<b>14 135 000</b>	<b>2.0%</b>
Rental of buildings and associated costs	1 609 000	1 632 000	1 879 000	1.4%	2 056 000	2 269 000	26.0%	2 330 000	13.3%	2 378 000	2.1%	2 426 000	2.0%	2 475 000	2.0%
Information, communication technology and data proc.	3 996 977	4 981 750	5 239 000	24.6%	5 235 000	6 462 000	5.1%	6 591 000	25.9%	6 723 000	2.0%	6 857 000	2.0%	6 994 000	2.0%
Movable property and associated costs	154 852	387 840	260 000	150.5%	460 000	457 000	18.6%	461 000	0.2%	470 000	2.0%	479 000	1.9%	488 000	1.9%
Current administrative expenditure	1 614 118	2 253 100	2 103 710	39.6%	2 113 500	2 441 000	-6.2%	2 453 500	16.1%	2 502 000	2.0%	2 552 000	2.0%	2 602 000	2.0%
Postage / Telecommunications	525 500	738 500	590 500	40.5%	639 000	572 000	-13.5%	584 000	-8.6%	595 000	1.9%	607 000	2.0%	619 000	2.0%
Meeting expenses	423 550	533 000	602 500	25.8%	576 000	597 400	8.1%	596 000	3.5%	607 000	1.8%	620 000	2.1%	633 000	2.1%
Running costs linked to operational activities		14 531	14 531	-											
Information and publishing	20 000	38 700	21 000	93.5%	40 000	40 000	3.4%	40 000	0.0%	41 000	2.5%	42 000	2.4%	43 000	2.4%
Studies															
Other infrastructure and operating expenditure	413 593	266 000	233 000	-35.7%	269 000	269 000	1.1%	269 000	0.0%	273 000	1.5%	277 000	1.5%	281 000	1.4%
<b>Total Title 3 &amp; Title 4 Operational Expenditure</b>	<b>627 319 490</b>	<b>731 848 225</b>	<b>506 430 861</b>	<b>16.7%</b>	<b>588 332 581</b>	<b>680 233 167</b>	<b>-19.6%</b>	<b>804 328 222</b>	<b>36.7%</b>	<b>891 291 770</b>	<b>10.8%</b>	<b>668 128 701</b>	<b>-25.0%</b>	<b>961 559 419</b>	<b>43.9%</b>
<b>Title 3 Operational expenditure</b>	<b>487 706 758</b>	<b>526 482 069</b>	<b>393 135 340</b>	<b>8.0%</b>	<b>505 220 669</b>	<b>531 859 994</b>	<b>-4.0%</b>	<b>678 143 343</b>	<b>34.2%</b>	<b>720 002 173</b>	<b>6.2%</b>	<b>552 181 447</b>	<b>-23.3%</b>	<b>829 839 419</b>	<b>50.3%</b>
ITER construction including site preparation	429 211 077	463 047 611	329 700 882	7.9%	416 958 506	427 771 313	-10.0%	569 939 843	36.7%	626 408 673	9.9%	472 691 447	-24.5%	689 916 919	46.0%
Technology for ITER and DEMO	3 497 257	3 863 172	3 863 172	10%	10 012 547	12 012 547	159.2%	7 503 500	-25.1%	6 693 500	-10.8%	1 890 000	-71.8%	35 122 500	1758.3%
Technology for Broader Approach	16 842 431	33 294 531	33 294 531	97.7%	49 583 165	56 483 165	48.9%	51 800 000	4.5%	31 900 000	-38.4%	22 500 000	-29.5%	47 900 000	112.9%
Technology for DONES		15 000	15 000	-	1 800 000	1 800 000	11900.0%	23 900 000	1227.8%	30 000 000	25.5%	30 100 000	0.3%	31 900 000	6.0%
External Support Activities	30 868 788	21 184 331	21 184 331	-31.4%	20 259 068	24 655 586	-4.4%	20 000 000	-1.3%	20 000 000	0.0%	20 000 000	0.0%	20 000 000	0.0%
Other Operational Expenditure	7 287 207	5 077 424	5 077 424	-30.3%	6 607 383	9 137 383	30.1%	5 000 000	-24.3%	5 000 000	0.0%	5 000 000	0.0%	5 000 000	0.0%
<b>Title 4 Earmarked Expenditure</b>	<b>139 612 731</b>	<b>205 366 156</b>	<b>113 295 521</b>	<b>47.1%</b>	<b>83 111 912</b>	<b>148 373 172</b>	<b>-59.5%</b>	<b>126 184 880</b>	<b>51.8%</b>	<b>171 289 597</b>	<b>35.7%</b>	<b>115 947 254</b>	<b>-32.3%</b>	<b>131 720 000</b>	<b>13.6%</b>
ITER construction- from ITER host state contribution	115 556 047	156 994 999	101 246 949	35.9%	83 111 912	145 021 205	-47.1%	126 184 880	51.8%	171 289 597	35.7%	115 947 254	-32.3%	131 720 000	13.6%
Tasks from ITER Organization	24 056 684	48 371 158	12 048 573	101.1%	p.m.	3 351 967		p.m.		p.m.		p.m.		p.m.	
Other Earmarked expenditure															
<b>TOTAL EXPENDITURE</b>	<b>703 934 018</b>	<b>805 250 418</b>	<b>580 750 001</b>	<b>14.4%</b>	<b>670 272 081</b>	<b>761 581 567</b>	<b>-16.8%</b>	<b>889 512 122</b>	<b>32.7%</b>	<b>980 021 770</b>	<b>10.2%</b>	<b>758 867 701</b>	<b>-22.6%</b>	<b>1 055 788 419</b>	<b>39.1%</b>

Note 1: F4E planned needs is based on the commitment forecast with end of September 2023 data (excluding risk)  
 VAR: Variation compared to the previous budget

SPD\_Table 6 Expenditure in Commitment Appropriations for 2022-2028

## 2.5 Expenditure in Payment Appropriations for next five years

EXPENDITURE In Payment Appropriations (EUR)	2022		2023				2024			2025		2026		2027		2028	
	Execution	Budget AM3	Estimated Budget available (including admin carry over)	Forecast (including admin carry over)	VAR 2023/22	Budget	Forecast	VAR 2024/23	Planned needs	VAR 2025/24	Planned needs	VAR 2026/25	Planned needs	VAR 2027/26	Planned needs	VAR 2028/27	
<b>Total Title 1 &amp; Title 2 Administrative Expenditure</b>	<b>73 573 466</b>	<b>73 387 662</b>	<b>80 313 732</b>	<b>81 230 680</b>	<b>-0.3%</b>	<b>81 939 500</b>	<b>81 348 400</b>	<b>11.7%</b>	<b>85 183 900</b>	<b>4.0%</b>	<b>88 730 000</b>	<b>4.2%</b>	<b>90 739 000</b>	<b>2.3%</b>	<b>94 229 000</b>	<b>3.8%</b>	
<b>Title 1 Staff Expenditure</b>	<b>65 152 977</b>	<b>62 556 772</b>	<b>66 189 856</b>	<b>67 008 984</b>	<b>-4.0%</b>	<b>70 551 000</b>	<b>68 241 000</b>	<b>12.8%</b>	<b>71 859 400</b>	<b>1.9%</b>	<b>75 141 000</b>	<b>4.6%</b>	<b>76 879 000</b>	<b>2.3%</b>	<b>80 094 000</b>	<b>4.2%</b>	
Salaries & allowances	59 176 253	54 737 000	57 048 183	58 371 183	-7.5%	62 380 000	60 045 000	14.0%	63 273 000	1.4%	66 395 000	4.9%	67 960 000	2.4%	70 998 000	4.5%	
Establishment plan posts	45 330 727	43 005 000	44 705 000	44 439 000	-5.1%	49 470 000	47 187 000	15.0%	49 845 000	0.8%	52 148 000	4.6%	53 579 000	2.7%	55 971 000	4.5%	
External staff	13 845 527	11 732 000	12 343 183	13 932 183	-15.3%	12 910 000	12 858 000	10.0%	13 428 000	4.0%	14 247 000	6.1%	14 381 000	0.9%	15 027 000	4.5%	
Expenditure relating to Staff recruitment	702 284	836 500	902 664	804 164	19.1%	964 000	984 000	15.2%	988 000	2.5%	1 008 000	2.0%	1 028 000	2.0%	1 048 000	1.9%	
Mission expenses	349 350	647 000	721 090	774 090	85.2%	650 000	700 000	0.5%	700 000	7.7%	714 000	2.0%	728 000	2.0%	743 000	2.1%	
Socio-medical infrastructure	377 194	666 900	875 299	844 799	76.8%	592 000	665 000	-11.2%	699 000	18.1%	713 000	2.0%	728 000	2.1%	743 000	2.1%	
Training	605 855	850 000	1 237 124	1 237 624	40.3%	807 000	804 000	-5.1%	818 000	1.4%	834 000	2.0%	851 000	2.0%	868 000	2.0%	
External Services	740 400	830 000	1 099 786	919 786	12.1%	800 000	800 000	-3.6%	850 000	6.3%	867 000	2.0%	884 000	2.0%	902 000	2.0%	
Receptions, events and representation	1 850	5 000	8 549	8 549	170.3%	5 000	5 000	0.0%	5 000	0.0%	5 000	0.0%	5 000	0.0%	5 000	0.0%	
Social welfare	51 864	50 000	77 152	90 152	-3.6%	60 000	67 000	20.0%	68 000	13.3%	69 000	1.5%	70 000	1.4%	71 000	1.4%	
Other Staff related expenditure	3 147 927	3 934 372	4 220 009	3 958 637	25.0%	4 293 000	4 171 000	9.1%	4 458 400	3.9%	4 536 000	1.7%	4 625 000	2.0%	4 716 000	2.0%	
<b>Title 2 Infrastructure and operating expenditure</b>	<b>8 420 489</b>	<b>10 830 890</b>	<b>14 123 875</b>	<b>14 221 695</b>	<b>28.6%</b>	<b>11 388 500</b>	<b>13 107 400</b>	<b>5.1%</b>	<b>13 324 500</b>	<b>14.5%</b>	<b>13 589 000</b>	<b>1.9%</b>	<b>13 860 000</b>	<b>2.0%</b>	<b>14 135 000</b>	<b>1.9%</b>	
Rental of buildings and associated costs	1 304 256	1 632 000	2 228 969	2 475 969	25.1%	2 056 000	2 269 000	26.0%	2 330 000	13.3%	2 378 000	2.1%	2 426 000	2.0%	2 475 000	2.0%	
Information, communication technology and data proc.	4 270 418	4 981 750	6 464 284	6 721 534	16.7%	5 235 000	6 462 000	5.1%	6 591 000	25.9%	6 723 000	2.0%	6 857 000	2.0%	6 994 000	2.0%	
Movable property and associated costs	202 720	387 840	460 856	333 016	91.3%	460 000	457 000	18.6%	461 000	0.2%	470 000	2.0%	479 000	1.9%	488 000	1.9%	
Current administrative expenditure	1 459 736	2 252 100	2 890 015	2 740 625	54.3%	2 113 500	2 441 000	-6.2%	2 453 500	16.1%	2 502 000	2.0%	2 552 000	2.0%	2 602 000	2.0%	
Postage / Telecommunications	365 893	738 500	978 935	830 935	101.8%	639 000	572 000	-13.5%	584 000	-8.6%	595 000	1.9%	607 000	2.0%	619 000	2.0%	
Meeting expenses	373 267	533 000	693 574	763 074	42.8%	576 000	597 400	8.1%	596 000	3.5%	607 000	1.8%	620 000	2.1%	633 000	2.1%	
Running costs linked to operational activities	15 943		14 531	14 531													
Information and publishing	22 487	38 700	42 471	24 771	72.1%	40 000	40 000	3.4%	40 000	0.0%	41 000	2.5%	42 000	2.4%	43 000	2.4%	
Studies				0													
Other infrastructure and operating expenditure	405 769	266 000	350 240	317 240	-34.4%	269 000	269 000	1.1%	269 000	0.0%	273 000	1.5%	277 000	1.5%	281 000	1.4%	
<b>Total Title 3 &amp; Title 4 Operational Expenditure</b>	<b>692 148 245</b>	<b>531 081 950</b>	<b>531 081 950</b>	<b>506 187 802</b>	<b>-23.27%</b>	<b>554 720 000</b>	<b>555 311 100</b>	<b>4.45%</b>	<b>720 000 000</b>	<b>29.80%</b>	<b>780 000 000</b>	<b>8.33%</b>	<b>670 000 000</b>	<b>-14.10%</b>	<b>600 000 000</b>	<b>-10.45%</b>	
<b>Title 3 Operational expenditure</b>	<b>528 289 679</b>	<b>389 574 429</b>	<b>389 574 429</b>	<b>388 672 012</b>	<b>-26.3%</b>	<b>428 320 000</b>	<b>428 911 100</b>	<b>9.9%</b>	<b>591 000 000</b>	<b>38.0%</b>	<b>644 000 000</b>	<b>9.0%</b>	<b>536 000 000</b>	<b>-16.8%</b>	<b>480 000 000</b>	<b>-10.4%</b>	
ITER construction including site preparation	496 699 312	332 617 544	332 617 544	331 715 127	-33.0%	344 320 000	344 911 100	3.5%	519 400 000	50.8%	570 100 000	9.8%	468 500 000	-17.8%	420 000 000	-10.4%	
Technology for ITER and DEMO	2 418 482	5 300 000	5 300 000	5 300 000	119.1%	6 500 000	6 500 000	22.6%	6 500 000	0.0%	8 800 000	35.4%	2 800 000	-68.2%	2 900 000	3.6%	
Technology for Broader approach	4 605 783	31 000 000	31 000 000	31 000 000	573.1%	50 500 000	50 500 000	62.9%	38 500 000	-23.8%	34 500 000	-10.4%	27 900 000	-19.1%	16 100 000	-42.3%	
Technology for DONES		500 000	500 000	500 000	-	2 000 000	2 000 000	300.0%	1 600 000	-20.0%	5 600 000	250.0%	11 800 000	110.7%	16 000 000	35.6%	
External Support Activities	17 027 980	15 020 833	15 020 833	15 020 833	-11.8%	20 000 000	20 000 000	33.1%	20 000 000	0.0%	20 000 000	0.0%	20 000 000	0.0%	20 000 000	0.0%	
Other Operational Expenditure	7 538 123	5 136 051	5 136 051	5 136 051	-31.9%	5 000 000	5 000 000	-2.6%	5 000 000	0.0%	5 000 000	0.0%	5 000 000	0.0%	5 000 000	0.0%	
<b>Title 4 Earmarked expenditure</b>	<b>163 858 566</b>	<b>141 507 521</b>	<b>141 507 521</b>	<b>117 515 791</b>	<b>-13.6%</b>	<b>126 400 000</b>	<b>126 400 000</b>	<b>-10.7%</b>	<b>129 000 000</b>	<b>2.1%</b>	<b>136 000 000</b>	<b>5.4%</b>	<b>134 000 000</b>	<b>-1.5%</b>	<b>120 000 000</b>	<b>-10.4%</b>	
ITER construction- from ITER host state contribution	148 024 185	116 779 263	116 779 263	116 779 263	-21.1%	126 400 000	126 400 000	8.2%	129 000 000	2.1%	136 000 000	5.4%	134 000 000	-1.5%	120 000 000	-10.4%	
Tasks from ITER Organization	15 834 381	23 991 730	23 991 730		51.5%	p.m.	p.m.		p.m.		p.m.		p.m.		p.m.		
Other Earmarked expenditure		736 528	736 528	736 528	-												
<b>TOTAL EXPENDITURE</b>	<b>765 721 712</b>	<b>604 469 612</b>	<b>611 395 681</b>	<b>587 418 482</b>	<b>-21.1%</b>	<b>636 659 500</b>	<b>636 659 500</b>	<b>5.3%</b>	<b>805 183 900</b>	<b>26.5%</b>	<b>868 730 000</b>	<b>7.9%</b>	<b>760 739 000</b>	<b>-12.4%</b>	<b>694 229 000</b>	<b>-8.7%</b>	

VAR: Variation compared to the previous budget

SPD\_Table 7. Expenditure in Payment Appropriations for 2022-2028

# HUMAN RESOURCE ESTIMATES PLAN

## HUMAN RESOURCES – OUTLOOK FOR 2024 – 2028

### Recruitment policy

The Fusion for Energy personnel structure consists of EU Officials, Temporary Agents and Contract Agents.

All F4E recruitments are consistent with article 53 of the Condition of Employment of Other Servants for Temporary Agents and article 80 of Condition of Employment of Other Servants for Contract Agents, as well as their Model Decision on the engagement and use of Temporary staff under article 2.f.

The tasks related to the operational mission of F4E require highly specialised profiles especially in the core areas related to the ITER and Broader Approach projects. This is also true for many of the staff working in the support functions as the project complexity and amount of capital involved are considerable.

EU Officials (FO) and Temporary Agents (TA) may be recruited under two function groups:

- Administrator (AD) profiles for senior and non-senior technical/legal/financial/procurement officers, contract managers, etc.
- Assistant (AST) profiles for senior and non-senior assistant positions.

Contract Agents (CA) work under the supervision of EU Officials and/or Temporary Agents and may be recruited under four function groups (from FGI to FGIV). However, F4E typically recruits the majority of its contract agents at the level of:

- FGII, who are in charge of clerical and secretarial tasks;
- FGIII, who are in charge of administrative and financial tasks in various support and operational units (e.g. Team Assistants); and
- FGIV, who are mainly specialized technical staff (e.g. Technical Support Officers, Project Management Support Officers) and qualified specialists in administrative fields (e.g. human resources, procurement, project management, legal, finance, etc.).

In terms of contract duration, F4E distinguishes between (1) long-term and (2) short-term employment contracts as follows:

1. Long-term employment

**EU Officials (FO)** – appointed by F4E from reserve lists or transferred from other EU institutions.

**Temporary Agents (TA)** - recruited on five-year renewable contracts which can be extended once for another period of five years and which are then followed by an indefinite duration contract if extended beyond the end of the first extension. The employment contract of the F4E Director falls under the short-term category as it cannot be extended more than once and is hence limited to a maximum period of two consecutive 5 year periods.

**Contract Agents (CA)** - recruited on a three-year renewable contract which can be extended once for a further period of four years, and which is then followed by an indefinite duration contract if extended beyond the end of the first extension.

Following the request from Fusion for Energy for staff reinforcement in the Strategic Resource Plan 2021-2027, the Commission has granted 10 new Temporary Agents positions and 15 conversions of Contract Agent posts into Temporary Agents posts. This reinforcement is effective from 2023 and must be followed by a reduction of 15 FTEs (9 Temporary Agents and 6 Contract Agents) before 2027. In addition, the Commission accepted the conversion of 5 CA FGII into 5 CA FGIII.

## 2. Short-term employment.

Following the agreement between F4E and the Commission to reinforce the F4E staff from 2023, out of the existing 31 short-term posts at the end of 2022, 16 were converted in long-term posts.

As part of the reinforcement agreement, F4E is to return 15 posts by 31 December 2026. The offset may come from the remaining 15 short-term posts.

Fusion for Energy may also employ **Seconded National Experts (SNE)**. These are seconded to F4E for an initial maximum period of two years, renewable for another period of two years and up to a total maximum period of four years. SNEs are paid by the seconding organisation (although F4E may reimburse the annual emoluments to the seconding organisation) and receive a daily allowance and monthly allowance paid for by F4E.

	Staff population and its evolution, overview of all categories of staff									
	Actually filled as of 31.12.2021	Authorised under 2021 EU budget	Actually filled as of 31.12.2022	Authorised under 2022 EU budget	Authorised under 2023 EU budget <sup>(1)</sup>	Envisaged in 2024	Envisaged in 2025	Envisaged in 2026	Envisaged in 2027 <sup>(2)</sup>	Envisaged in 2028
Subtotal FO/TA	274	280	269	280	305	305	305	305	296	296
Subtotal CA	167	170	164	170	155	155	155	155	149	149
Subtotal SNE	2	3	3	7	7	7	7	7	7	7
<b>TOTAL</b>	<b>443</b>	<b>453</b>	<b>436</b>	<b>457</b>	<b>467</b>	<b>467</b>	<b>467</b>	<b>467</b>	<b>452</b>	<b>452</b>
<sup>(1)</sup> Reinforcement of 10 new AD posts plus conversion of 15 CA posts into TA										
<sup>(2)</sup> Return of 9 TA posts and 6 CA posts										

**SPD\_table 8. Overview of staff population and its evolution**

For a more detailed view on staff see HR\_table 01 of the annexes to HR REP.

## Section IV. Work Programme 2024

This Work Programme 2024 offers an overview of the objectives of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E) for 2024 and also identifies the financial decisions for the actions that are planned to be carried out in 2024 with the available budget.

It covers the work on both ITER and Broader Approach (BA) according to the tasks entrusted to the organisation.

The WP2024 objectives, the main milestones and the allocation of the human resources provide a good idea of the complexity of the tasks to be carried throughout the year and of the technical challenges they entail.

The table below provides a quick overview of the expected results in 2024 in terms of achieved credit for ITER in kind deliveries.

Action*		Baseline to end March 2023 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2024
Number	Name	755.43566	681.80551	554.31642	73.35065
Action 1	Magnets	177.92881	174.87481	156.71281	2.39500
Action 2	Vacuum Vessel	86.26629	65.71200	47.01400	8.88594
Action 3	In Vessel- Blanket	0.50000	0.35000	0.20000	1.27000
Action 4	In Vessel- Divertor	3.70000	3.70000	3.62000	0.02500
Action 5	Remote Handling	13.52974	5.14000	2.90000	2.70000
Action 6	Cryoplant and Fuel Cycle	38.91857	31.26673	26.84473	6.51848
Action 8	Heating & Current Drive	50.01812	47.38240	40.53840	11.71314
Action 9	Diagnostics	8.46957	5.98368	4.04500	3.09726
Action 11	Site and Buildings and Power Supplies	376.10457	347.39589	272.44148	36.74583

\* Action 7 Plasma Engineering & Operations, action 10 TBM, action 12 Cash Contributions, action 13 Technical Support Activities and action 15 DONES are not listed in the above table since no kIUA are associated to these actions. Action 14 Broader Approach uses kBAUA instead of kIUA (see full table under PP\_table 8).

### **SPD\_table 9<sup>23</sup>: Expected 2024 results in terms of discharge of Euratom obligations to ITER (status: end of March 2023)**

<sup>23</sup> **Achieved credits** corresponds to milestones completed by F4E. **Released credits** corresponds to milestones for which F4E received the associated credits (in IUA) from IO.

Figures in column **Baseline** correspond to "Total credits initially planned to be achieved at the end of March 2023".

Figures in column **Achieved** Credit correspond to "Total achieved credits at the end of March 2023".

Figures in column **Released** Credit correspond to "Total released credits at the end of March 2023".

Figures in column **2024** correspond to the "Credits to be achieved in year 2024".

## WP2024 Executive summary

The work programme 2024 is mostly focused on the following activities (FP-relevant areas are shown):

- **Magnets (FP):** In 2024, only the Poloidal Field Coil #3 will be under manufacturing and will be delivered to IO.
- **Vacuum Vessel (FP):** All major contracts have been signed and manufacturing activities are ongoing. The first 2 sectors are currently scheduled to be completed and delivered within 2024, although this is subject to the extent of the field joint repairs needed prior to shipping. Commitments for the transportation of these sectors to Cadarache will be signed with the main contractor. Furthermore, extensions, modifications or amendments to existing contracts and arrangements, including possible continuation of incentive schemes, may have to be signed. Also, Specific Contracts for support activities, like Inspectors, Documentation Support, Engineering and Analysis, Project Management support, Experts etc... will continue to be issued depending on the project needs.
- **In-Vessel [Blanket System and Divertor]:**

### Blanket Systems

The WP2024 has been prepared taking into account the current knowledge on the potential changes coming from the ITER project rebaseline.

For the **Blanket First Wall** 2024 it assumes that the decision to discontinue the Be activities will be taken by the ITER Organization in October 2023 (i.e. with the approval of the corresponding PA Change Notice). Therefore, it is assumed that only the **non-Be** activities will be continued during 2024 under the current contractual configuration for the contract F4E-OMF-900, including the re-opening of competition. Provisions for additional commitments related to the development/qualification of the new armour design maybe executed in 2024. It shall be noted that these activities may undergo substantial modifications as consequence of the ITER project changes and decisions expected during the year 2023-2024.

For the **Blanket Cooling Manifolds (BCM)**, the year 2024 will be focused on the qualification and manufacturing activities of the prototype bundle and 1<sup>st</sup> batch of pipe bundles under the Task 1 of the Framework F4E-OMF-1080 and execution of the material procurement under the Task 8 of the same framework contract. Moreover, additional activities for design and testing of alternative support will continue. Preparation of the Technical Specification for the Chimney pipes will take place as well as the reopening of competition of Task 3 of the Framework Contract F4E-OMF-1080.

No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.

### Divertor Systems:

For the Divertor Cassette Body (CB) project, the main activities will be devoted to the follow-up of the on-going manufacturing of the series fabrication (both for Stage 1 and Stage 2).

For the Divertor Inner Vertical Target (IVT) project, the main activities will be the progress of the IVT series first specific contract and the signature of the IVT series second specific contract.

For the Divertor Rails project, following the Procurement Arrangement signature, activities will proceed for the launch of the procurement procedure for the components production.

No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.

- **Remote Handling (partly FP):** The procurement of the Remote Handling Systems (RHS) will focus mainly on the final design activities and first plasma components moving gradually towards manufacturing. Some areas of non-first plasma component will continue with the preliminary design and moving towards final design. Complementary RH technology activities will be implemented (design and tests) aiming at manufacturing of first components (e.g. rad hard cameras and electronics) to be integrated in the RH systems.

- **Cryoplant and Fuel Cycle**

**For Vacuum Pumping (Partly FP),** Torus and Cryostat Cryopump, Front-end and cryodistribution systems and Leak detection and localization systems will focus on manufacturing activities. Neutral Beam cryopumps will work on definition of technical requirements and preparation of procurement arrangement amendment signature.

**For Tritium plant,** Isotope separation system and water detritiation system will focus on definition of requirements and activities for de-risking and procurement arrangement preparation

**In the area of REMS (Radiation and Environmental Monitoring Systems),** design, de-risking activities and procurement activities will continue.

**In the area of Cryoplant (FP),** commissioning for LN2 Plant and Auxiliary Systems components will continue.

**For Fuel Cycle,** a joint IO-F4E team will be established to update the design of the Fuel Cycle.

- **Plasma Engineering and operations (partly FP):**

This action refers to activities in support to the future exploitation of the ITER experiment by the F4E member States and in support to F4E procurements. The main goals are the assessment of the impact of design changes on plasma performance, the verification of load specifications linked to the plasma and the preparation for the commissioning and operation of the ITER tokamak.

- **Heating and Current Drive (partly FP):**

For the EC systems, installation, and commissioning at site of the power supplies will proceed, design activities for the gyrotrons will be completed and the design and qualification activities for the Electron Cyclotron Upper Launcher will progress. For the EC control system, the activity will focus on the preparation for FDR of the EC Plant Control Stage 3 system (Control of First Plasma EC plant) and of the EC Upper Launcher Subsystem Control Unit Stage 2 (also first plasma).

For the Heating Neutral Beam (HNB) mechanical components, the PA for the Passive Magnetic Shield (PMS) and Acceleration, Correction and Compensation Coils (ACC Coils) will be signed. In parallel, design activities will proceed for the HNB Vessels and for the tooling of HNB assembly phase II.

Finally, for the Neutral Beam Test Facility (NBTF), F4E plans to complete the delivery of the MITICA Beam Source, proceed with the assembly and factory testing of Beam Line Components and start the installation of the MITICA Interlock and Safety System.

- **Diagnostics (partly FP):** Manufacturing activities for several diagnostic components and systems will continue and part of these will be delivered, most of those being essential for First Plasma. Design of all remaining Diagnostics systems will progress and some of these will complete their design activities, with approval of the final design review. Procurement activities will focus mainly on the placement of framework contracts for manufacture of Second Plasma components and port engineering of six diagnostics ports, as well as task orders within these framework contracts and existing framework contracts for manufacture of First Plasma components and design of Second plasma components.

- **Test Blanket Systems** (non-FP, non-in-kind contribution): The activities will focus on the end of the preliminary design and the first step of the final design of the two TBM Sets, Ancillary Systems, Safety Studies and Accidental Analyses. Analogously the activities aimed to prove the feasibility of the fabrication and assembly processes of the TBM-sets would continue as well as the needed EUROFER procurement.

As in the previous years, support and transversal activities such as the consultancy of an Agreed Notified Body, the storage, handling and, when needed, transportation of steel materials will proceed.

The codification of the database of EUROFER in RCC-MRx will continue. Some activities could be executed under the ITER TBM Project Team Funding scheme. The collaboration with EUROfusion will continue in the R&D area. The cooperation agreement on the Helium Cooled TBM system was signed with the Korean DA. The joined team is currently progressing on the design of the TBM box and ancillary systems.

- **Site, Buildings and Power Supplies:** The focus of the Buildings works will be to complete the civil works of the Tritium building (B14); to deliver the Tritium building (B14) available for IO equipment installation up to R1 level including the painting works; to progress on the installation, test & commissioning of the cargo lift in the Tokamak building (B11); to deliver and install the doors in the Tritium building (B14); to deliver the building services components (HVAC, piping, electrical, Instrumentation & Control) to IO for installation in the Tokamak Complex; to complete the NB High Voltage Power supply Building (B37), the Control building (B71 Non PIC part), the Fast Discharge & Switching Network Resistor building (B75), the NB Power supply building (B34) and the Busbar Bridges.

The Emergency Power Supply Buildings (B44, B46), Medium Voltage Distribution Buildings (B45, B47), the Load Centers LC01, LC02, LC08, LC09, LC15 & LC16 and the Medium Voltage MV04, MV05 & MV06, construction will continue progressing.

- **Cash contribution:** The activities in 2024 will focus on the commitment of the agreed cash contribution for 2025.
- **Technical Support Activities** including the signature of task orders for experts, Quality control inspectors for manufacturing activities, Configuration Management, Technical Integration and Issues Management capabilities, Operations support, all Engineering unit domains: System Design-Mechanical Engineering, CAD Data Management, Material-Manufacturing Technologies and Processes, Analysis and Codes, Metrology, I&C-CODAC, other Domestic Agencies' components Transportation and project management activities (on QA, Nuclear Safety and CE Marking, System Engineering, PM tools, planning, risk and cost) are foreseen. F4E also plans renewal of existing Frameworks contracts and signature of new ones.

Engineering procurement activities will aim at:

- providing technical resources and services to the different ITER D/ P & BA Projects based on Programmes' priorities through the establishment of a broad range of Framework Contracts and related specific contracts.
- at delivering the EU obligation for the Transportation of all ITER Components from the port/airport of entry to ITER site.
- **Broader Approach (BA):** the EU activities are carried out in the frame of the Agreement, concluded between Euratom and Japan, consisting of activities which complement the ITER project and accelerate the realisation of fusion energy towards DEMO. Activities in 2024 will be based on the Project Plans expected to be agreed by the BA Steering Committee in spring 2023.
- **DONES:** the focus is on preparatory activities as well as early procurement of essential equipment. Further details will be available at a later stage.

In addition, amendments, indexation and release of options of existing contracts in all areas will need to take place. Quality control inspection services will be necessary for the majority of the areas through available framework contracts.

See details of the Work Programme 2024 in the annexes to Work Programme.

## Section V. Other information

### 1. Barcelona Office Building Policy

#	Building Name and type	Location	SURFACE AREA (in m <sup>2</sup> )			RENTAL CONTRACT					Host country (grant or support)	Building present value (€)
			Office space	non-office	Total	RENT (€/year)	Duration of the contract	Type	Breakout clause Y/N	Conditions attached to the breakout clause (if applicable)		
1	TDL B3	Barcelona	9000	750	9750	0 € *	Long term rent lease agreement until 2042  Short term rent lease agreements for additional space covered by the Host State as of 01/01/2022.		Y	no longer applicable	Rent paid by Spain for 9750 m2	N/A
<b>TOTAL</b>						<b>0 €</b>						

\* Community charges are imputed to F4E budget.

#### SPD\_table 10 . F4E building

In accordance with the 2007 Host Agreement, Spain (Host State) shall provide F4E with permanent premises in Barcelona. After several suggestions for a new building, the Spanish Ministry offered in April 2016 to fix F4E's permanent premises at its current location, which was deemed, before, to be of temporary nature only. This offer consisted of a long-term lease agreement until 2042 for the current premises and an extension of approximately 1 000m<sup>2</sup> of additional space, for which the Host State would also cover the refurbishment costs. In May 2016, the long-term agreement was signed between Spain, the building owner, and F4E.

Following the mandate given by the GB to the Host State/F4E Working group in 2021, an agreement was reached on the terms of the refurbishment of F4E premises, which has been split into two phases:

a) the refurbishment of the additional office space allocated to F4E, which has been finished in 2023 and funded by the Host State;

b) to be followed by the refurbishment of all other floors assigned to F4E, including the ground floor, also funded by Spain. F4E will contribute with 20% of the costs, while Spain will pay for the remaining 80%, as agreed at the December 2021 GB meeting.

As a result of the discussions of the same working group, the Spanish authorities agreed to take charge of the rent (from 1 January 2022 and until the finalisation of the refurbishment) of the additional office modules F4E had been renting to secure space for the staff occupying the floors being refurbished.

## 2. Privileges and immunities

Joint undertaking privileges	Privileges granted to staff	
	Protocol of privileges and immunities / diplomatic status	Education / day care
As provided by the Host State, according to the Seat Agreement: - VAT exemptions - Building free of charge	Diplomatic status only for the Director, and the person appointed to replace him in his absence - The PPI applies to all staff - VAT reimbursements during the first year on goods and furniture. - Purchase of one motor vehicle without taxes. - Exemption of import tax registration for vehicles (if done through the Spanish Ministry of Foreign Affairs)	- No privilege granted regarding education/day care

*SPD\_table 11 . Privileges and Immunities*

## 3. Environment management

Fusion for Energy shares the same headquarters building in Barcelona with several companies and as a leaseholder, therefore, its room for manoeuvre to reduce its environmental impact is limited from that point of view. However, after the Host State's decision to fix F4E's permanent premises at its current location, F4E will explore the feasibility of an EMAS certification and will intensify its efforts towards more sustainability. It should be noted that premises hosting F4E already benefit from a LEED (Leadership in Energy and Environmental Design) certification that demonstrates the high environmental quality of the building; F4E will continue to collaborate on a regular basis with the Building Management to maintain this certification and improve its overall environmental score.

## 4. Strategy for achieving efficiency gains and synergies

### **F4E Improvement framework**

F4E is fully committed to continuous improvement and manages its corporate improvement projects triggered by a Senior Management decision which is then implemented through its various committees and networks.

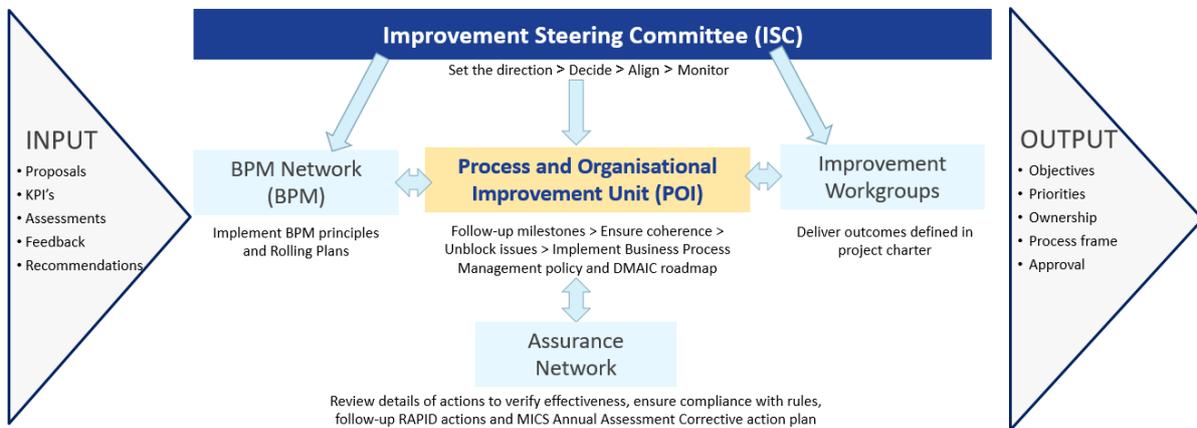
The F4E Improvement framework defines the frame of activities to enhance performance and has seven principles: Continual Improvement approach; Business Process Management (implementation and monitoring), Improvement Methodology, Annual Focus on Areas of Improvement, Leadership Involvement on Improvement (Improvement Steering Committee), Internal Control Strategy and Continuous Improvement Action Plan (BPM Rolling Plan).

These principles ensure the standardisation of the system implemented to enhance performance in F4E, to ensure compliance with the Internal Control framework and overall maintenance of the Integrated Management System.



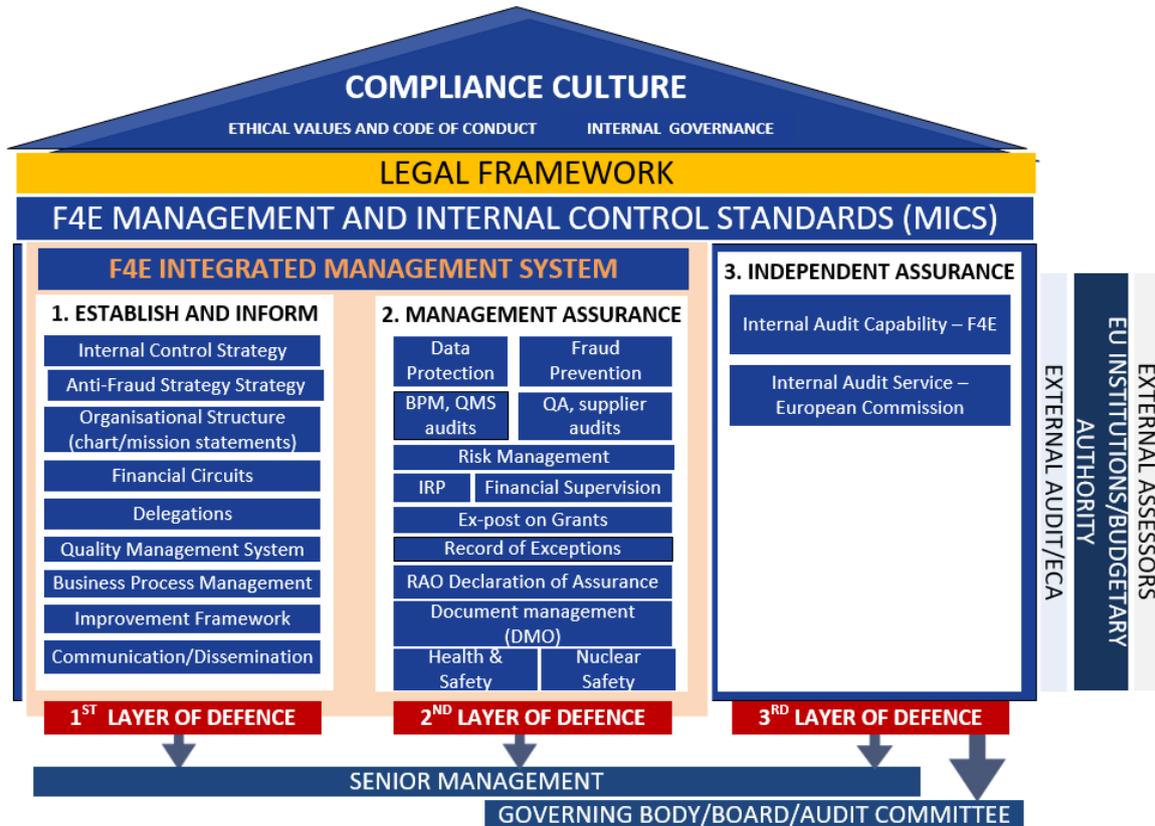
In 2016, F4E set up an Improvement Steering Committee (ISC) to provide a dedicated forum to set priorities on corporate improvement actions and align management views. This committee monitors results and proposes corrective actions if needed.

The ISC together with the Senior Management Meeting (SMM) and the Project Steering Meeting (PSM) form the internal governance strategy and decision-making bodies of F4E. The SMM is the main decision-making body of F4E, and the PSM scope covers activities linked to fulfilling the technical programmes of the ITER Project.



F4E uses the **DMAIC** (Define, Measure, Analyse, Improve, and Control) **approach** which forms part of the Lean Six Sigma methodology (a set of techniques and tools for process improvement) to ensure that processes are more efficient and effective to achieve efficiency gains. Results are measured over a certain period with key performance indicators to confirm the positive trends, and corrective actions are taken if needed to further reinforce and streamline F4E's core activities.

**Strategy for organisational management and internal control systems including their anti-fraud strategy**



The Internal Control System (ICS) comprising F4E's Integrated Management System is based on the 3 layers of defence of the IIA (Institute of Internal Auditors) and combines the two control environments within which F4E operates - the ITER-wide quality system which is intended to ensure the performance of ITER and the compliance with the nuclear safety requirements, and the European Commission Internal Control Framework which is inspired on the internationally recognised COSO framework.

The F4E Management and Internal Control Standards (MICS) are central to the assessment of the effectiveness of this system. F4E makes an Annual Assessment, in line with the EC Internal Control Framework and methodology which determines the functioning of its F4E's 20 MICS covering the five components: control environment, risk assessment, including risks of fraud, control activities, information and communication and monitoring activities.

F4E identifies deficiencies which affect the effective functioning of any of the MICS and adopts a corrective action plan to ensure follow-up.

- **1<sup>st</sup> LAYER (1<sup>st</sup> LINE OF DEFENCE) ESTABLISH AND INFORM:** Internal controls as defined by F4E's Management for application by all F4E Staff and providing adequate training and raising awareness.
- **2<sup>nd</sup> LAYER (2<sup>nd</sup> LINE OF DEFENCE) MANAGEMENT ASSURANCE:** The Management (in its role of 1st line of defence) puts in place the 2nd layer of defence by establishing risk management and assurance functions to help build and/or monitor the first line-of-defence controls.

- *3<sup>rd</sup> LAYER (3<sup>rd</sup> LINE OF DEFENCE) INDEPENDENT ASSURANCE* The internal auditor (IAS) and the IAC, who provide the governance bodies and the senior management with risk-based and objective assurance, advice and insight and help the Joint Undertaking to accomplish its objectives by bringing a systematic, disciplined approach in order to evaluate and improve the effectiveness of risk management, control and governance processes.

The F4E Internal Control Strategy defines internal control roles and responsibilities, and outlines how the Internal Control System provides reasonable assurance of achieving the following objectives (based on Article 30 of the F4E FR):

- 1.1. effectiveness, efficiency and economy of operations;
- 1.2. reliability of reporting;
- 1.3. safeguarding of assets and information;
- 1.4. prevention, detection, correction and follow-up of fraud and irregularities;
- 1.5. adequate management of the risks relating to the legality and regularity of the underlying transactions, taking into account the multi-annual character of programmes as well as the nature of the payments concerned.

The Anti-Fraud (OLAF) and Ethics Officer promoted and coordinated the implementation of the F4E Anti-Fraud Strategy and the accompanying Anti-Fraud Action Plan.

The Anti-Fraud and Ethics Officer monitors the execution of the actions foreseen in the Anti-Fraud Action Plan for the year under review by means of targeted communications, individual meetings with action owners as well as transversal compliance-oriented meetings and meetings of the Audit Committee.

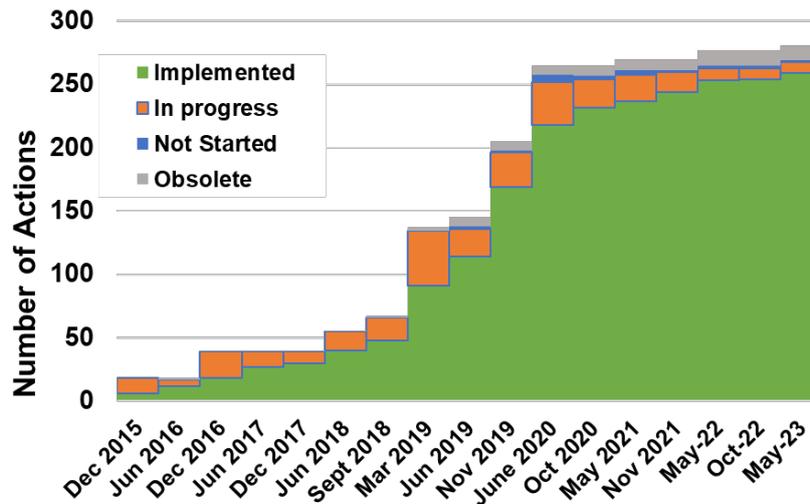
The implementation of actions arising from audit recommendations, corporate risk actions and other sources as well as the Anti-fraud Action Plan is systematically monitored through a dedicated database (RAPID) which details the scope of each action, the action owner, and the target date for its implementation.

## 5. Evaluations

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The Corporate Action Plans respond to recommendations from Annual Assessments and Ad-Hoc Groups of the Governing Bodies, Governing Board Actions and also own-initiative actions.

During the period until mid-2023, the total number of actions increased from 277 to 281 following the 10<sup>th</sup> annual assessment. The total percentage level of implemented actions is reached 96%.



**SPD\_Figure 13: Evolution of the implementation of F4E's corporate level actions**

The April 2018 Council Conclusions on the reformed ITER project state that “the independent annual assessments of the progress of ITER have to be continued and intensified with a focus on the performance and project management, including cost containment, schedule project control as well as risk management”.

To meet the Council's request for 2023, F4E's Governing Board appointed a panel of three independent experts of recognized standing to conduct an assessment of F4E's building programme.

The outcome of the assessment was presented to F4E's Governing Board in July 2023 (final report delivered in September 2023) and F4E was requested to present by December 2023 an action plan addressing the recommendations.

The assessment panel put forward 35 recommendations in six main areas: benchmarking, programme management, suitability of FIDIC contract models, FIDIC contracting best practices, FIDIC contracting recommendations, further integration between IO and F4E.

## 6. Strategy for cooperation with third countries and/or international organisations

The F4E Statutes endow F4E with a prominent international role and all F4E's objectives have an international dimension:

### 1. International Cooperation Projects

#### a. ITER

F4E has been created with the main objective to provide Euratom's contribution to the ITER project in an international collaboration to demonstrate the scientific and technological feasibility of fusion energy

for peaceful purposes. Euratom has formally designated F4E as the EU domestic agency for ITER under the ITER International Agreement.<sup>24</sup>

While Euratom is formally represented at the ITER Governance level by the European Commission (DG-ENER), the further implementation of Euratom's contribution to ITER is realised through F4E's cooperation with the ITER International Organization (IO) as well as with bodies nominated by the ITER parties, the domestic agencies of the other ITER partners, China, India, Japan, Korea, Russia and the United States.

#### b. Broader Approach

The second main objective the Statutes entrust to F4E is to carry out the Broader Approach activities with Japan. The purpose of the Agreement between Euratom and Japan for the Joint Implementation of the Broader Approach Activities in the Field of Fusion Energy Research<sup>25</sup> is to provide a framework for activities aiming to complement the ITER project and accelerate the development of fusion energy. F4E has been formally designated by Euratom as the implementing agency to discharge its commitments for the implementation of the Broader Approach Activities vis-à-vis Japan. In this capacity, F4E cooperates with Japan on 3 projects:

- a) IFMIF/EVEDA: The International Fusion Materials Irradiation Facility (IFMIF) is a fusion neutron source test facility to find and qualify new advanced materials for the plasma-facing components in future fusion reactors. The Engineering Design and Engineering Validation Activities (EVEDA) aim to produce an integrated engineering design of the IFMIF plant as well as the data necessary for decisions on the construction, operation, exploitation and decommissioning of the future Fusion Neutron Source.
- b) JT-60SA: The project comprises the upgrade of the JT-60 Tokamak experimental equipment owned by the Japanese Implementing Agency to an advanced superconducting Tokamak and its subsequent exploitation to support the operation of ITER as well as the investigation into how to optimise the operation of fusion power plants after ITER (DEMO; see Section 1.c. below) by addressing key physics issues;
- c) IFERC: The International Fusion Energy Research Centre supports the other joint fusion projects (ITER, IFMIF/EVEDA, JT60-SA) and contributes to the development of the next generation of fusion devices after ITER, such as DEMO.

The Broader Approach Steering Committee can authorise collaborations with third parties and BA Projects at research institution level following the domestic approval procedures of each party.

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<sup>24</sup> Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project, 21 November 2006.

<sup>25</sup> Cf. Council Decision 2007/614/Euratom of 30 January 2007 concerning the conclusion, by the Commission, of the Agreement between the European Atomic Energy Community and the Government of Japan for the Joint Implementation of the Broader Approach Activities in the Field of Fusion Energy Research.

c. DEMO and IFMIF.

The third main objective the Statutes entrust to F4E is to prepare and coordinate a programme of activities in preparation for the construction of a demonstration fusion reactor (DEMO) and related facilities including the international fusion materials irradiation facility (IFMIF).

The purpose of DEMO is to bring fusion energy research to the threshold of a prototype fusion reactor opening the way to its industrial and commercial exploitation. Currently, different conceptual DEMO projects are under consideration by all ITER Members (China, EU, India, Japan, Korea, Russia and, to a lesser extent, the United States).

The International Fusion Materials Irradiation Facility (IFMIF) is a projected materials test facility in which candidate materials for the use in an energy producing fusion reactor can be fully qualified. The IFMIF project was started in 1994 as an international scientific research program, carried out by Japan, the European Union, the United States and Russia, and managed by the International Energy Agency. Since 2007, it has been pursued by Japan and F4E under the Broader Approach Agreement in the field of fusion energy research (see Section 1.b above), through the IFMIF/EVEDA project, which conducts engineering validation and engineering design activities for IFMIF. The IFMIF/DONES (Demo Oriented NEutron Source) is a simplified version of IFMIF with one particle accelerator instead of 2. Its construction phase has started in Granada (Spain). Its primary goal is to test, validate and qualify materials to be used in future fusion power plants such as DEMO.

d. TBM

F4E's participation in the Test Breeding Modules (TBM) Programme falls under F4E's first statutory objective (see section 1.a above). The TBM Programme, however, has some particular features.

The Programme aims to test tritium breeding module concepts in the ITER reactor, so that future (DEMO) reactor could achieve tritium self-sufficiency, the extraction of high grade heat and electricity production. TBM are formally not part of the ITER facilities. The Programme is covered by the ITER Agreement as "*any other activities that are necessary to achieve its* [i.e. the ITER Organization's] *purpose*" (Article 3.1.d of the ITER Agreement).

European collaboration in the TBM Programme is based on the detailed TBM Arrangements signed between F4E and the ITER Organization. The implementation of the TBM activities involves F4E cooperation with the European fusion laboratories participating in the EUROfusion consortium.

F4E entered also into a long-term partnership with the Korean Domestic Agency (ITER Korea) for the joint supply of the Helium Cooled Ceramic Pebble (HCCP) Test Blanket Module System for the operation of the ITER machine. Following the signature of the partnership arrangement between F4E and ITER Korea, both parties concluded a trilateral TBM Arrangement with the ITER Organization.

e. Validation process

The objectives of F4E cooperation with third countries and international organisations are clearly defined in its Statutes as outlined above.<sup>26</sup> F4E cooperation with these international partners takes place within the boundaries set out in the F4E Statutes and is enshrined in international agreements and arrangements which translate the F4E objectives set out in its Statutes and define the details of cooperation with F4E's international partners.

All F4E collaboration international agreements and arrangements require the formal approval by the F4E Governing Board in accordance with Article 6(3)(n) of the F4E Statutes: *"The Governing Board shall ... approve the conclusion of agreements or arrangements regarding cooperation with third countries and with institutions, undertakings or persons of third countries or with international organisations with the exception of the procurement arrangements with the ITER IO."*<sup>27</sup>

The only exceptions are the so-called Procurement Arrangements, between F4E and the ITER IO for the ITER project, and between F4E and QST for BA projects, which spell out the details of the technical implementation of the Euratom contribution to the ITER Project and the Broader Approach Projects, as pre-defined in the ITER International Agreement and the Broader Approach Agreement respectively.

Furthermore, the F4E Governing Board confirmed the power of the F4E Director to conclude any arrangement on additional cash compensation with the ITER Organization, which modifies a Procurement Arrangement between the ITER Organization and Fusion for Energy. The power is subject to specific financial thresholds.

In all other cases, prior F4E Governing Board approval is mandatory before F4E enters into international obligations.

In this context, it should be kept in mind that Euratom has *"the right to make a reservation to a decision by the Governing Board, when it considers that that decision may be contrary to Community law, including notably its international commitments arising from the ITER International Agreement. Euratom shall give due legal justification to such reservation. In this case the decision shall be suspended and the matter referred to the Commission for a review of its legality, together with the view of the Governing Board, including representatives of Euratom, must be consulted."*

Consequently, the mechanism requiring prior Governing Board approval of international agreements and arrangements concluded by F4E constitutes a safeguard ensuring that F4E remains within the mandate and institutional framework defined in its Statutes and does not appear as representing the European Union beyond its statutory remit.

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<sup>26</sup> Cf. Article 3 F4E Statutes annexed to the Decision of the Council of the EU Council Decision of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it.

<sup>27</sup> The Governing Board delegated approval of the non-strategic international cooperation agreements to the Administration and Management Committee.

## 2. *Switzerland as F4E Member*

In addition to Euratom and the EU Member States, Switzerland was a full F4E member based on a cooperation agreement in the field of controlled nuclear fusion. Switzerland ceased being an F4E member in December 2020, when the agreement expired. In 2022, F4E concluded an agreement with the Ecole Polytechnique Fédérale de Lausanne regarding scientific and technological co-operation.

## 3. *Relations with the United Kingdom*

Following the United Kingdom's withdrawal from Euratom, the United Kingdom's membership in F4E depends on the adoption of Articles 7 and 8 of draft Protocol I (Programmes and activities in which the United Kingdom participates) of the Joint Declaration on Participation in Union Programmes and Access to Programme Services under the EU-UK Trade and Cooperation Agreement. However, as the parties could not conclude the Protocol, the UK is still not associated with the Euratom research and training programme and the F4E's activities. Therefore, the UK is currently not a member of F4E.

## 4. *Relations with the Russian Federation following the Russian aggression in Ukraine*

The EU has condemned the Russian Federation's military aggression of Ukraine in violation of international law and has responded with restrictive measures, severing most ties with the Russian Federation, including in the area of research and innovation.

Against this background, F4E is working in close cooperation with Euratom (represented by the Commission) to determine the course of action regarding two existing agreements with Russian entities, namely (i) a trilateral, binding Memorandum of Understanding between the ITER Organization, Russian Domestic Agency and Fusion for Energy on Port Plug Test Facility and (ii) a non-binding Memorandum of Understanding with Gycom related to gyrotron testing at the FALCON test facility.

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## List of Acronyms

ASN	Autorité de Sûreté Nucléaire (French Nuclear Regulator)
BA	Broader Approach
BAUA <sup>28</sup>	Broader Approach Unit of Account.
BA SC	Broader Approach Steering Committee
C-O	Close-Out
CD	Current Drive
CDR	Conceptual Design Review
CQMS	Common Quality Management System
COSO	Internal Control standard
CXRS	Core plasma charge-exchange Recombination Spectroscopy
DA	Domestic Agency
DEL	Delivery
DEMO	Demonstration fusion reactor
DIV	Divertor
DT	Deuterium Tritium
DWS	Detailed Work Schedule
EAC	Estimate at Completion
EB	Electron Beam
EC	Electron Cyclotron
EC UL	Electron Cyclotron Upper Launcher
ECH	Electron Cyclotron Heating
Euratom	The European Atomic Energy Community
F4E	Fusion for Energy
FAT	Factory Acceptance Test
FDR	Final Design Review
FP	First Plasma
FW	First Wall
GB	Governing Board
HCLL	Helium Cooled Lithium-Lead
HCPB	Helium Cooled Pebble Bed
H&CD	Heating & Current Drive
HHF	High Heat Flux
HV	High Voltage
HVD	High Voltage Deck
IC	Ion Cyclotron or ITER Council
I&C	Instrumentation and Control
ICH	Ion Cyclotron Heating
IFERC	International Fusion Energy Research Center
IFMIF	International Fusion Materials Irradiation Facility

<sup>28</sup> 1,000 BAUA equal to EUR 678,000 (value 5 May 2005).

INB	Installation Nucleaire de Base
IO	ITER Organization
IR	Infra-Red
IRS	Internal Reporting system
ISEPS	Ion Source and Extraction Power Supplies
ISS	Isotope Separation System
ITA	ITER Task Agreement
ITER	International Thermonuclear Experimental Reactor
IUA <sup>29</sup>	ITER Unit of Account.
IVT	Inner Vertical Target
IVVS	In-Vessel Viewing System
KPI	Key Performance Indicator
LIPAc	Linear IFMIF Prototype Accelerator
MV	Medium Voltage
NB	Neutral Beam
NBI	Neutral Beam Injector
NBTF	Neutral Beam Test Facility
PA	Procurement Arrangement
PBS	Product Breakdown Structure
PCR	Project Change Request
PDR	Preliminary Design Review
PE	Plasma Engineering
PF	Poloidal Field
PIC	Protection Important Components
PM	Project Management
PP	Project Plan
QA	Quality Assurance
QC	Quality Control
QST	Japanese Implementing Agency
R&D	Research & Development
REC	Remote Experimentation Centre
REM	Radiological Environmental Monitoring
RF	Radio Frequency
RFCU	Radio Frequency Control Unit
RFE	Ready For Equipment (when access is granted to IO)
RFIOC	Ready for IO Contractors
RFOC	Ready for other contractors (when civil work is complete enough to enable access to other contractors)
RH	Remote Handling
RWM	Resistive Wall Mode
SAT	Site Acceptance Test

<sup>29</sup> In 2008, the IUA exchange rate approved by the ITER Council corresponded to EUR 1498.16.

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SC	Specific Contract
SR2FP	Straight Road to First Plasma
SS	Steady State
STP	Satellite Tokamak Programme
STIK	Short Term In-Kind
TBM	Test Blanket Module (Tritium breeding blanket)
TF	Toroidal Field
TFC	Toroidal Field Coils
TO	Technical Officer
VAR	Variation
VC	Voluntarily Contribution
VCDIS	Voluntarily Contribution Design Institutions
Vis	Visible
VV	Vacuum Vessel
WAVS	Wide Angle Viewing System
WBS	Work Breakdown Structure
WDS	Water Detritiation System
WP	Work Programme, Work Package or Winding Pack

SPD2024_ANNEXES TO PROJECT PLAN
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### The ITER Procurement Arrangements and their status

This table shows the credit value that F4E should have earned up to end of March 2023 (baseline) against the credit that F4E has actually achieved and the credit that the IO has already released to F4E as acknowledgement of the achieved milestones F4E has formally declared as such to the IO. It provides all details per PA with the yearly forecast credit up to end 2028 and the cumulative value for the years beyond.

Once a CAS milestone is achieved, before F4E can formally declare its achievement to the IO, all necessary data, reports and other information has to be collected from the supplier and then submitted to the IO. This information is linked to the delivery by the supplier of all the necessary contractual deliverables that have to be formally approved by F4E before being sent to the IO. Then, it will be the turn of the IO to revise and validate the whole set of documents provided in order to confirm such achievement and release the credit through its SAP tool.

For this reason, the process can last some months.

Action	PA	Baseline to end March 2023 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2024	2025	2026	2027	2028	2029+
		755.43566	681.80551	554.66524	73.35065	30.76713	23.01456	30.22597	49.34239	127.84427
Action 1 Magnets	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	89.74000	86.18600	73.02400	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 1.1.P2A.EU.01 Pre Compression Rings	0.60000	0.60000	0.60000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	32.97000	33.47000	28.47000	2.39500	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 1.1.P6A.EU.01 Toroidal Field Conductors	43.39000	43.39000	43.39000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 1.1.P6C.EU.01 Poloidal Field Conductors	11.22881	11.22881	11.22881	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Action 2 Vacuum Vessel	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	86.26629	65.71200	47.01400	8.88594	5.89535	3.00000	0.00000	0.00000	0.00000
Action 3 In Vessel- Blanket	PA 1.6.P1A.EU.01 Blanket First Wall	0.10000	0.10000	0.00000	1.10000	0.00000	0.00000	9.30000	7.10000	22.73000
	PA 1.6.P6.EU.01 Blanket Manifolds	0.40000	0.25000	0.20000	0.17000	0.35000	0.77000	0.84201	1.56600	0.33100
Action 4 In Vessel- Divertor	PA 1.7.P1.EU.01 Cassette Body	0.56000	0.56000	0.53000	0.00000	0.92000	0.38000	0.38000	0.57000	3.23000
	PA 1.7.P2B.EU.01 Inner Vertical Target	3.14000	3.14000	3.09000	0.02500	0.00000	0.00000	0.78000	2.85000	12.82500
Action 5 Remote Handling	PA 2.3.P2.EU.01 Divertor Remote Handling System	2.20000	1.40000	0.00000	0.00000	0.60000	0.00000	0.70000	0.32000	6.40000
	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	4.50000	0.80000	0.80000	2.70000	1.00000	2.00000	0.80000	1.00000	8.98768

	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	2.44974	0.46000	0.30000	0.00000	0.00000	0.19000	0.00000	1.09000	4.33974
	PA 5.7.P1.EU.01 In-Vessel Viewing System	4.38000	2.48000	1.80000	0.00000	0.90000	0.00000	1.70000	1.10000	0.57313
Action 6 Cryoplant and Fuel Cycle	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	4.81341	1.00000	0.00000	3.81341	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.90000	1.20000	0.18000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 3.1.P1.EU.01 Warm Regeneration Lines	0.20000	0.20000	0.20000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.61199	0.42863	0.22979	0.00000	0.00000	0.00000	0.15319	0.00000	0.00000
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	2.40000	0.70000	0.00000	0.70000	0.00000	1.00000	1.30000	0.00000	0.00000
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II - 1st Amendment)	0.40000	0.15000	0.00000	0.30000	0.05000	0.05000	0.00000	0.00000	0.00000
	PA 3.2.P5.EU.01 Water Detritiation System - Tanks	3.25200	3.25200	3.25200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	25.98117	24.27610	22.98294	1.70507	0.00000	0.00000	0.00000	0.00000	0.00000
	PA 6.4.P1.EU.01 for Design of REMS	0.36000	0.06000	0.00000	0.00000	0.12000	0.35223	0.00000	0.30000	0.60000
		PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.74740	0.74740	0.74740	1.84314	4.97617	2.71105	2.87870	4.29280
Action 8 Heating & Current Drive	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	0.00000	0.00000	0.00000	1.25000	0.00000	1.83502	2.03502	2.03502	0.80005
	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	11.18072	10.46500	8.49100	0.00000	0.00000	1.16300	0.00000	0.00000	0.00000
	PA 5.2.P1B.EU.01 Electron Cyclotron Control System	1.15000	1.10000	1.00000	0.00000	0.10000	0.05000	0.05000	0.10000	0.00000
	PA 5.3.P6.EU Neutral Beam Power Supply	17.76000	17.36000	14.56000	2.50000	1.90000	3.97200	0.00000	0.85000	2.80371
	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	19.18000	17.71000	15.74000	6.12000	0.50000	0.00000	0.00000	0.00000	0.00000
		PA 5.5.P1.EU.02-16-17-19 Diagnostics - Magnetics	0.84168	0.85352	0.85352	0.00000	0.06721	0.00000	0.00000	0.00000
Action 9 Diagnostics	PA 5.5.P1.EU.03 Diagnostics - Bolometers	0.50151	0.11800	0.11800	0.61951	0.00000	0.32450	0.00000	0.73751	1.15025
	PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.38320	0.19160	0.19160	0.00000	0.19160	0.00000	0.40235	0.15328	0.01907
	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	1.38239	0.73541	0.56796	0.45352	0.40890	0.00000	0.31144	0.22263	0.00000
	PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0.27538	0.13769	0.13769	0.07868	0.07868	0.00000	0.29506	0.00000	1.23927
	PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0.00000	0.00000	0.00000	0.88840	0.53304	0.00000	0.31982	0.87706	0.88842

	PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0.49780	0.33499	0.17218	0.16281	0.21707	0.35817	0.02100	0.00000	0.00000
	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0.61650	0.00000	0.00000	0.41100	0.41100	0.00000	0.20550	1.36998	0.82197
	PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.58623	0.22759	0.11724	0.16552	0.66211	0.33105	0.00000	1.15874	0.00000
	PA 5.5.P1.EU.10-11-12-13-14-21 Diagnostics - Port Engineering Systems	2.88488	2.88488	1.38681	0.00000	0.00000	0.00000	0.00000	3.51589	2.61438
	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software	0.50000	0.50000	0.84882	0.31782	0.10000	0.11200	0.00000	0.00000	0.00000
Action 11 Site and Buildings and Power Supplies	MAIN MILESTONES	22.28000	21.08000	0.00000	2.46000	0.00000	0.00000	0.00000	0.00000	0.00000
	COMMON	60.54196	54.41865	51.84060	1.60527	1.80000	2.00000	2.48304	3.10000	5.33810
	TOKAMAK COMPLEX	93.48096	86.78650	72.04013	8.03792	2.52900	2.41554	3.16884	15.03348	0.00000
	AUX BUILDINGS TB03/TB04	62.00716	58.73916	58.43916	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB05	15.25156	14.55000	14.30000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB06	9.62922	8.79000	7.13000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB07	6.74850	6.74850	6.03420	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	###AUX BUILDINGS TB09/TB10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	42.46250
	AUX BUILDINGS D&B TB12	19.28369	14.58873	1.62104	13.27264	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB13	2.04000	0.00000	0.00000	7.49500	0.11500	0.00000	0.00000	0.00000	0.00000
	LOAD CENTERS	5.50300	4.30800	3.66800	3.23500	6.34200	0.00000	0.00000	0.00000	0.00000
	INTERCONNECTING ACTIVITIES	22.62932	20.74635	0.72835	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB17	0.06920	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	9.69000
	COMMON CONTRACTUAL ACTIVITIES	42.79000	42.79000	42.79000	0.64000	0.00000	0.00000	2.10000	0.00000	0.00000
PA 6.2.P2.EU.06 Headquarters Building	13.85000	13.85000	13.85000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	

\* Action 7 Plasma Engineering & Operations, action 10 TBM, action 12 Cash Contributions, action 13 Technical Support Activities and action 15 DONES are not listed in the above table since no kIUA are associated to these actions. Action 14 Broader Approach uses kBAUA instead of kIUA (see full table under PP\_table 8).

**PP\_table 1. Credits per Procurement Arrangement**

## BA Overall Information

### The Satellite Tokamak Programme (aka JT-60SA project)

The mission of the JT-60SA project is to contribute to the early realisation of fusion energy by supporting the exploitation of ITER and research towards DEMO by addressing key physics issues associated with these machines, in particular by designing, constructing and operating a device:

- capable of confining break-even equivalent class high-temperature deuterium plasmas lasting for a duration longer than the timescales characteristic of plasma processes;
- pursuing full non-inductive steady-state operation with high plasma beta close to and exceeding no-wall ideal stability limits;
- establishing ITER-relevant high density plasma regimes well above the H-mode power threshold.

The primary reference for the Satellite Tokamak Programme is the Project Plan for the next five-year-period revised and submitted for endorsement to the BA Steering Committee<sup>1</sup>.

The assembly of the facility was completed by March 2020. The integrated commissioning allowed to start the energization of the superconducting magnets by January 2021. At the beginning of March 2021, the Toroidal Field Coils (the most relevant EU contribution) reached full current and design toroidal field. Taking advantage of the maximum toroidal field an Electro Cyclotron Resonance Heating plasma was obtained on 2<sup>nd</sup> March 2021.

While the operation of integrated commissioning was approaching successful completion, on 9<sup>th</sup> March 2021, an incident happened during the final energization test of the Equilibrium Field1 coil. The incident has serious consequences on the schedule of the project.

After warming up the superconducting coils and inspection inside the cryostat, it was found that the terminals of the EF1 coil were damaged by a double short to ground. Extensive experimental tests have progressively revealed that the high voltage insulations (primarily those made with manual techniques on-site), did not always guarantee its performance in so-called Paschen conditions, and led to the conclusion that an extensive repair action had to be implemented to reduce this risk.

Repair and re-test activities, continued in the year 2022 and first quarter 2023.

After completion of the insulations repair of critical locations, a Global Paschen test in August 2022 indicated that the Equilibrium Field and Central Solenoid coils were still not Paschen tight beyond 500-800 Volt and also the Toroidal Field Coil were still not Paschen-tight (though all repaired locations were passing the test).

A new strategy for the operation of the machine has been developed, accepting the limitations of voltage holding in Paschen Region and relying on early detection of vacuum deterioration and de-energization of the magnets.

For the power supplies, some critical improvements were designed and implemented till first quarter 2023.

By April 2023, as part of the new strategy for machine protection, F4E has designed, fabricated, and tested (under high magnetic field), a full set of Cold Cathode Gauge vacuum-sensors, which can identify minimum variations of vacuum level (e.g. deriving from a small helium leak) and command the coil de-energization. The system is now installed in the tokamak secondary vacuum.

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<sup>1</sup> The Project Plans for the BA Phase II (from 2024-2028) for all three projects are to be approved by the Broader Approach Steering Committee in May 2023.

Under success-oriented hypotheses we could achieve this first plasma as early as September 2023.

After completion of the Integrated Commissioning and Operation 1, the period of Dec 2023 – March 2028 covers the completion of repairs and integrated commissioning/ operation of the facility as well as machine enhancements of the JT-60SA device. The present plan and operation and machine enhancement phases is detailed in the latest version of the Project Plan, which has taken advantage of the establishment of the Experiment Team (the Experiment Leaders and the Topical Group Leaders are appointed and operative) providing details of the scientific mission.

The research area will expand gradually together with some upgrades of the hardware such as plasma heating systems, diagnostics, control actuators, divertor and other in-vessel components, remote handling systems, power supplies, cryogenics etc. European contribution to machine enhancements, diagnostics, maintenance and spare parts and integrated commissioning/operation support are handled also with the collaboration of Eurofusion.

For the period up to March 2028 the total commitment for the EU amounts to 511.74 kBAUA. (From April 2020-March 2028 Phase II – 275.6 kBAUA).

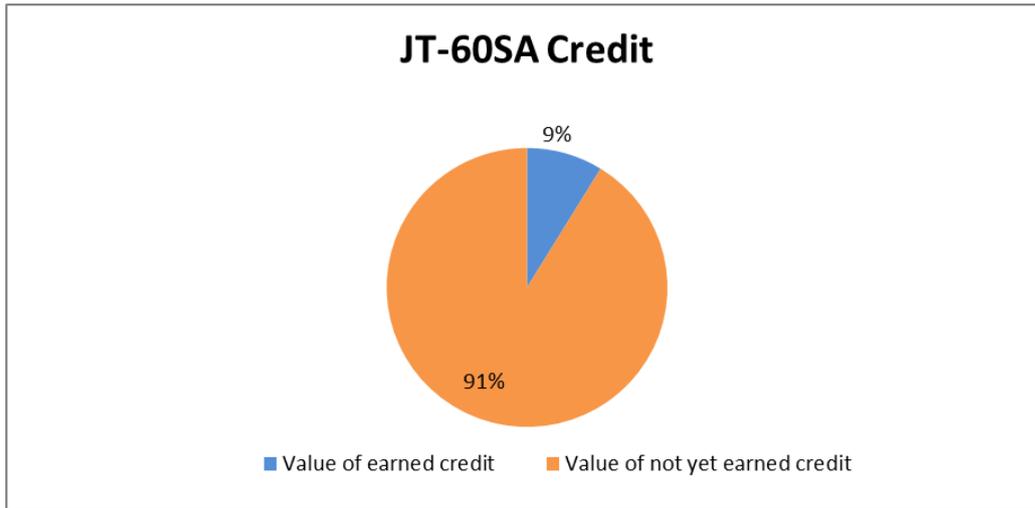
The sharing of activities with Japan, which leads to this associated total credited budget, was agreed by the BA Steering Committee in May 2023 in the form of endorsement of the document: ‘Satellite Tokamak Programme Project Plan’. The latest version of the Project Plan implements the modifications of schedule and scope as consequence of the incident and its repair and recovery plan.

In broad terms the F4E activities for this period will include the following machine enhancements (in-kind). Part of the scope hereinafter is designed and procured with support of Eurofusion):

- In-vessel Components (Actively Cooled Divertor, cryopumps, Massive gas injection).
- Heating & CD Systems (Electro Cyclotron Resonance Heating Power Supplies and Transmission Lines).
- Plasma Diagnostics (Thomson Scattering, Fast Ion Loss Detector, VUV).
- Cryogenic System (Cryoplant Enhancements, Spare parts and Nitrogen Storage).
- Magnet and Power Supply (Power Supply Enhancements, Spare parts, Error Field Correction Coil Power Supplies).
- Control System (Sensors and Tokamak Simulator Development).
- EU Personnel in support of Integrated Commissioning and Operation.
- Power Supplies Spare parts, industrial support and expertise.
- Remote Handling Equipment and tests

It is noted that in a limited number of cases, recent block of contracts established with Russian Federation entities will produce delays due to the necessity to find alternatives for procurement of critical components.

In addition, a share of EU contribution is provided by F4E through cash transfer to a dedicated fund, primarily dedicated to consumables (electricity, helium, nitrogen etc.), IT infrastructures, maintenance & repair and support to EU on-site personnel on site.



**PP\_figure 1. JT-60SA: percentage of earned/not yet earned credits for BA Phase II<sup>2</sup> (Status April 2023)**

## The IFMIF/EVEDA

The IFMIF/EVEDA Project (Engineering Validation and Engineering Design Activities for IFMIF), started in June 2007, aims to provide a detailed, complete and fully integrated engineering design of the IFMIF facility and all data necessary for future decisions on the construction, operation, maintenance, and decommissioning of such a fusion neutron source. In order to fulfill this commitment, the IFMIF/EVEDA project consists of two parallel mandates: the Engineering Design Activity (EDA) and the Engineering Validation Activity (EVA).

The IFMIF/EDA mandate delivered the Intermediate IFMIF Design by issuing the Intermediate IFMIF Engineering Design Report that was approved by the stakeholders in December 2013.

As for the EVA mandate, it deals with the three key technological demonstrators, namely:

- the Accelerator Facility (“LIPAc”),
- the Lithium Target Facility,
- the Test Facilities.

While the EVA phase of the Lithium Target Facility and the Test Facility was successfully completed in February 2017, the EVA phase of the LIPAc Facility is still on-going on Rokkasho site. In July 2019, a 125 mA D+ beam was successfully accelerated up to 5 MeV with the required characteristics. This remarkable result proves that the design of all the LIPAc components of the low and medium energy part is validated from the beam physics standpoint. It has been followed by the successful completion of the first stage of the phase B+ (test of the complete LIPAc accelerator apart from the SRF Linac replaced by a drift line). The aim of the phase B+ is to operate a 125-mA D+ beam at 5 MeV in Continuous wave mode for at least 30 minutes, so that the design of these components will be fully validated. The two other stages of the phase B+ will continue over the whole year 2023. The cryomodule, which will be assembled in parallel, is planned to be integrated in the beam line in 2024. The LIPAc accelerator will be at that point fully completed in its final configuration. From 2025 to at least 2027, the LIPAc commissioning will be then implemented starting at low DC and low intensity, to reach 9-MeV with a 125-mA deuteron beam meeting the beam characteristics requirements in continuous wave. The full demonstration of the IFMIF accelerator concept will be then completed. In the meantime, over the period 2023-2027, the refurbishment and improvement, based on the operational feedback of key subsystems, like the injector, the control system, and the RF power system, will be carried out. The objective is to maintain the facility in operation, as a test stand, in order to test new equipment, train scientists, engineers, and operators, and optimize the beam

<sup>2</sup> Out of the credits related to BA Phase I amounting to 236.413 kBAUA 99.68% has been earned, the latest 0.32% is expected to be earned in the second quarter of 2023.

operation strategies until the safe and regular operation of the future Fusion Neutron Source facilities such as DONES and A-FNS.

After the delivery in 2020 of the work plans to be implemented by both implementing agencies from 2021 to 2025, the corresponding procurement Arrangements for the Fusion Neutron Source engineering design activities and the Lithium Target Facility engineering validation activities covering the activities for 2021-2025 have been defined, in collaboration with Eurofusion, and signed in 2021. This theoretical and experimental work aims to provide an update of the Fusion Neutron Source Engineering Design report delivered in the framework of the BA phase I. The activities will be devoted to the enhancement of the design of the Lithium loop and the update of the Fusion Neutron Source Design focusing on the design activities for safety and accidental scenarios. It is planned to continue these activities beyond the completion of the running procurement arrangements, namely beyond 2025, but the scope is yet to be defined by both implementing agencies, and will depend on the decisions that will be made for the DONES and A-FNS projects.

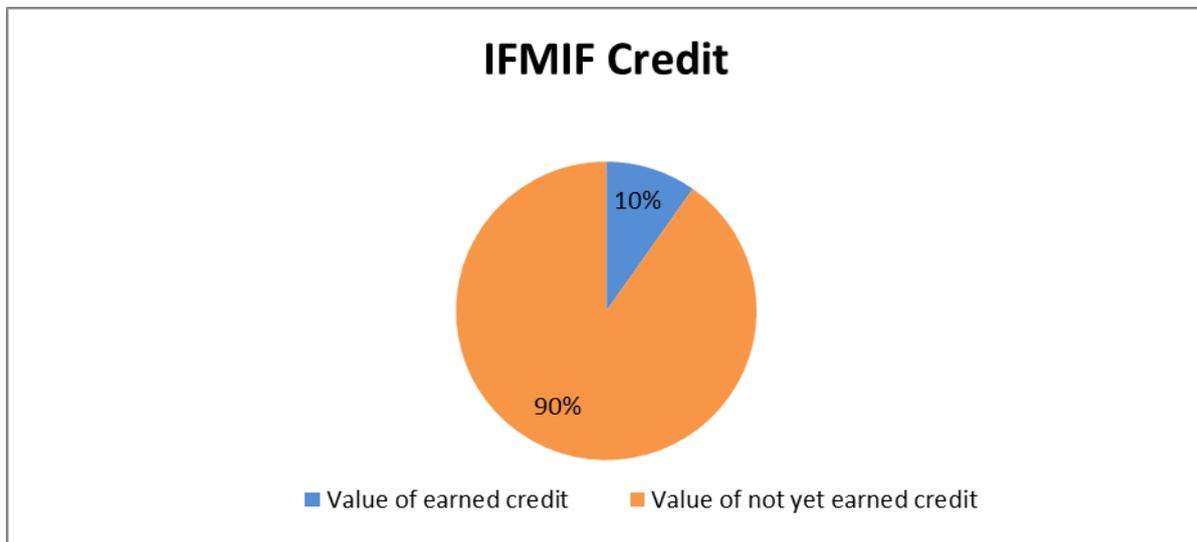
In addition to the above activities, F4E is engaged with Eurofusion for the preparation of the necessary supporting documents for deciding and starting the IFMIF-DONES project (building a scaled down IFMIF plant with number of accelerators reduced from 2 to 1). If decided within the EU and at international level with Japan, we expect the construction of this facility to start after 2023.

For the period up to March 2028 the total commitment for the EU corresponding amounts to 221.23 kBAUA. (From April 2020-March 2028-Phase II- 73.20 kBAUA).

The sharing of activities with Japan, which leads to this associated total credited budget, was agreed in May 2023 by the BA Steering Committee in the form of the document: "IFMIF/EVEDA Project".

In broad terms, the F4E activities for this period will focus on achieving:

- The full performance of the LIPAc facility, though the completion of assembly of the superconducting LINAC, beam commissioning and operation, provision of expertise, enhancements, consumables as well as spare parts.
- Support the preparations for the IFMIF/DONES neutron source.



**PP\_figure 2. IFMIF/EVEDA: percentage of earned/not yet earned credits for BA (Phase II) (Status April 2023)<sup>3</sup>**

<sup>3</sup> The credits related to BA Phase I amounting to 148.025 kBAUA have all been awarded.

## The IFERC

While in BA phase I, a large part of the effort was to establish the IFERC as a research centre in Rokkasho and to initiate the various research collaborations, in BA phase II the work of IFERC has refocused to support the projects ITER, JT-60SA, and IFMIF/EVEDA.

The EU contribution DEMO Design work concentrates on five key areas, prioritised in terms of direct relevance to ITER and JT-60SA exploitation, and aiming to integrate lessons learned towards the construction of future machines.

The IFERC activities include three sub projects:

- DEMO Design and R&D activities,
- establishment and operation of a Computer Simulation Centre (CSC),
- establishment and operation of a Remote Experimentation Centre (REC)

In BA phase I, the DEMO R&D activities concentrated on materials for blankets in order to establish a common basis for a DEMO design. In BA phase II, the objective of activities in fusion reactors R&D is to contribute to the materials database and handbooks for future reactors and to continue to support ITER in issues related to Tritium retention in first wall materials.

Regarding the CSC activities, in BA phase I the EU procured and delivered the Helios supercomputer for the Rokkasho CSC. In BA phase II, the CSC activities include managing the HPC resources provided by Japan as host in order to advance high priority simulation studies for ITER, JT-60SA and fusion reactor in general (e.g. DEMO).

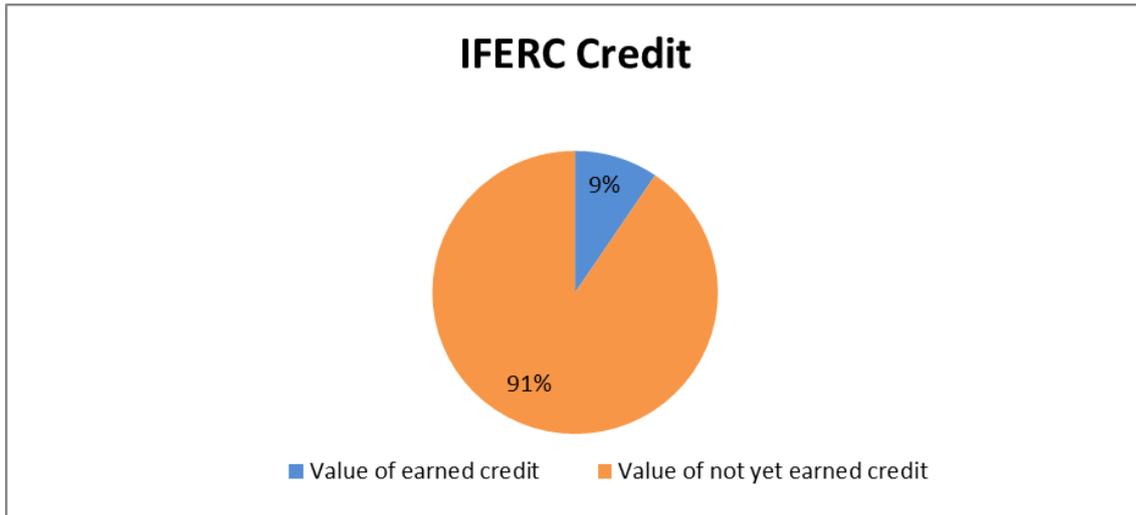
The Remote Experimentation Centre in Rokkasho aims to facilitate broad participation of scientists into ITER experiments. In BA phase I, the remote experimentation room was procured, and remote experimentation techniques were tested on existing machines, such as JT-60SA, JET and WEST. In BA phase II, the activities concentrate on collaborative activities with ITER, the IFMIF/EVEDA LIPAc accelerator, and JT-60SA. Most of the contribution to REC is provided by F4E.

For the period up to March 2027 the total planned commitment for the EU corresponding amounts to 138.986 kBAUA. (From April 2020-March 2028-Phase II – 23.436 kBAUA).

The sharing of activities with Japan, which leads to this associated total credited budget, was agreed in May 2023 by the BA Steering Committee in the form of the document: "IFERC Project Plan".

In broad terms, the F4E activities for this period will focus on supporting JT-60SA, LIPAc as well as ITER by:

- Developing remote experimentation/participation tools for the three projects (i.e. so called REC project),
- Maintaining the provision of high performance computer resources,
- And furthering the consolidation of tokamak design and licensing through the DEMO activities carried out in collaboration with Eurofusion and QST.



**PP\_figure 3 . IFERC: percentage of earned/not yet credits for BA (Phase II)  
(Status April 2023)<sup>4</sup>**

## DONES

The DONES Construction phase started on 16 March 2023 with the holding of the first DONES Steering Committee.

The mission of the DONES Programme is to develop a database of fusion-like neutron irradiation effects in the materials required for the construction of fusion power reactors, and for benchmarking of radiation response of materials. To do so, a neutron source producing high-energy neutrons at sufficient intensity and irradiation volume must be built.

The main objectives of the DONES Programme are:

- a) to provide a neutron source producing fusion-like neutrons at sufficient intensity and irradiation volume;
- b) to generate materials irradiation test data for the design, licensing, construction and safe operation of a fusion demonstration power reactor;
- c) to set up a database for benchmarking of radiation responses of materials hand in hand with computational material science;
- d) to develop a complementary experiments' work programme relevant for other scientific and technological areas.

The Programme Manager of the DONES Programme, responsible for implementing the overall programme and managing the Integrated Programme Team, has not been yet nominated. However, taking into account that some organisational work is needed and in order to avoid unnecessary delays, a Working Group, called Mobilisation Working Group (MWG) has been established.

This DONES MWG is chaired by an F4E representative and involves F4E staff, and representatives of interested Parties, with the mandate to:

- (i) prepare to take ownership, and consolidate the preparatory work for DONES,
- (ii) assess the proposed baseline,
- (iii) plan and prepare the initial steps of the Programme ramp-up, and
- (iv) define the selection procedure for the Programme Manager.

The DONES Mobilisation Working Group will report to the DONES Steering Committee and will be operational until the Programme Manager is selected.

<sup>4</sup> The credits related to BA Phase I amounting to 115.55 kBAUA have all been awarded.

## Objectives and KPIs

### Multiannual objectives for the ITER Project

There are 3 multiannual objectives for the ITER Project:

AREA	Objective	Target
GB/IC milestones	Achieve the GB and IC milestones within "agreed quarters"	Ensure that the Governing Board milestones are delivered before the end of the agreed quarters
EVM-CAS SPI <sup>5</sup>	SPI above a defined value	<i>No target defined for the time being</i>
Overall Costs	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.

#### Focus on GB/IC milestones:

Since 2016, the ITER Council approves and monitors a set of high-level milestones to track the overall progress of the project. To supplement the ITER Council (IC) milestones, F4E's Governing Board (GB) approved additional ones. The list of milestones is updated each year with a rolling wave approach. These GB/IC milestones are ideal for the purpose of being used as technical objectives as they are not only critical path oriented but they cover a larger group of components at different stages of their development. Most of them are key to achieve FP, but some of them also relate to non-FP systems due to be delivered in later years. This is why F4E has decided that its technical objectives will be the achievement on time of the GB/IC milestones.

F4E regularly reports on the status of these milestones via monthly reports, tracks the risks of not achieving them and, where necessary, implements recovery actions to mitigate any forecasted delays. In order to show the close link between the long-term (i.e. Project Plan) planning and the short-term (i.e. Work Programme) activities, F4E is tracking in the Work Programme some selected existing technical milestones leading to the GB/IC ones (i.e. the predecessors) and in the chain of all critical and near-critical paths. Therefore such milestones in the short-term will act as an alert against the increasing risk of missing any critical and near-critical path milestones in the longer term.

PP\_table 2 below shows these milestones (the First Plasma ones are in pale yellow).

The table includes all additional milestones selected up to end of March 2023 as well as all modifications of quarters of completions agreed by ITER Council/Governing Board until that date.

<sup>5</sup> A new EVM-CAS indicator will start being used once the new ITER Project baseline is approved at the ITER Council. The associated target will be defined at that point.

IC/GB Reference	Programme	Milestone	Type of Milestone	Agreed Quarter	Forecast Date of Achievement	PA	PA Deliverable
IC02/GB00	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Start of B1 civil works in Tokamak building	IC	Q1 2016	Achieved	6.2.P2.EU.05	Building Construction
IC04/GB01	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Erection of Tokamak Main Cranes in Assembly Hall	IC	Q2 2016	Achieved	6.2.P2.EU.05	Building Construction
IC05/GB02	MAGNETS UNIT	Completion of first EU TF winding pack	IC	Q2 2016	Achieved	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
IC09/GB03	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Installation of WDS tanks in Tritium building	IC	Q2 2016	Achieved	6.2.P2.EU.05	Building Construction
IC13/GB04	VACUUM VESSEL UNIT	First Sub Segment Assembly of VV Sector 5 completed	IC	Q4 2016	Achieved	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
IC14/GB05	CRYOPLANT & FUEL CYCLE UNIT	First Liquid Nitrogen Refrigerator equipment Factory Acceptance Tests completed	IC	Q4 2016	Achieved	3.4.P1.EU.01	Cryoplant system - LN2 Plant and Auxiliary Systems
IC19/GB06	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Energisation of 400KV switch yard	IC	Q1 2017	Achieved	4.1.Pn.EU	Steady-State Electrical Network and Pulsed Power Electrical Network Installation
IC21/GB07	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Completion of RFE 1A (Assembly Hall)	IC	Q2 2017	Achieved	6.2.P2.EU.05	Building Construction
IC24/GB08	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Tokamak Concrete crown civil works achieved	IC	Q3 2018	Achieved	6.2.P2.EU.05	Building Construction
IC25/GB09	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Civil works and finishing performed in B2 level allowing TB04 installation to begin in tokamak building B2 level	IC	Q4 2018	Achieved	6.2.P2.EU.05	Building Construction

IC30/GB10	HEATING & CURRENT DRIVE UNIT	Neutral Beam Test Facility (NBTF): Start of integrated commissioning of SPIDER beam	IC	Q1 2018	Achieved	5.3.P9.EU.01	NB Test Facility Components
IC33/GB11	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: First limited access to Tokamak pit for installation without large crane availability (RFE 1B stage 1)	IC	Q2 2018	Achieved	6.2.P2.EU.05	Building Construction
IC42/GB12	MAGNETS UNIT	PF Coil: EU PF 5 coil ready for cold test	IC	Q1 2020	Achieved	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)
IC50/GB13	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Building: Limited crane access between Assembly Hall and Tokamak Building (RFE 1B stage 2)	IC	Q1 2020	Achieved	6.2.P2.EU.05	Building Construction
IC54/GB14	MAGNETS UNIT	PF Coil: Manufacturing complete for EU PF 6 Coil and delivery to site	IC	Q2 2020	Achieved	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)
IC53/GB15	MAGNETS UNIT	TF Coils: Complete FAT for PA work scope for first EU TF Coil	IC	Q1 2020	Achieved	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
IC58/GB16	VACUUM VESSEL UNIT	VV: First EU Vacuum Vessel Sector fabrication complete and delivered to IO site	IC	Q4 2020	30/05/2024	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
IC76/GB18	CRYOPLANT & FUEL CYCLE UNIT	Commissioning: Cryostat Leak Detection System delivery to site	IC	Q3 2023	12/06/2026	3.1.P3.EU.01	Leak detection and Localisation System
GB19	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Cryoplant Compressor Building (51) RFE (RFE #8B)	GB	Q1 2023	Achieved	6.2.P2.EU.05	Building Construction
GB20	IN VESSEL UNIT	In-vessel: Delivery of the first all-Tungsten prototype test assembly of the Divertor Inner Vertical Target to the RF test facility.	GB	Q4 2018	Achieved	1.7.P2B.EU.01	Divertor inner vertical targets
GB21	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Construction of Cryoplant Coldbox Building (52) Completed	GB	Q1 2023	15/06/2023	6.2.P2.EU.05	Building Construction
GB22	HEATING & CURRENT DRIVE UNIT	EC UL: Manufacturing of 1st batch of Diamond Disks for EC Upper Launcher 1 finished	GB	Q3 2023	Achieved	5.2.P1B.EU.02	EC Upper Launchers (4 port plugs) and ex-vessel Waveguide system (32 for EC Upper Launcher and 24 for EC Equatorial Launcher)
GB23	MAGNETS UNIT	TF Coil: Seventh EU TF Coil delivery to site	GB	Q1 2022	Achieved	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings

IC64/GB24	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Medium Voltage distribution LC1A Ready for Equipment	IC	Q4 2022	28/06/2024	6.2.P2.EU.05	Building Construction & Steady-State Electrical Network and Pulsed Power Electrical Network Installation
GB25	VACUUM VESSEL UNIT	VV: Delivery of Sector 9 by EU-DA to ITER Site	GB	Q2 2021	08/09/2025	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
GB26	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Medium Voltage Distribution Building LC/2B (47) RFE (RFE #10)	GB	Q3 2024	28/06/2024	6.2.P2.EU.05	Building Construction
GB27	HEATING & CURRENT DRIVE UNIT	NB&PS: Start of Installation of Acceleration Grid Power Supplies - Converter System of Neutral Beam Injector-1 Q2	GB	Q3 2024	11/07/2024	5.3.P6.EU.01	NB Power Supply
GB28	CRYOPLANT & FUEL CYCLE UNIT	Cryo&FC: Delivery of Torus and Cryostat Front-End Cryopump Distribution System and Cryojumpers 5-8 (4 no.) Batch 2 by EU-DA to Site	GB	Q3 2023	20/06/2023	3.1.P1.EU.02	Front-End Cryopump distribution
GB29	HEATING & CURRENT DRIVE UNIT	EC UL: Manufacturing of 1st batch of Waveguides for EC Upper Launcher 1 finished	GB	Q1 2026	23/12/2026	5.2.P1B.EU.02	EC Upper Launchers (4 port plugs) and ex-vessel Waveguide system (32 for EC Upper Launcher and 24 for EC Equatorial Launcher)
GB30	HEATING & CURRENT DRIVE UNIT	NB&PS: Start of Installation of High Voltage Dec 1 of Neutral Beam Injector -1	GB	Q2 2025	28/05/2025	5.3.P6.EU.01	NB Power Supply
GB32	REMOTE HANDLING UNIT	Remote Handling: Task Order Signed for Manufacturing for Cask and Plug Remote Handling System (CPRHS)	GB	Q3 2022	13/09/2023	2.3.P3.EU.01	15 Cask and Plug RH systems
GB33	CRYOPLANT & FUEL CYCLE UNIT	Cryo&FC: Delivery of First Torus & Cryostat	GB	Q2 2023	28/06/2024	3.1.P1.EU.03	Cryopumps: 6 Torus and 2 Cryostat Cryopumps
IC90.2/GB34	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: B71 North ready for IO Installation	IC	Q2 2022	Achieved	6.2.P2.EU.05	Building Construction
GB35	CRYOPLANT & FUEL CYCLE UNIT	Cryo&FC : Delivery of Primary (VV)Leak Detection and Localisation by EU-DA to ITER Site for 1st Plasma	GB	Q4 2023	24/03/2027	3.1.P3.EU.01	Leak detection and Localisation System

GB36	DIAGNOSTICS UNIT	Diagnostics: Delivery of In-V Elec Feedthroughs for Upper Ports Batch 2 by EU-DA to IO ITER Site	GB	Q4 2025	31/07/2025	5.5.P1.EU	Diagnostics (roughly 25% of all diagnostic systems)
GB37	IN VESSEL UNIT	In-Vessel: Completion of the qualification phase prior to start of Blanket First Wall series production	GB	Q3 2023	28/08/2023	1.6.P1A.EU	Blanket First Wall (215 panels)
GB38	IN VESSEL UNIT	In-vessel: Completion of Stage I of the series production of Divertor Cassette Bodies.	GB	Q2 2028	15/03/2027	1.7.P1.EU.01	54 Divertor cassette bodies
GB39	DIAGNOSTICS UNIT	Diagnostics: Electronics and Software for Magnetics Delivered to ITER Site	GB	Q3 2023	13/07/2023	5.5.P1.EU	Diagnostics (roughly 25% of all diagnostic systems)
GB40	REMOTE HANDLING UNIT	Remote Handling :Equatorial Port Plug First Assembly Cask Delivered to ITER Site	GB	Q4 2023	24/03/2026	2.3.P3.EU.01	15 Cask and Plug RH systems
GB41	REMOTE HANDLING UNIT	Remote Handling: Upper Port Plug First Assembly Cask Delivered to ITER Site	GB	Q4 2023	19/06/2026	2.3.P3.EU.01	15 Cask and Plug RH systems
GB42	REMOTE HANDLING UNIT	Remote Handling :Monorail crane of Neutral Beam Remote Handling System and Delivered to ITER Site	GB	Q1 2024	06/05/2030	2.3.P5.EU.01	1 Neutral Beam RH system.
GB43	HEATING & CURRENT DRIVE UNIT	NB & PS: 8th Set of Main High Voltage Power Supplies & Body Power Supplies (MHVPS & BPS) Delivered to ITER Site by EU-DA	GB	Q2 2024	Achieved	5.2.P4.EU.01	67% EC High Voltage Power Supplies
GB44	HEATING & CURRENT DRIVE UNIT	ECES: EC Upper Launcher Control System ITER Site Acceptance completed	GB	Q3 2024	17/06/2024	5.2.P1B.EU.01	Electron Cyclotron (EC) Control System
GB45	IN VESSEL UNIT	In-vessel: Completion of Stage I of the series production of Divertor Inner Vertical Target.	GB	Q4 2026	15/10/2027	1.7.P2B.EU.01	Divertor inner vertical targets
GB46	HEATING & CURRENT DRIVE UNIT	EC UL: Delivery 1st EC Upper Launcher from EU-DA to IO	GB	Q3 2027	23/09/2027	5.2.P1B.EU.02	EC Upper Launchers (4 port plugs) and ex-vessel Waveguide system (32 for EC Upper Launcher and 24 for EC Equatorial Launcher)
GB47	REMOTE HANDLING UNIT	In Vessel Viewing System Unit #1 Delivered to ITER Site	GB	Q2 2028	07/03/2030	5.7.P1.EU.01	6 In-Vessel Viewing systems

GB48	HEATING & CURRENT DRIVE UNIT	NB&PS: Delivery of 1st Set (1MW) of Gyrotrons Tubes by EU-DA to ITER Site	GB	Q3 2027	30/09/2027	5.2.P3.EU	25% EC Gyrotron Sources
GB49	IN VESSEL UNIT	In-vessel: Delivery of the Divertor Rails to the ITER Site.	GB	Q4 2028	01/03/2029	1.7.P2E.EU.01	Divertor rails
GB50	CRYOPLANT & FUEL CYCLE UNIT	Cryo&FC : Delivery of Heating Neutral Beam Cryopumps 1 from EU-DA to ITER Site	GB	Q4 2030	15/12/2031	3.1.P1.EU.04	Cryopumps for the Neutral Beam system (ITER and MITICA)
IC43/GB51	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Building: Assembly building complete	IC	Q4 2018	Achieved	6.2.P2.EU.05	Building Construction
IC67/GB54	MAGNETS UNIT	TF coils: Complete FAT for PA work scope for 18 TF Coils	IC	Q4 2021	15/05/2023	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
IC32/GB55	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Cryostat: Cryostat support bearings full scale prototype delivery to site	IC	Q2 2018	Achieved	6.2.P2.EU.05	Building Construction
GB56	HEATING & CURRENT DRIVE UNIT	NB & PS: 1st Set of Main High Voltage Power Supplies & Body Power Supplies (MHVPS & BPS) Delivered to ITER Site by EU-DA	GB	Q1 2020	Achieved	5.2.P4.EU.01	67% EC High Voltage Power Supplies
IC90.1/GB57	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Cryoline Bridge available for installation of systems	IC	Q2 2022	05/05/2023	6.2.P2.EU.05	Building Construction
IC91.1/GB58	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Buildings: Busbar Bridge available for installation of systems	IC	Q4 2022	29/09/2023	6.2.P2.EU.05	Building Construction
IC59.1/GB59	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	Building: Tokamak Building access granted in L3	IC	Q2 2020	Achieved	6.2.P2.EU.05	Building Construction
IC59.2/GB60	SITE, BUILDINGS AND POWER SUPPLIES PROJECT TEAM	LV and MV Load-centers for all First Plasma nonnuclear	IC	Q2 2020	Achieved	6.2.P2.EU.05	Building Construction

**PP\_table 2. Multiannual objectives of the ITER project (IC-GB milestones) (as of 31<sup>st</sup> March 2023)**

## Multiannual objectives for the Test Blanket Module (TBM)

The work carried out on the Test Blanket Module (TBM) Systems is not covered by a standard Procurement Arrangement, but by specific TBM Arrangements (TBMA) signed with ITER Organization. Through a TBMA, F4E is committing to deliver a Test Blanket Systems – or a part of it, in case of a collaboration with another DA (see below) – and the associated equipment/tools to the ITER Site according to an agreed schedule.

Initially two independent European TBM Systems were to be tested in ITER, a Helium-cooled Lead-Lithium (HCLL) and a Helium-cooled Pebble-Bed (HCPB). Two TBMA were signed with the IO in 2014 for that purpose.

In 2018, in line with a recommendation of the working group for the realignment of the TBM and DEMO Breeding Blanket programmes, F4E decided to replace the development of one of the two helium-cooled TBM System with a water-cooled lead-lithium (WCLL-TBS) one. An amendment to the HCLL-TBS TBMA was signed with IO, now constituting the WCLL-TBS TBMA. In addition, F4E has entered in a close collaboration with EUROfusion for the execution of its large TBM R&D program.

In 2020, as a follow-up action of the reduction of the number of TBM test ports in ITER, F4E and ITER Korea decided to join their effort to develop and deliver the helium-cooled Pebbled Bed TBM System. It was renamed the Helium-Cooled Ceramic Pebble (HCCP) TBM System. The former HCPB TBMA was terminated, and a tripartite F4E-ITER Korea-IO new TBMA was signed for the HCCP-TBS in 2023. Simultaneously, F4E and ITER Korea signed a Partnership Arrangement ruling their collaborative effort toward the IO. In this collaboration, F4E is responsible for delivering only 40% of the HCCP-TBS (and ITER Korea 60%).

The following milestones of the TBM programme complement the set of Technical Objectives for the ITER project .

Reference	Action	Milestone	Date
TBM01	10-Test Blanket Module	Initiation of the official process for changing one European TBM System and preparation of a new TBM Arrangement	2018-Achieved
TBM02	10-Test Blanket Module	Signature of the WCLL TBM Arrangement	2020-Achieved
TBM03	10-Test Blanket Module	WCLL TBS Conceptual Design Review (CDR)	2020-Achieved
TBM04	10-Test Blanket Module	Signature of the HCCP TBM Arrangement and Partnership Arrangement	2023-Achieved
TBM05	10-Test Blanket Module	WCLL TBS and HCCP TBS Preliminary Design Review (PDR)	Q2 2024
TBM06	10-Test Blanket Module	Signature of FD and procurement of WCLL and HCCP ancillary systems	Q4 2025
TBM07	10-Test Blanket Module	WCLL TBS and HCCP TBS Final Design Review (FDR)	Q2 2027
TBM08	10-Test Blanket Module	Signature of procurement of WCLL TBM and HCCP TBM sets	Q1 2028
TBM09	10-Test Blanket Module	Delivery of WCLL and HCCP ancillary systems to ITER site	Q4 2031
TBM10	10-Test Blanket Module	Delivery of WCLL and HCCP TBM sets to ITER site	Q4 2031

**PP\_table 3 . Multiannual objectives of the TBM project**

## Multiannual objectives for the Broader Approach

The technical objective for the European part of the BA projects for Phase II, as presently defined in the Project Plan approved by the BA Steering Committee, is the achievement on time of the milestones that are listed, project by project, in the tables below in which the achievements are shown in pale green.

These simplified tables are largely based on the grouping of the relevant project milestones, originally defined and valorized in the EU relevant Procurement Arrangements. The technical objectives are defined based on the Project Plans 2023-2028 for all three projects<sup>6</sup>.

Related PA (BA)	Description	Baseline Achievement Date - Year	Credit Allocation (kBAUA)
Power Supplies Spare Parts – Part 1 (PSSP01)	Power Supplies Maintenance Support	2021	2.306
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils - Approval of First Design Report	2021	1.074
Thomson Scattering (TSCC)	Fabrication and Tests - Optical fibres	2021	2.420
Thomson Scattering (TSCC)	Fabrication and Tests – delivery of all other hardware	2023	3.770
ECRH PS Spare Parts (ECPSSP01)	Electro Cyclotron Resonance Heating – Approval of First Design Report	2023	1.257
ECRH PS Spare Parts (ECPSSP01)	Electro Cyclotron Resonance Heating - Approval of Report on Factory Tests and Delivery to Site	2024	2.514
ECRH PS Spare Parts (ECPSSP01)	Electro Cyclotron Resonance Heating –Acceptance Tests on Site	2025	0.419
Pellet injector (PEINJ)*	Delivery of fueling source	2025	1.460
Pellet injector (PEINJ)*	Delivery of Pacing Source, Delivery of Centrifuge and Drift Tube and Integrated Test in Europe and acceptance on site	2025	4.380
Cryopumps (CRPUM)	Divertor cryopumps - delivery on site – (10 units)	2023	1.500
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils – Approval of Report on Factory Tests	2022	1.074
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils - Delivery to Site and Acceptance Tests on Site	2023	1.412
ECRH Transmission (ECRHWG)	Electro Cyclotron Resonance Heating Transmission lines – Delivery of components Part 1	2023	5.128
ECRH Transmission (ECRHWG)	Electro Cyclotron Resonance Heating Transmission lines – Delivery of components Part 2 and approval on-site	2024	7.692
Actively Cooled Divertor Part 1(DIV-1)*	High Heat Flux Elements 1 <sup>st</sup> stage	2023	2.720
Actively Cooled Divertor Part 1(DIV-1)*	High Heat Flux Elements 2 <sup>nd</sup> stage	2025	9.030
Actively Cooled Divertor Part 2 (DIV-2)*	Normal Heat Flux Elements and Cassettes	2025	16.969
Actively Cooled Divertor Part 3 (DIV-3)*	Integration of Cassettes, Normal and high Heat Flux Elements	2026	14.318
ECRH PS (ECPSSP02)	Electro Cyclotron Resonance Heating – Procurement of 2 PS	2026	5.106
Cryoplant (CRENH01)	Enhancement of Cryoplant Performance	2024	2.789
Cryoplant (CRENH01)	Enhancement of Cryoplant Performance	2025	1.489

**PP\_table 4 . Multiannual objectives JT-60SA**

<sup>6</sup> The Project Plans were approved by the BA Steering Committee in May 2023.

Related PA (BA)	Description	Baseline Achievement Date - Year	Credit Allocation (kBAUA)
Injector Spare parts (AF02-3)	LIPAc injector upgrade – work plan	2024	0.500
SRF Linac (AF4-2)	SRF Linac – Assembly of the LIPAc cryomodule and supply of high sensitivity beam loss Monitors	2024	2.540
RF Power System (AF6-2)	RF Power System – Refurbished PSYS (protection system)	2023	1.330
RF Power System (AF6-3)	RF Power System - Enhancement pre-series	2024	3.370
RF Power System (AF6-4)	RF Power System - Enhancement RFQ series	2026	4.900
Control System (AF8-3)	Control System – maintenance of hardware and software – year 2025	2024	0.990
Control System (AF8-3)	Control System – maintenance of hardware and software – year 2026	2025	2.440
LF Enhancement (LF6-2)	LF Enhancement: Li Loop, Purification System & Safety Part 1	2025	3.800
LF Enhancement (LF6-2)	LF Enhancement: Li Loop, Purification System & Safety – Part 2	2027	0.800
FNS Engineering Design (ED6-2)	Technical reports Part 1	2025	3.250
FNS Engineering Design (ED6-2)	Technical reports Part 2	2025	0.800

**PP\_table 5. Multiannual objectives IFMIF/EVEDA**

Related PA (BA)	Description	Baseline Achievement Date - Year	Credit Allocation (kBAUA)
Demo Design Activities and DEMO R&D (5 PAs)	Complete planning with EUROfusion of DEMO design and DEMO R&D activities from 2021-2024 EU	2022	1.279
CSC-EU	Computer resources and joint simulation projects contribution 2020-2022	2022	0.400
REC-EU	Supply of the implementing plan for the ITER Remote Experimentation Centre	2022	0.050
DEMO Design Activities	Summary report of activities	2025	4.686
DEMO R&D	Structure material development for in-vessel components	2025	1.874
DEMO R&D	Database for material corrosion	2025	0.469
DEMO R&D	Neutron irradiation experiment of breeding functional materials	2025	1.405
DEMO R&D	Tritium technology for collection and inventory evaluation	2025	0.937
CSC-EU	Computer resources and joint simulation projects contribution 2023	2023	0.200
REC-EU	Supply of the equipment for tests of remote experiment with ITER and the support of remote experiments for the ITER Remote Experimentation Centre	2023	0.200

**PP\_table 6. Multiannual objectives IFERC**

### Multiannual objectives for DONES

Precise and detailed multiannual objectives will be defined for DONES once the formal involvement of F4E is decided and the content of the Procurement Arrangements is defined.

### Multiannual objectives for DEMO

No separate technical objectives are set for DEMO considering the current limited involvement of F4E in such activities.

### Annual Objectives

In addition to the multiannual objectives, annual objectives are identified and are constantly monitored by F4E and are reported upon. The PP\_table 7 below provides a list of these objectives.

AREA	Objective	Target
Annual M-SPI	Reach a minimum SPI value by end of the year	SPI≥0.8
Annual commitment budget	Implement a defined percentage of Commitment Appropriations by end of the year	90% implementation of commitment
Budgeted forecast of the Work Programme	Implement a defined percentage of allocated commitment appropriation to Work Programme Actions, without reserves, by end of year	95% implementation of commitment
Annual payment budget	Implement a defined percentage of Payment Appropriations by end of the year	95% implementation of payment
Quality – NCR closure time	Ensure Nonconformity Reports (NCR) closure in due time	KPI≥0.8
Quality – NCR closure rate	Close a minimum percentage of NCR annually	KPI≥0.95
Phase gate – Annual implementation	Execute a minimum number of phase gates planned during the year	KPI≥0.8
Human Resources	Vacancy rate to be less than a defined value by end of the year	Vacancy rate to be less than 4%

**PP\_table 7. Annual Objectives**

### Definition of the F4E Key Performance Indicators (KPIs) and their thresholds

#### **Multiannual KPI**

*Equation 1: GB milestones variance*

$$\text{GB milestone Achieved Date} - \text{GB milestone Foreseen Date}$$

*Equation 2: EVM-CAS SPI*

$$\frac{EV}{PV} = \frac{\text{Achieve credit (IUA)}}{\text{baseline credit to date (IUA)}}$$

Equation 3: Overall Costs

$$\frac{\text{Cost estimation for "ITER + Broader Approach"}}{\text{Total budget available for "ITER + Broader Approach"}}$$

**Annual KPI:**

Equation 4: Annual M-SPI

$$\frac{\text{Number of milestones with Status = Completed}}{\text{Number of milestones with reference date } \leq \text{Current month}}$$

Equation 5: Annual commitment budget

$$\frac{\text{Actual commitment executed to date + remaining commitment planned to be executed between date and year's end}}{\text{Latest approved annual commitment budget}}$$

Equation 6: Annual budgeted forecast of Work Programme

$$\frac{\text{Actual commitment executed to date + remaining commitment planned to be executed between date and year's end}}{\text{Latest approved budgeted forecast of the Work Programme Actions}^7}$$

Equation 7: Annual payment budget

$$\frac{\text{Actual payment executed to date + remaining payment which is planned to be executed between date and year's end}}{\text{Latest approved payment appropriation for the year}}$$

Equation 8: Quality - Closure time

$$\frac{\text{Number of open NCR respecting the target date for NCR closure}}{\text{Number of open NCR}}$$

Equation 9: Quality NCR - NCR closure rate

$$\frac{\text{Number of NCRs closed during the year}}{\text{Number of NCR opened during the year}}$$

Equation 10: Phase gate – Annual implementation

$$\frac{\text{Annually executed number of phase gates}}{\text{Annually planned number of phase gates}}$$

Equation 11: Vacancy rate

$$\frac{\text{Number of vacant posts}}{\text{Total authorised posts in the Establishment Plan (FO, TA and CA)}}$$

Equation 12: Turnover rate

$$\frac{\text{Number of departures}}{\text{Total authorised posts in the Establishment Plan (FO, TA and CA)}}$$

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<sup>7</sup> Excluding Reserves

Equation 13: Absenteeism rate

$$\frac{\text{Cumulative number of days of sick leave of staff member in year N}}{\text{Total number of staff members in year N} \times 365}$$

**KPI Thresholds**

Each KPI has thresholds:

Green	The KPI is within the accepted range.
Amber	The KPI is at risk of moving outside of the accepted range.
Red	The KPI is outside of the accepted range.

A project manager may choose to flag a KPI as at risk whenever there is a risk that the KPI may move outside of the accepted range. This step should be reflected in the identification of specific risks in the risk log with a consequent tracking and mitigation actions.

The objective of the KPIs is to ensure that the project is proceeding in line with the overall plan so that:

1. The long-term project schedule and deliverables are on schedule.
2. The project costs are under control.
3. The project quality management process is functioning as planned.
4. The Establishment Plan is being utilized effectively.

**List of main KPIs monitored during the year and associated thresholds**

- GB Milestones

Blue	Milestone completed
Green	Forecast date more than one month before the end of target quarter
Amber	Forecast date in the final month of target quarter (or Project Manager has flagged KPI as being at risk)
Red	Forecast date later than end of target quarter

- EVM-CAS SPI

No RAG status defined until there is a multi-annual target agreed by the Governing Board.

- Overall costs

Green	$KPI \geq 1.0$
Amber	$1.0 > KPI \geq 0.95$
Red	$KPI < 0.95$

- Annual M-SPI

Green	$SPI \geq 0.80$
Amber	$0.80 > KPI \geq 0.60$
Red	$KPI < 0.60$

- Annual Commitment Budget (overall at F4E Level)

Green	$0.90 \leq \text{KPI}$
Amber	$0.70 \leq \text{KPI} < 0.90$
Red	$\text{KPI} < 0.70$

- Budgeted forecast of the Work Programme

Green	$0.95 \leq \text{KPI}$
Amber	$0.90 \leq \text{KPI} < 0.95$
Red	$\text{KPI} < 0.90$

- Annual Payment Budget (overall at F4E Level)

Green	$0.95 \leq \text{KPI}$
Amber	$0.90 \leq \text{KPI} < 0.95$
Red	$\text{KPI} < 0.90$

- Quality – NCR closure time

Green	$0.80 \leq \text{KPI}$
Amber	$0.60 \leq \text{KPI} < 0.80$
Red	$\text{KPI} < 0.60$

- Quality – NCR closure rate

Green	$0.95 \leq \text{KPI}$
Amber	$0.90 \leq \text{KPI} < 0.95$
Red	$\text{KPI} < 0.90$

- Phase gate – Annual implementation

Green	$0.80 \leq \text{KPI}$
Amber	$0.60 \leq \text{KPI} < 0.80$
Red	$\text{KPI} < 0.60$

- Vacancy rate

Green	$\text{KPI} \leq 0.04$
Amber	$0.04 < \text{KPI} < 0.07$
Red	$\text{KPI} \geq 0.07$

## Detailed break-down of credits for the period April 2020-March 2028 for Broader Approach

Title	BA EU Commitment kBAUA
<b>Enhancements in-kind</b>	
In-vessel Components	59.536
Heating & CD Systems	33.223
Plasma Diagnostics	23.950
Cryogenic	11.400
Magnet and Power Supply	16.580
Control System	0.000
Other Tokamak Systems	36.900
EU on-site personnel	6.200
<b>Operation / Maintenance / Assembly</b>	
Consumables	24.492
EU on-site personnel support and Project Team Cost	1.600
Maintenance & Assembly	29.979
Replacement parts	19.040
IT infrastructure	5.000
Others	7.700
<b>JT-60SA (Total)</b>	<b>275.600</b>
Fusion Neutron Source	6.400
Lithium Target Facility	6.400
LIPAc-Injector	5.300
LIPAc-SRF Linac	3.340
LIPAc-RF Power System	13.000
LIPAc-Control System	4.250
Common Expenses (Europe)	1.500
Common Fund (Europe)	14.500
Maintenance (Europe)	1.710
On site personnel (Europe)	16.800
<b>IFMIF/EVEDA (Total)</b>	<b>73.200</b>
DEMO Design	8.835
DEMO R&D	8.841
CSC	1.800
REC	1.800
Project Team	2.160
<b>IFERC (Total)</b>	<b>23.436</b>

**PP\_table 8 . Detailed break-down of credits for the period April 2020-March 2028 for Broader Approach <sup>8</sup>**

<sup>8</sup> As not all PAs are signed, the PAs have been summed up based on topics, to show the total credit values planned up to March 2028.

<b>Action number</b>	<b>Action name</b>	<b>PMP delivery status</b>
Action 1	Magnets	No PMP forecasted since Programme is finishing
Action 2	Vacuum Vessel	Delivered
Action 3 & 4	In Vessel - Blanket and Divertor	Delivered
Action 5	Remote Handling	Delivered
Action 6	Cryoplat and Fuel Cycle	Delivered
Action 7	Plasma Engineering & Operations	On-hold
Action 8	Heating and Current Drive	Delivered
Action 9	Diagnostics	Delivered
Action 10	Test Blanket Module	Delivered

***PP\_table 9 . State of play on Project Management Plans preparation***

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## ANNEX TO SECTION III “RESOURCE ESTIMATES PLAN”

The REP for F4E Financial Resources includes the Estimate of Revenue and Expenditure for the following five years according to:

- Estimate of Revenue from the Contributors (EURATOM, ITER Host State and Members),
- Estimate of Expenditure in Commitments according to the corresponding Work Programme for the current year and estimates of needs until 2028,
- Estimates of expenditure in payments according to detailed Payment Forecasts for 2023 and 2024 and estimates based on commitment needs until 2028.

### 1. Assumptions of the Resource Estimates Plan

The REP is based on the general assumptions introduced in the Single Programming Document 2024-2028 and on the following specific budget assumptions.

#### 1.1. Estimate of Revenue

The F4E revenue is made up of:

- EURATOM contribution,
- ITER Host State contribution,
- Other contributions
  - Membership contributions from members other than EURATOM
  - Possible Other contributions
- Additional Revenues, for tasks requested by ITER Organization, from Other Assigned Revenue (Japan/UP#10), and from recoveries,
- Unused commitment appropriations made available again,
- In kind contribution to F4E

#### EURATOM contribution

The contribution from EURATOM constitutes the main source of revenue for F4E. This revenue is divided in contribution to F4E operational and administrative expenditure. The latter covers the main part of the F4E administrative costs.

The breakdown of the annual EURATOM contribution until 2027 is included in the Legislative Financial Statement<sup>1</sup> accompanying the Council Decision (2021) 281, which can be further adjusted during the

<sup>1</sup> Legislative financial statement to Commission proposal COM (2013) 607 for a Council Decision amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it

annual budgetary procedures based on updated EC Statement of Estimates and final approval by EU budgetary Authority.

### 1.1.2 ITER Host State Contribution (IHS)

The contribution from the ITER Host State constitutes the second source of revenue for F4E. France as the ITER Host State covers 9.09% of the total costs of the ITER construction phase, this is equivalent to 20% of the total European participation to the construction of ITER. New principles and methodology to calculate the French contribution is established in the exchange of letters<sup>2</sup> from 2022, with retroactive effect in 2021. It is calculated on the EURATOM contribution to F4E minus the domains of exclusion as agreed in the exchange of letter and defined as follows:

- Administrative expenditure,
- Test Blanket Modules cost,
- DONES cost,
- Broader Approach cost,
- The Transportation cost.

Compared to the 2011 agreement<sup>3</sup>, covering the period until the end of 2020, this new methodology is no longer limited in time and covers the remaining lifetime of the project.

### 1.1.3 Other Contributions

#### 1.1.3.1 Membership Contributions

The Annual Membership Contributions are composed of:

- A minimum contribution of 0.1% of the total amount of annual membership contributions and,
- Additional contribution calculated in proportion to the EURATOM financial participation (excluding JET) in the Member's expenditure in the framework of the Community Fusion Research Programme in year N-2.

The contributions are established and adopted annually within the F4E budget. The calculations correspond to 10% of the F4E draft administrative budget prepared in year N-2.

The revenue from the Membership contributions is not assigned. As from 2016 onwards, the breakdown by Member is established by EURATOM on the basis of the figures provided by EUROfusion, in compliance with the frame defined in F4E statutes.

<sup>2</sup> Contribution financière française à la construction d'ITER : Lettre du Haut Représentant Français pour ITER (formal exchange of letters on 17 June 2022 and 29 July 2022 between France and the European Commission).

<sup>3</sup> Contribution financière française à la construction d'ITER : Lettre du Haut Représentant Français pour ITER (formal exchange of letters on 8 September and 17 November 2011 between France and the European Commission).

### 1.1.3.2 Other contributions

Revenue resulting from the annual contributions from third countries to F4E budget and ITER project received from EURATOM based on their cooperation agreements with the European Commission.

### 1.1.4 Additional Revenues (Revenue from ITER Organization, Other Revenue and Recoveries)

The revenue from the ITER Organization (IO)<sup>4</sup> is covering the tasks implemented by F4E at IO request:

- For the implementation of the Project Change Requests originating from IO that have been introduced after 05 March 2015 according to the terms of reference of IO Reserve Fund,
- In the frame of resolution of non-conformities on request of IO DG,
- For tasks requested by IO DG for the general interest of the project, considering the capacity of F4E suppliers.

The Revenue considered under Other Assigned Revenue, is revenue coming from Other Domestic Agencies covering the transfer of specific tasks to be implemented by F4E.

Miscellaneous revenue according to F4E financial Regulation as for liquidity damages or administrative fees.

The Recoveries include revenues from undue payments which are returned to the budget.

### 1.1.5 Implementation of unused commitment appropriations

The F4E Financial Regulation foresees the possibility to make the unused appropriations<sup>5</sup> available again as revenue in subsequent budgetary years according to the F4E operational needs. This financial mechanism does not apply to the assigned revenue received from ITER Host State (France) and from ITER Organization and to F4E administrative expenditure as they follow specific rules. The table below gives the global overview of the commitment appropriations cancelled and made available again since 2007.

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<sup>4</sup> Article 6e and Article 20 of F4E Financial Regulation in accordance with art. 4(2) and art. 12 (1e) of the F4E Council Decision and Statutes

<sup>5</sup> according to Chapter 2 of F4E Financial Regulation (Principle of annuality), the unused appropriations at the end of each year are cancelled, as well as the de-commitments (cancellation of budgetary commitments).

Commitment Appropriations Current Value MEUR	2007-2013 FP VII	B-2014 Executed	B-2015 Executed	B-2016 Executed	B-2017 Executed	B-2018 Executed	B-2019 Executed	B-2020 Executed
Cancelled	528.297	292.68	85.708	6.234	37.593	5.569	14.920	56.414
Made available again	9.760				96.000	120.007	149.170	390.697
<b>Total CA still to be made available again</b>	<b>518.538</b>	<b>811.222</b>	<b>896.930</b>	<b>903.164</b>	<b>844.757</b>	<b>730.319</b>	<b>596.070</b>	<b>261.787</b>

Commitment Appropriations Current Value MEUR	B-2021 Executed	B-2022 Executed	B-2023 Estimation	B-2024 Estimation	B-2025 Estimation	B-2026 Estimation	B-2027 Estimation	Budgetary provision for Risk Exposure	TOTAL
Cancelled	75.807	168.040	133.347			46.622	23.129		<b>1 474.364</b>
Made available again	-	-	-	176.048	74.072			458.612	<b>1 474.364</b>
<b>Total CA still to be made available again</b>	<b>337.594</b>	<b>505.634</b>	<b>638.981</b>	<b>462.932</b>	<b>388.861</b>	<b>435.483</b>	<b>458.612</b>	<b>-</b>	<b>0.000</b>

**Financial table 1 Implementation and forecast of unused commitment appropriations**

By the end of September 2023, the cancelled appropriations amount to EUR 505.6 million.

As per Amendment 2 to Work Programme 2023, F4E will be not able to implement its entire commitment budget in 2023. This is expected to increase the unused commitment appropriations further by EUR 133.3 million, bringing the total to EUR 639.0 million at the end of 2023. An additional increase by EUR 13.0 million is foreseen and is linked to forecasted de-commitments.

The unused appropriation at the end of 2027 is estimated to be EUR 458.6 million. This amount serves as a safeguard to cover F4E's potential risk exposure.

### 1.1.6 In kind contribution to F4E

There is no in-kind contribution to the F4E Budget, except for the premises hosting the F4E seat in Barcelona. The office building used by F4E is provided free of charge by the Host Country (Spain).

For year 2021 this service in-kind amounts to EUR 3.3 million.

## 1.2. Estimate of Expenditure

The F4E expenditure is divided in:

- Administrative expenditure covering the staff and operating costs
- Operational expenditure covering the needs of F4E projects

### 1.2.1 Administrative Expenditure

The F4E administrative expenditure is composed of F4E staff and operating costs, mainly related to staff remuneration and building's infrastructure.

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## 1.2.2 Operational Expenditure

The operational expenditure corresponds to F4E tasks discharging EURATOM obligations with regard to:

- A. EURATOM contribution to ITER Organization (IO), in accordance with the ITER Agreement<sup>6</sup>,
- B. EURATOM contribution to the Broader Approach (BA) activities, in accordance with the BA Agreement with Japan<sup>7</sup>,
- C. Coordination of a programme of activities in preparation of the construction of a demonstration fusion reactor (DEMO).

The F4E activities are grouped under two headings (projects):

1. ITER project that represents the main activity of F4E and consists of:
  - (a) Tasks related to the ITER construction phase according to the Procurement Arrangements and ITER Tasks Arrangements signed with IO,
  - (b) Contribution in cash to ITER Organization to ensure the financing for its management, the research and development and for the participation to the ITER fund,
  - (c) Contribution in cash to Japan within the frame of the transfer of procurement responsibilities from EURATOM to Japan,
  - (d) ITER site support activities.
2. Technology projects that cluster the R&D activities necessary for ITER and Broader Approach:
  - (a) Technology for ITER and DEMO, to allow extra R&D activities, in particular related to the completion of specification for ITER and the preparation of DEMO,
  - (b) Technology for BA corresponding to the EURATOM contribution managed by F4E for IFMIF-EVEDA, the IFERC at Rokkasho and the JT-60SA Tokamak,
  - (c) Technology for DONES/IFMIF construction.

Additional Earmarked operational expenditure are dedicated to:

1. Tasks executed on request of ITER Organization, mainly amendment to existing contracts related to Project Change Requests initiated by IO and approved for financing from the IO Reserve Fund and other tasks requested and financed from IO Budget.
2. Other appropriations accrued from Third parties to specific items of expenditure, other than ITER Organization, in accordance with Article 4 (2) of F4E Constituent Decision, Article 12 (1) (e) of the F4E Statutes, mainly activities with other Domestic Agencies within the ITER project.

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<sup>6</sup> Final Report of Negotiations on ITER Implementation, 1 April 2006 (Attachment 2\_C)

<sup>7</sup> Broader Approach Agreement F4E\_D\_22FTK5

### 1.3. Monitoring of implementation of Expenditure in Commitment Appropriations (current value)

The table below shows the expenditure for the period 2007-2028. The figures provided beyond 2020 are based on the last amendment to F4E Constituent act<sup>8</sup> from 2021 and last EC Statement of Estimate from June 2023.

Current Value MEUR		< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Executed	Total 2014-2020	Total 2007-2020
Commitment Appropriations	ITER Construction	42.129	2 978.490	548.305	318.784	382.511	458.543	604.218	613.373	720.345	3 646.079	6 624.569
	Technology		48.092	16.007	14.008	12.901	14.552	11.354	5.650	19.968	94.441	142.533
	Technology for ITER		27.499	9.521	6.740	6.694	4.606	7.790	1.433	0.777	37.562	65.061
	Technology for Broader Approach		20.592	6.486	7.268	6.207	9.946	3.565	4.218	19.191	56.880	77.472
	Technology for DONES		-	-	-	-	-	-	-	-	-	-
	Other Expenditure		5.051	1.518	2.340	1.868	4.210	5.923	12.818	15.586	44.262	49.314
	F4E Administration		183.982	42.625	44.028	47.669	52.361	55.388	56.630	59.223	357.925	541.907
	F4E Total Budget	42.129	3 215.615	608.455	379.160	444.948	529.667	676.884	688.472	815.123	4 142.708	7 358.322
	Tasks from ITER Organization		-	-	1.078	13.422	1.403	3.158	20.661	10.119	49.840	49.840
	Other Earmarked expenditure										-	-
F4E Total Expenditure	42.129	3 215.615	608.455	380.237	458.370	531.069	680.042	709.133	825.242	4 192.548	7 408.163	

Current Value MEUR		2021 Executed	2022 Executed	2023 Budget AM3	2024 Budget	2025 Planned needs	2026 Planned needs	2027 Planned needs	2028 Planned needs	Total 2021-2028	Total <2007-2028
Commitment Appropriations	ITER Construction	875.336	544.767	620.043	500.070	696.125	797.698	588.639	821.637	5 444.314	12 111.012
	Technology	15.351	20.340	37.173	61.396	83.204	68.594	54.490	114.923	455.469	598.002
	Technology for ITER	5.373	3.497	3.863	10.013	7.504	6.694	1.890	35.123	73.956	139.017
	Technology for Broader Approach	9.978	16.842	33.295	49.583	51.800	31.900	22.500	47.900	263.798	341.270
	Technology for DONES			0.015	1.800	23.900	30.000	30.100	31.900	117.715	117.715
	Other Expenditure	20.801	38.156	26.262	26.866	25.000	25.000	25.000	25.000	212.086	261.399
	F4E Administration	61.260	76.615	73.388	81.940	85.184	88.730	90.739	94.229	652.084	1 193.991
	F4E Total Budget	972.749	679.877	756.865	670.272	889.512	980.022	758.868	1 055.788	6 763.953	14 164.404
	Tasks from ITER Organization	4.701	24.057	48.371	-	-	-	-	-	77.129	126.969
	Other Earmarked expenditure	1.400								1.400	1.400
F4E Total Expenditure	978.850	703.934	805.236	670.272	889.512	980.022	758.868	1 055.788	6 842.482	14 292.473	

Note 1: The past executed figures in this REP can differ from the figures in previous REP due to the impact of de-commitments and recoveries, accounted in the year of origin of the initial commitment.

#### **Financial\_table 2 Annual Expenditure in Commitment Appropriations (current value)**

<sup>8</sup> COUNCIL DECISION (Euratom) 2021/281 of 22 February 2021 amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it (OJ L62/41 of 23.2.2021)

## 2. Additional information

### Budget outturn and cancellation of appropriation

The budget outturn<sup>9</sup> for 2022 amounts to EUR 1.186 million.

Budget outturn	2020	2021	2022
Revenue actually received (+)	795 296 133.07	749 680 274.96	830 998 712.60
Payments made (-)	796 738 752.83	742 421 341.74	761 886 274.22
Carry-over of appropriations (-)	15 178 745.76	13 254 482.16	77 350 912.48
Cancellation of appropriations carried over (+)	933 726.90	708 926.68	950 730.26
Adjustment for carry over of assigned revenue appropriations from previous year (+)	16 832 766.00	11 643 308.35	8 468 314.19
Exchange rate differences (+/-)	- 1 305.53	17 886.33	5 675.67
Adjustment for negative balance from previous year (-)	-	-	-
<b>Total</b>	<b>1 143 821.85</b>	<b>6 374 572.42</b>	<b>1 186 246.02</b>

*Financial\_table 3 Budget outturns for the years 2020, 2021 and 2022*

<sup>9</sup> The budget outturn for year N-1 shall be return back to EURATOM and reintroduced with budget for year N+1. It is calculated as the total revenue actually cashed deducted by the total payments incurred during the year and further deducted by the appropriations carried over to the following year. It is made of the unused payment appropriations, cancelled at the year-end.

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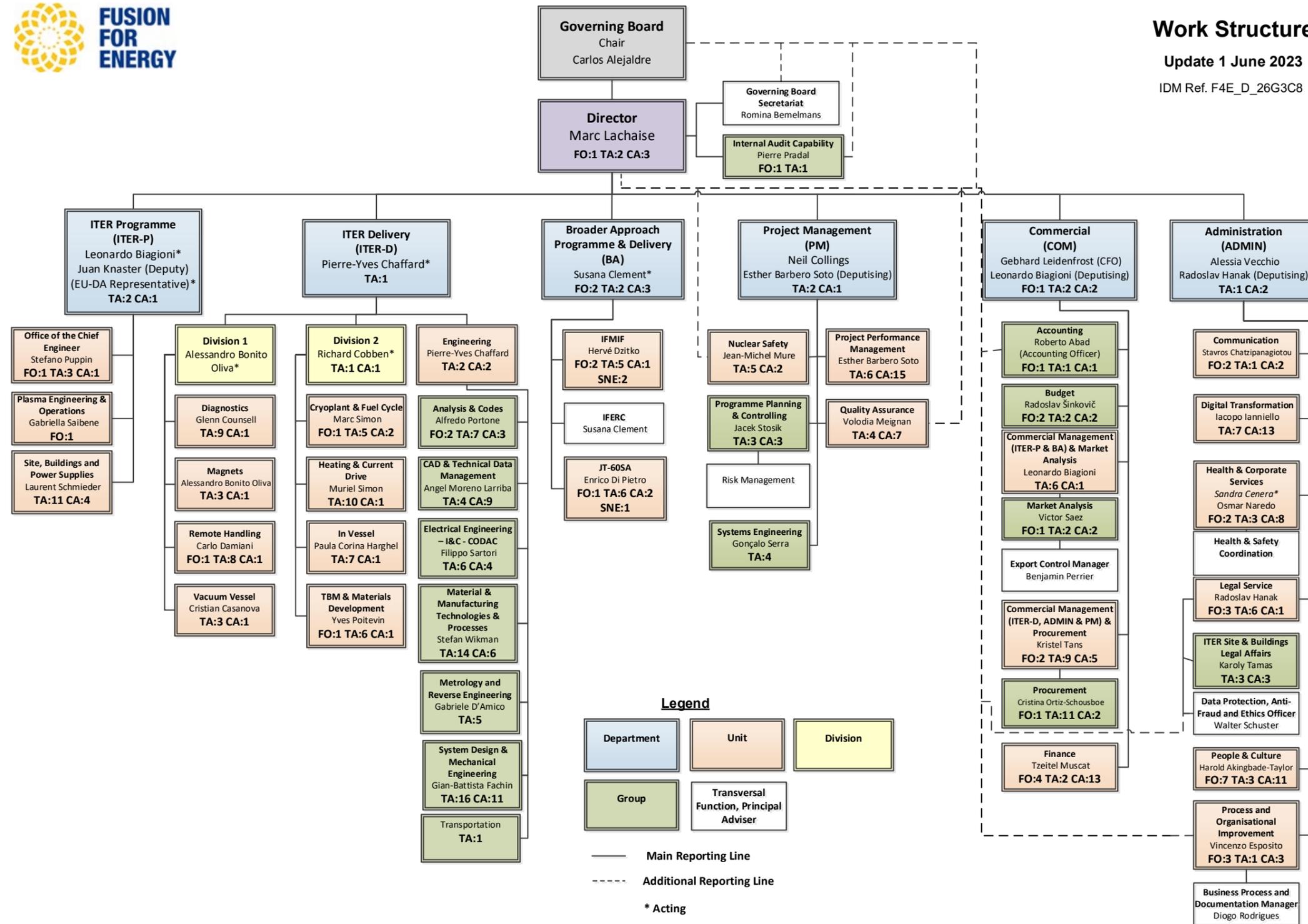
SPD2024\_ANNEXES TO HR REP

1. Organization chart



Work Structure

Update 1 June 2023  
IDM Ref. F4E\_D\_26G3C8



Disclaimer: This chart is for information purposes only and does not infer any rights

## 2. Human Resources per action 2024-2028

The allocation of the F4E staff varies according to the needs of the project and depends on the nature of the work, its complexity and the required expertise.

The allocation of staff in the forthcoming year will be made with a rolling wave approach and therefore the staff figures may vary depending on change of requirements in each programme.

The staff reduction in 2027 reflects the return of 15 posts that F4E had obtained as part of the agreement reached with the Commission in March 2022. The return of these posts to the Commission may be done by a non-renewal of employment contracts of the staff employed on short term positions. In practice, this means that the ramp down for some of these posts will be sooner than 2027.

Annex II: Ressources allocation per activity 2023-2028

Action #	Action	2023			2024			2025			2026			2027			2028		
		FO/TA	CA/SNE	Budget allocated	FO/TA	CA/SNE	Estimate Budget allocated	FO/TA	CA/SNE	Estimate Budget allocated	FO/TA	CA/SNE	Estimate Budget allocated	FO/TA	CA/SNE	Estimate Budget allocated	FO/TA	CA/SNE	Estimate Budget allocated
1	Magnets	10.1	11.4	€ 3,301,777	10.3	9.5	€ 1,608,267	2.1	1.9	€ -	2.1	1.9	€ -	1.9	1.7	€ -	1.8	1.6	€ -
2,3,4,10*	Main Vessel	68.4	31.4	€ 56,693,785	71.5	28.0	€ 110,183,418	79.6	31.0	€ 149,548,086	75.8	31.3	€ 160,686,172	69.2	27.7	€ 73,089,530	75.2	28.2	€ 100,423,462
5	Remote Handling	31.5	13.5	€ 15,816,606	31.7	11.3	€ 8,145,139	32.6	11.9	€ 13,030,046	36.7	13.1	€ 25,795,905	37.1	13.1	€ 7,350,900	33.9	12.1	€ 109,973,497
6	Cryoplant & Fuel Cycle	16.6	16.6	€ 7,763,734	18.9	14.3	€ 3,818,495	18.4	14.8	€ 11,432,690	14.5	11.8	€ 63,207,894	15.8	12.7	€ 39,012,543	16.7	13.9	€ 4,862,853
7	Plasma Engineering & Operations																		
8	Heating and Current Drive	41.3	26.9	€ 62,293,119	43.1	27.6	€ 25,452,484	44.3	29.2	€ 106,892,453	45.8	29.8	€ 58,092,419	45.6	29.5	€ 54,854,936	47.9	31.6	€ 119,789,622
9	Diagnostics	26.0	18.7	€ 17,659,975	29.4	16.5	€ 6,487,229	28.6	16.5	€ 60,105,677	29.8	17.8	€ 81,476,844	29.7	17.6	€ 27,490,061	26.9	16.2	€ 33,332,767
11	Site and Buildings and Power Supplies	43.6	24.5	€ 125,944,498	44.5	23.9	€ 137,594,954	44.5	24.3	€ 106,674,470	44.8	24.2	€ 141,064,286	43.0	23.2	€ 107,598,616	42.2	23.4	€ 210,816,086
12	Cash Contributions	0.8	1.6	€ 155,949,959	0.8	1.6	€ 211,979,980	0.8	1.6	€ 251,666,560	0.8	1.6	€ 273,052,639	0.8	1.5	€ 278,513,692	0.8	1.5	€ 284,083,965
13	Technical Support Activities	23.0	10.8	€ 26,557,201	22.8	11.4	€ 30,391,391	23.1	11.7	€ 29,297,887	23.3	11.8	€ 26,047,111	22.1	11.2	€ 27,688,423	21.2	10.3	€ 18,491,192
14	Broader Approach	29.6	20.6	€ 34,177,127	31.0	19.0	€ 50,651,225	30.9	19.3	€ 51,780,352	30.9	19.1	€ 31,868,500	29.9	18.6	€ 22,480,000	29.4	17.4	€ 47,900,000
15	DONES			€ 273,080			€ 2,020,000			€ 23,900,000			€ 30,000,000			€ 30,050,000			€ 31,885,975
<b>Sub-total Ressource allocation per activity</b>		<b>291.0</b>	<b>176.0</b>	<b>€ 506,430,861</b>	<b>304.0</b>	<b>163.0</b>	<b>€ 588,332,581</b>	<b>304.8</b>	<b>162.2</b>	<b>€ 804,328,222</b>	<b>304.5</b>	<b>162.5</b>	<b>€ 891,291,770</b>	<b>295.2</b>	<b>156.8</b>	<b>€ 668,128,701</b>	<b>295.8</b>	<b>156.2</b>	<b>€ 961,559,419</b>
Reserve stemming from cancelled appropriations to be entered in the estimate of revenue and expenditure of the following financial years as per Art.12.1 FR				€ 133,346,729															
Reserve stemming from appropriations corresponding to external assigned revenue from ITER IO as per Art.12.2.4.b FR				€ 36,322,585															
Of which reserve stemming from appropriations corresponding to external assigned revenue from ITER Host State as per Art.12.2.4.b FR				€ 55,748,050															
<b>Total Budget</b>		<b>291.0</b>	<b>176.0</b>	<b>731,848,224</b>	<b>304.0</b>	<b>163.0</b>	<b>588,332,581</b>	<b>304.8</b>	<b>162.2</b>	<b>804,328,222</b>	<b>304.5</b>	<b>162.5</b>	<b>891,291,770</b>	<b>295.2</b>	<b>156.8</b>	<b>668,128,701</b>	<b>295.8</b>	<b>156.2</b>	<b>961,559,419</b>

Notes/assumptions:

- \* The sub-Actions of Vacuum Vessel, In-Vessel Blanket, In-Vessel Divertor and Test Blanket Module are presented merged in one single line due to commercial sensitive information.
- 1 2023 figures corresponds to the budget allocated for the Work Programme Amendment 2
- 2 2024 figures corresponds to the budget allocated for the Work Programme
- 2 2025-2029 figures correspond to the commitment forecast with end of September 2023 data, without risks and without reserve for operational commitments not forecasted
- 3 Figures are limited to operational budget (administrative expenditure are excluded). All figures in other parts of the SPD regarding the Work programme contain exclusively operational budget and thus can be reconciled with the resource table figures.
- 8 The staff reinforcement agreement foresees from 2023 the grant of 10 new TA posts and the conversion of 15 CA posts into TA  
 9 TA posts and 6 CA posts are to be returned in 2027  
 7 SNE post during the whole period  
 A minimum capacity of operational staff and administrative support is envisaged in Magnets and Vacuum Vessel at the end of their manufacturing phases  
 The Antennas programme has merged with Neutral Beam to become the Heating & Current Drive Programme  
 The current HR resources for DONES is 1 FTE. This number should increase gradually as long as the project is evolving, either more posts from BAPD department or from matrixed staff

**HR\_table 1. Resources allocation per activity 2023-2028**

### 3. HR Quantitative

#### 3.1. Statutory staff, SNE and other staff

Human Resources	Year 2022			Year 2023 <sup>(2)</sup>	Year 2024	Year 2025	Year 2026	Year 2027 <sup>(3)</sup>	Year 2028
	Authorised Budget	Filled as of 31/12/2022	Occupancy rate (%) <sup>(1)</sup>	Authorised Budget	Envisaged staff	Envisaged staff	Envisaged staff	Envisaged staff	Envisaged staff
<b>ESTABLISHMENT PLAN POSTS</b>									
Administrators (AD)	238	225	95%	256	256	256	256	253	253
Assistants (AST)	42	44	105%	49	49	49	49	43	43
Assistants/Secretaries (AST/SC)	-	-	-	-	-	-	-	-	-
<b>TOTAL ESTABLISHMENT PLAN POSTS</b>	<b>280</b>	<b>269</b>	<b>96%</b>	<b>305</b>	<b>305</b>	<b>305</b>	<b>305</b>	<b>296</b>	<b>296</b>
<b>EXTERNAL STAFF</b>	<b>Authorised Budget</b>	<b>Executed FTE as of 31/12/2022 <sup>(4)</sup></b>	<b>Execution Rate %</b>	<b>Authorised Budget</b>	<b>Envisaged FTE</b>	<b>Envisaged FTE</b>	<b>Envisaged FTE</b>	<b>Envisaged FTE</b>	<b>Envisaged FTE</b>
Contract Agents (CA)	170	164.9	97%	155	155	155	155	149	149
Seconded National Experts (SNE)	7	2.3	33%	7	7	7	7	7	7
<b>TOTAL EXTERNAL STAFF</b>	<b>177</b>	<b>167.2</b>	<b>94%</b>	<b>162</b>	<b>162</b>	<b>162</b>	<b>162</b>	<b>156</b>	<b>156</b>
<b>TOTAL STAFF</b>	<b>457</b>	<b>436.2</b>	<b>95%</b>	<b>467</b>	<b>467</b>	<b>467</b>	<b>467</b>	<b>452</b>	<b>452</b>
Structural Service Providers		28							
External Service Providers <sup>(5)</sup>		452							
Interim staff		12							

<sup>(1)</sup> The occupancy rate >100% in the Assistants is due to the fact that 2 AST posts were converted into AD to allow for 2 certification procedures

<sup>(2)</sup> Request of 10 new AD posts plus conversion of 15 CA posts into 9 TA AD and 6 TA AST, as well as 1 conversion of AD into AST  
In addition we maintain the 31 short term posts as part of the request included in the Strategic Resource Plan

<sup>(3)</sup> Return of 9 TA posts (indicatively 3 AD and 6 AST) and 6 CA posts as part of the agreement with the Commission services for the staff reinforcement from 2023

<sup>(4)</sup> Following the travel restrictions due to the pandemic in Japan, where normal access was only fully reinstated in November 2022, it was very difficult to find candidates willing to establish in Japan. Hence, the low rate of execution in 2022. We have been able to recruit two SNEs in 2023, following the normalization of the situation.

<sup>(5)</sup> Forecast of needs reported in the Strategic Resource Plan 2021-2027 for 2022 (data as at 1 March 2021)

#### **HR table 2. Statutory staff, SNE and other staff**

3.2. Multiannual staff policy plan Year N+1, Year N+2, Year N+3, Year N+4, Year N+5

A. Staff in Establishment Plan

Function group and grade	Year 2022				Year 2023		Year 2024		Year 2025		Year 2026		Year 2027		Year 2028	
	Authorised Budget (Amended)		Actually filled as of 31/12/2022		Requested <sup>(1)</sup>		Envisaged <sup>(2)</sup>		Envisaged <sup>(3)</sup>		Envisaged <sup>(4)</sup>		Envisaged <sup>(5)</sup>		Envisaged <sup>(6)</sup>	
	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts	Perm. Posts	Temp. posts
AD 16																
AD 15		1				1										1
AD 14	3	1	2		4	3	4	4	5	5	5	5	6	6	6	6
AD 13	7	5	6	4	7	9	6	7	7	11	7	12	7	13	7	16
AD 12	11	23	11	20	11	24	9	26	12	26	12	31	11	35	12	41
AD 11	2	21	2	16	3	24	1	28	1	30	2	39	2	43	1	46
AD 10	5	37	5	45	3	49	8	53	4	53	2	57	1	57	0	60
AD 9	5	58	4	51	4	50	1	42	1	55	0	48	0	50	0	41
AD 8	1	26	1	22		24		29	0	25	0	20	0	16	0	14
AD 7	3	20		20	1	20	2	16	0	12	0	11	0	6	0	2
AD 6		9	1	15		19		20	0	9	0	5	0	0	0	0
AD 5																
AD TOTAL	37	201	32	193	33	223	31	225	30	226	28	228	27	226	26	227
AST 11	1		1		2		2		2		2		2		2	
AST 10	3		1		2		1		2		2		3		3	
AST 9	1	1	2		2	1	3	1	4	1	4	1	3	2	3	3
AST 8		2	2	1	1	3	1	1	3	4	3	5	3	5	4	6
AST 7	1	6	1	1	1	7	1	10		9	1	9	1	10		9
AST 6	1	8	2	12		9	2	8	1	11		11		12		12
AST 5	2	11	2	7	3	11	2	8		6		5		2		1
AST 4	2	3	2	6	1			3		2		4				
AST 3				4		6		6		4		2				
AST 2																
AST 1																
AST TOTAL	11	31	13	31	12	37	12	37	12	37	12	37	12	31	12	31
AST/SC 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AST/SC TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	48	232	45	224	45	260	43	262	42	263	40	265	39	257	38	258
GRAND TOTAL	280		269		305		305		305		305		296		296	

Note: The request for 2024 and the estimations for 2025, 2026, 2027 and 2028 are calculated according to the promotion rates of Annex I of the Staff Regulations.

<sup>[1]</sup> Incorporation of 10 new TA posts (1 AD9, 4 AD8 and 5 AD6) conversion of 15 CA into 9 TA AD6 and 6 AST3 as part of the staff reinforcement from 2023

In addition, conversion of 1 FO AD into FO AST following the cancellation of one certification procedure

Finally, conversion of 3 FO AD post into TA AD in view of the departures of three officials

<sup>[2]</sup> Conversion of 2 FO AD posts into TA AD in view of the departure of two officials

<sup>[3]</sup> Conversion of 1 FO AD post into TA AD in view of the departure of one official

<sup>[4]</sup> Conversion of 2 FO AD posts into TA AD in view of the departure of two officials

<sup>[5]</sup> Conversion of 1 FO AD post into TA AD in view of the departure of one official  
Return of 9 TA posts (indicatively 3 AD and 6 AST) as part of the agreement with the Commission services for the staff reinforcement from 2023

<sup>[6]</sup> Conversion of 1 FO AD post into TA AD in view of the departure of one official

**HR\_table 3. Multi-annual staff policy Plan 2024-2028 – Staff in Establishment Plan**

B. External personnel

Contract agents	Authorised Budget 2022	Executed FTE as of 31/12/2022	Headcount as of 31/12/2022 <sup>(1)</sup>	FTE requested for 2023 <sup>(2)</sup>	FTE corresponding to the authorised budget 2024	FTE corresponding to the authorised budget 2025	FTE corresponding to the authorised budget 2026	FTE corresponding to the authorised budget 2027 <sup>(3)</sup>	FTE corresponding to the authorised budget 2028
Function Group IV	97	98.6	98	88	88	88	88	85	85
Function Group III	50	52.8	53	49	49	49	49	48	48
Function Group II	23	13.5	13	18	18	18	18	16	16
Function Group I	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>170</b>	<b>164.9</b>	<b>164</b>	<b>155</b>	<b>155</b>	<b>155</b>	<b>155</b>	<b>149</b>	<b>149</b>

Seconded National Experts	Authorised Budget 2022	Executed FTE as of 31/12/2022	Headcount as of 31/12/2022	FTE requested for 2023	FTE corresponding to the authorised budget 2024	FTE corresponding to the authorised budget 2025	FTE corresponding to the authorised budget 2026	FTE corresponding to the authorised budget 2027	FTE corresponding to the authorised budget 2028
<b>TOTAL</b>	<b>7</b>	<b>2.3</b>	<b>3</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>

<sup>(1)</sup> Staff in place only. It may differ from the recruited/filled in figure reported in table 2.2. External Staff of the F4E

<sup>(2)</sup> Conversion of 9 FGIV and 6 FGIII into 15 TA posts as part of the staff reinforcement from 2023  
In addition 5 CA FGII posts are converted into FGIII

<sup>(3)</sup> Return of 6 CA posts as per agreement of the Commission services in March 2022. The number of returned FGII, FGIII and FGIV is only indicative.

**HR\_table 4. Multi-annual staff policy Plan 2024-2028 – External personnel**

C. Additional external staff expected to be financed from grant, contribution or service-level agreements

Human Resources	Year N	Year N+1	Year N+2	Year N+3	Year N+4	Year N+5
	Envisaged staff					
Contract Agents (CA)	-	-	-	-	-	-
Seconded National Experts (SNE)	-	-	-	-	-	-
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**HR\_table 5. Staff financed from grant, contribution or SLA**

D. Selection procedures

F4E applies the General Implementing Provisions (GIP) on the Procedure governing the Engagement and use of Temporary Agents and those specific to Contract Agents. For the selection and use of EU Officials, F4E follows the rules applied by the Commission, by analogy. In agreement with the Commission and following a verification exercise by the European Personnel Selection Office (EPSO) of the F4E selection procedures, F4E has been selecting staff on the basis of both interviews and written tests since April 1st, 2013 for all long-term employment contracts.

Vacancy announcements have typically been advertised on the career opportunities section of F4E's website. Various other job portals and specialized media are also used to attract applicants from as wide a geographical basis as possible. The increased reliance on social media is part of a sourcing strategy emphasizing a more tailored approach to filling vacancies.

1. Selection of Established Officials

Vacant permanent posts intended to be occupied by already established Officials and/or candidates on reserve lists, are filled in conformity with the Staff Regulations. Interviews are conducted by a Panel (composed by a representative of the administration and a representative of the concerned department) using pre-defined criteria stipulated in the corresponding vacancy notice and a standard evaluation grid based on the aforementioned criteria.

Since 2007, F4E has launched 64 publications for FO positions. However, in an effort to harmonize its workforce structure and in keeping with the time limited mandate of F4E, a decision was taken to stop expanding the F4E FO staff complement. This decision was taken in 2015 and provides that whenever FO positions become vacant, they shall be replaced by equivalent or lesser graded TA positions.

2. Selection of Temporary Agents

These are typically organized on the basis of the following grade brackets:

- AST 1 – AST 4 for assistant positions (technical and administrative).
- AD5 – AD12 for technical and administrative profiles;
- AD9 – AD12 for managerial and senior profiles (technical/scientific experts, group leaders depending on the group and functions to be developed);
- AD12 for Heads of Department<sup>1</sup>.
- AD14 for the F4E Director.

E. Recruitment forecasts 2024 following retirement/mobility

Below are the selections expected for 2024 according to the information available.

Job title in the Agency	Type of contract		TA/Official		CA
	(Official, TA or CA)		Function group/grade of recruitment internal		Recruitment Function Group (I, II, III or IV)
	Due to foreseen retirement/mobility	New post requested due to additional tasks	Internal (brackets)	External (single grade)	
Head of Department	FO/TA	-	12-14	12	-
Head of Unit	FO/TA	-	9-14	9	-
Programme Manager	FO/TA	-	9-14	9	-
Senior Technical Officer	FO/TA	-	8-12	8	-
Administrative Officer	FO/TA	-	5-12	6	-
Senior Technical Officer	FO/TA	-	8-12	8	-

**HR\_table 6. Recruitment forecast**

<sup>1</sup> While the model Implementing Rule on middle management applicable to agencies only considers management to be senior as of grade AD14, F4E considers the role of Head of Department as an intermediate step between the Director (senior management) and the Heads of Unit.

4. HR Qualitative

4.1. Implementing Rules on recruitment policy

Implementing rules in place		Yes	No	If no, which other implementing rules are in place	
Engagement of CA	Model Decision C(2019)3016	X			Decision of the Administration and Management Committee on the use and engagement of contractual agents (15 November 2019) <a href="https://f4enet.f4eda.local/sectionMyF4E/HR/About_us/Documents/decision_final_use%20and%20engagement%20of%20CA%20with%20annexes_signed.pdf">https://f4enet.f4eda.local/sectionMyF4E/HR/About_us/Documents/decision_final_use%20and%20engagement%20of%20CA%20with%20annexes_signed.pdf</a>
Engagement of TA	Model Decision C(2015)1509	X			Decision of Administrative and Management Committee of F4E on general implementing provisions governing the engagement and use of temporary staff under Article 2(f) of the CEOS (15 October 2015). <a href="https://f4enet.f4eda.local/sectionMyF4E/HR/Staff_regulations/Documents/Article_2f.pdf">https://f4enet.f4eda.local/sectionMyF4E/HR/Staff_regulations/Documents/Article_2f.pdf</a>
Middle management	Model decision C(2018)2542	X			Decision of the Administration and Management Committee of F4E on middle management staff (13 June 2018). <a href="https://f4enet13.f4eda.local/ourorganisation/SiteAssets/Pages/OurOrg/AMC%20middle%20management_signe.pdf">https://f4enet13.f4eda.local/ourorganisation/SiteAssets/Pages/OurOrg/AMC%20middle%20management_signe.pdf</a>
Type of posts	Model Decision C(2018)8800	X			Decision of the Administration and Management Committee on types of post and post titles (14 June 2019). <a href="https://f4enet.f4eda.local/sectionMyF4E/HR/career/my_contract/Documents/AMC%20decision%20type%20of%20post%20final%20signed.pdf">https://f4enet.f4eda.local/sectionMyF4E/HR/career/my_contract/Documents/AMC%20decision%20type%20of%20post%20final%20signed.pdf</a>

HR\_table 7. Adopted Implementing Rules

4.2. Appraisal and reclassification/promotion

A. Performance management

Staff performance is assessed annually based on an F4E-wide performance appraisal. The latter serves the purposes of improving individual staff performance by establishing and subsequently reducing gaps between desired and actual performance. The key constituent parts of the mechanism are:

1. Establishment of “SMART” and jointly agreed performance objectives.
2. Self-assessment by the staff member.
3. Performance review and dialogue with the line manager.
4. Definition of career development and training objectives addressing agreed areas of improvement and career aspirations. The assessment period coincides with the calendar year and runs from January, 1st to December, 31st. In keeping with the staff regulations, the appraisal assesses three main areas of competence as follows: efficiency, ability and conduct in the service. The use of languages and the level of responsibility exercised are two additional constituent components of the merit rating.

Looking ahead, and in keeping with its project nature, F4E will further optimise the annual performance appraisal system to increase the effectiveness of the matrix structure. One aim is to better capture performance feedback from both line managers and functional managers of staff having dual reporting lines in the framework of the matrix structure. Another objective is to better cascade the corporate objectives down to individual objectives and to implement mid-year performance reviews. In keeping with the corporate challenge of enhanced accountability, F4E also looks to establish standardized performance objectives for different workforce population groups. These standards will be based on a job classification review aimed at establishing clearly defined responsibility standards for each grade. These are major steps forward in optimizing performance management.

Promotions and reclassifications shall be exclusively by selection from officials, temporary agents and contract agents who have completed a minimum of two years in their grade.

Promotion/reclassification takes place on the 1 January of the year of the exercise (N) (or on the first day of the month following that in which the 2 years seniority are acquired). In recognition of the need to be in alignment with the promotion rates foreseen in the relevant implementing rule F4E will endeavor to align

its rate of promotion/reclassification to the average duration grades foreseen in the staff regulation and associated implementing rules. Illustratively. The Tables below provide an overview of the number of promotions awarded in each grade during the last exercise.

B. Implementing Rules in place

Implementing rules in place		Yes	No	If no, which other implementing rules are in place	
Redassification of TA	Model Decision C(2015)9560	X			Decision of Fusion for Energy Administration and Management Committee laying down general implementing provisions regarding Article 54 of the Conditions of Employment of Other Servants of the European Union (reclassification of <a href="https://f4enet.f4eda.local/ouorganisation/SiteAssets/Pages/OurOrg/54.pdf">https://f4enet.f4eda.local/ouorganisation/SiteAssets/Pages/OurOrg/54.pdf</a> )
Redassification of CA	Model Decision C(2015)9561	X			Decision of Fusion for Energy Administration and Management Committee on general implementing provisions regarding Article 87(3) of the Conditions of Employment of Other Servants of the European Union (reclassification of Contract Agents, 9 <a href="https://f4enet.f4eda.local/ouorganisation/SiteAssets/Pages/OurOrg/87.pdf">https://f4enet.f4eda.local/ouorganisation/SiteAssets/Pages/OurOrg/87.pdf</a> )

**HR\_table 8. Adopted Implementing Rules**

C. Reclassification of TA / promotion of officials

Reclassification of Temporary Agents / Promotion of Officials							
Grades	Year 2018	Year 2019	Year 2020	Year 2021*	Year 2022**	Actual average over 5 years	Average over 5 years (Annex IB SR)
<b>AD05</b>							2.8
<b>AD06</b>	5.2	2.7	3.2	3.3	3.5	<b>3.6</b>	2.8
<b>AD07</b>	2.3	2.6	2.5	2.3	2.8	<b>2.5</b>	2.8
<b>AD08</b>	2.8	3.1	2.9	3.1	3.0	<b>3.0</b>	3
<b>AD09</b>	2.8	4.0	3.4	4.4	4.0	<b>3.7</b>	4
<b>AD10</b>	5.1	3.9	3.9	3.7	3.7	<b>4.0</b>	4
<b>AD11</b>	5.5	4.3	4.0	4.8	5.3	<b>4.8</b>	4
<b>AD12</b>	10.9		11.8	11.0		<b>11.2</b>	6.7
<b>AD13</b>		8.0	10.0	9.0		<b>9.0</b>	6.7
<b>AST1</b>							3
<b>AST2</b>		3.0					3
<b>AST3</b>	3.1	2.5	3.0	3.2	4.1	<b>3.2</b>	3
<b>AST4</b>	2.5	4.0	4.3	3.9	3.0	<b>3.5</b>	3
<b>AST5</b>		3.2	3.4	3.7	4.0	<b>3.6</b>	4
<b>AST6</b>	2.0		3.5			<b>2.8</b>	4
<b>AST7</b>		3.0			4.0	<b>3.5</b>	4
<b>AST8</b>		4.0				<b>4.0</b>	4
<b>AST9</b>							N/A
<b>AST10 (Senior Assistant)</b>		7.0				<b>7.0</b>	5

*\*The average seniorities in grade of AD6, AD9 and AST3 have been modified as the ones reported in the Draft SPD were not correct.*

*\*\*Final figures*

**HR\_table 9. Reclassification of TA / promotion of officials**

D. Reclassification of contract agents

Reclassification of Contract Staff					
Function Group	Grade	Staff in activity at 01.01.2021	How many staff members were reclassified in 2022	Average number of years in grade of reclassified staff members	Average number of years in grade of reclassified staff members according to decision C(2015)9561
CA IV	17	5			Between 6 and 10 years
	16	24	5	5.00	Between 5 and 7 years
	15	38	8	4.07	Between 4 and 6 years
	14	24	7	3.05	Between 3 and 5 years
	13	1			Between 3 and 5 years
CA III	12	4			
	11	18	1	6.01	Between 6 and 10 years
	10	18	6	5.03	Between 5 and 7 years
	9	11	6	4.27	Between 4 and 6 years
	8				Between 3 and 5 years
CA II	7	3			
	6	6			Between 6 and 10 years
	5	2			Between 5 and 7 years
	4	1	1	3.17	Between 3 and 5 years
CA I	2				Between 6 and 10 years
	1				Between 3 and 5 years
<b>Total</b>		<b>155</b>	<b>34</b>		

HR\_table 10 . Reclassification of contract staff

4.3. Gender representation

The figures are consistent with workforce statistics in the industry sectors related to the core tasks of the Agency and show a predominance of male colleagues in the technical functions. Conversely female colleagues are predominantly represented in administrative and support roles. F4E will continue to address the issue to increase the representation of female staff. Special efforts will be made for the managerial functions.

A. Statutory staff (only officials, AT and AC)

Staff distribution per type of contract, category and gender at 31.12.22

		Official		Temporary Agents		Contract Agents		Grand Total	
		Staff	%	Staff	%	Staff	%	Staff	%
<b>Female</b>	Administrator	11	24.4%	47	21.0%			58	13.4%
	Assistant	8	17.8%	10	4.5%			18	4.2%
	FGII, FGIII, FGIV					89	54.3%	89	20.6%
	<b>Total female</b>	<b>19</b>	<b>42.2%</b>	<b>57</b>	<b>25.4%</b>	<b>89</b>	<b>54.3%</b>	<b>165</b>	<b>38.1%</b>
<b>Male</b>	Administrator	21	46.7%	146	65.2%			167	38.6%
	Assistant	5	11.1%	21	9.4%			26	6.0%
	FGII, FGIII, FGIV					75	45.7%	75	17.3%
	<b>Total male</b>	<b>26</b>	<b>57.8%</b>	<b>167</b>	<b>74.6%</b>	<b>75</b>	<b>45.7%</b>	<b>268</b>	<b>61.9%</b>
<b>Grand Total</b>		<b>45</b>	<b>100%</b>	<b>224</b>	<b>100%</b>	<b>164</b>	<b>100%</b>	<b>433</b>	<b>100%</b>

HR\_table 11. Gender representation Officials, AT and AC on 31/12/2022

B. Evolution over 5 years of the Middle and Senior management

	2017		2021		2022*	
	Number	%	Number	%	Number	%
<b>Female Managers</b>	3	<b>10%</b>	6	<b>18%</b>	6	<b>19%</b>
<b>Male Managers</b>	26	<b>90%</b>	27	<b>82%</b>	25	<b>81%</b>
Total	29	100%	33	100%	31	100%

	2017		2021		2022*	
	Number	%	Number	%	Number	%
<b>Female Senior Managers</b>	0	<b>0%</b>	1	<b>3.0%</b>	1	<b>3.2%</b>
<b>Female Middle Managers</b>	3	<b>10%</b>	5	<b>15.2%</b>	5	<b>16.1%</b>
<b>Male Senior Managers</b>	6	<b>21%</b>	6	<b>18.2%</b>	3	<b>9.7%</b>
<b>Male Middle Managers</b>	20	<b>69%</b>	21	<b>63.6%</b>	22	<b>71.0%</b>
Total	29	100%	33	100%	31	100%

\*Figures at 31/12/22

HR\_table 12. Gender evolution of Senior and Middle management

#### 4.4. Geographical balance

The table below provides the geographical distribution as at 31.12.2022 based upon the filled in posts on 31.12.2022 (accepted job offers are included).

The over representation of Spanish nationals follows from the Agency being headquartered in Spain and from the large proportion of short-term non-renewable positions which typically do not entice non-Spaniards to apply. A diversity policy is being developed to address the imbalance. Looking forward F4E will continue to strike a balance between ensuring a broad geographical distribution of staff and the non-discrimination principle enshrined in its selection and recruitment policies.

##### A. Statutory staff per nationality

Nationality	AD + CA FGIV		AST/SC - AST + CA FGI / FGII / FGIII		TOTAL	
	Number	% of Total Staff members in AD and FG IV categories	Number	% of Total Staff members in AST SC/AST and FG I, II and III categories	Number	% of total staff
<b>Belgian</b>	7	2.2%	10	9.1%	17	3.9%
<b>British</b>	8	2.5%	4	3.6%	12	2.8%
<b>Bulgarian</b>	5	1.5%	1	0.9%	6	1.4%
<b>Croatian</b>	1	0.3%		0.0%	1	0.2%
<b>Czech</b>	2	0.6%	2	1.8%	4	0.9%
<b>Dutch</b>	4	1.2%		0.0%	4	0.9%
<b>Estonian</b>	1	0.3%		0.0%	1	0.2%
<b>Finnish</b>	3	0.9%	1	0.9%	4	0.9%
<b>French</b>	66	20.4%	19	17.3%	85	19.6%
<b>German</b>	8	2.5%	6	5.5%	14	3.2%
<b>Greek</b>	6	1.9%	3	2.7%	9	2.1%
<b>Hungarian</b>	6	1.9%		0.0%	6	1.4%
<b>Irish</b>	5	1.5%	3	2.7%	8	1.8%
<b>Italian</b>	58	18.0%	19	17.3%	77	17.8%
<b>Lithuanian</b>		0.0%	3	2.7%	3	0.7%
<b>Maltese</b>	1	0.3%		0.0%	1	0.2%
<b>Polish</b>	5	1.5%		0.0%	5	1.2%
<b>Portuguese</b>	10	3.1%	1	0.9%	11	2.5%
<b>Romanian</b>	9	2.8%	1	0.9%	10	2.3%
<b>Slovak</b>	1	0.3%		0.0%	1	0.2%
<b>Spanish</b>	113	35.0%	37	33.6%	150	34.6%
<b>Swedish</b>	4	1.2%		0.0%	4	0.9%
<b>TOTAL</b>	<b>323</b>	<b>100%</b>	<b>110</b>	<b>100%</b>	<b>433</b>	<b>100.0%</b>

*HR\_table 13. Nationalities of staff*

## B. Evolution over 5 years of the most represented nationality

Most represented nationalities	2017		Most represented nationalities	2022	
	Number	%		Number	%
<b>Spanish</b>	141	34%	<b>Spanish</b>	150	35%
<b>Italian</b>	90	22%	<b>French</b>	85	20%
<b>French</b>	82	20%	<b>Italian</b>	77	18%
<b>British</b>	24	6%	<b>Belgian</b>	17	4%
<b>Belgian</b>	20	5%	<b>German</b>	14	3%
<b>German</b>	20	5%	<b>British</b>	12	3%
Total F4E	415		Total F4E	433	

*HR\_table 14. Evolution over 5 years of the most represented nationalities*

#### 4.5. Staff mobility

##### A. Internal mobility

Increased career mobility consistently features as the foremost concern of staff. In recognition of this wish, the agency adopted an internal mobility policy in June 2015 foreseeing that all vacancies are subject to internal selections prior to opening them externally. The policy only provides for horizontal mobility and complements vertical mobility, which is only possible through external selection procedures and/or promotion/reclassification decisions.

In keeping with its project nature and matrix organization, F4E will also seek to increase the effectiveness of its workforce management through increased flexibility and transience of project assignments. As part of this endeavor F4E will seek to progressively 'flatten' its structure and reduce the number of vertical levels currently in place. In parallel F4E will increase the number of clearly visible project manager roles thereby creating more attractive internal development paths.

##### B. Inter-agency job Market

It will predominantly concern support and administrative profiles rather than operational and technical staff. Where necessary and deemed useful F4E will use the Interagency Job Market to publish its vacancy notices.

#### 4.6. Schooling

In the absence of a European School in F4E's Barcelona and Cadarache work sites, the Agency established Service Level Agreements with a number of international schools located in and around these two sites. Under these agreements, F4E staff enjoys easier access to school registration and enrolment for their dependent children. The agreements also provide a framework for the direct settlement of school fees by the Agency. The number of international schools making up the F4E schooling offer has gradually grown over the years and is currently a prominent part of F4E's employee value proposition. In addition, F4E continues to be involved in the governance of the International School of Manosque where it is part of the international Advisory Council and where it strives to uphold the interests of its staff with dependent children in that establishment. While, F4E does not currently envisage any further actions at this time, it will endeavor to maintain its appeal in this domain for both existing and prospective staff members.

Taken together, Service Level Agreements have been established with 24 international schools of which 21 in the area of Barcelona and 3 in Cadarache (France).

<b>Agreement(s) in place with School(s)</b>				
Contribution agreements signed with the EC on type I European schools	Yes		No	<b>X</b>
Contribution agreements signed with the EC on type II European schools	Yes		No	<b>X</b>
Number of service contracts in place with international schools:	<b>24*</b>			
*Out of which, <i>F4E has in place an agreement with a school for children with special needs</i>				

**HR\_table 15. Service Level Agreements with International schools**

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## SPD2024\_ANNEXES WORK PROGRAMME 2024

### 1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2024

The 2024 Work Programme takes into account to the extent possible the European Commission's guidelines for the Programming document as requested by the Financial Regulation. It comprises a general overview of the progress of work and the procurement activities that will be committed during 2024, detailed objectives, expected results, and targets for each WP Action.

#### Main assumptions

The following assumptions are considered as the basis of the Work Programme 2024:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of March 2023 except for In-Vessel, Plasma Engineering & Operations, Heating & Current Drive and Technical Support Activities for which some adjustments were made relying on the end of September 2023 data.
- The F4E schedule takes into account:
  - ✓ The latest input and developments of the schedules from the F4E suppliers, taking into account the agreed fabrication routes and showing the real development of the work.
  - ✓ The most realistic assumption of Procurement Arrangement (PA) signature dates based on the current status of the design of components and on the forecasted dates of the required design reviews prior to the PA signature.
  - ✓ The available manpower in F4E, taking into account bottlenecks in specific areas where staffing is not sufficient to grant a prompt process of the work. In specific cases, F4E foresees to satisfy its manpower needs by using external contractors.
  - ✓ The most realistic assumptions on the input data availability from IO to take into account the existing delays and the agreed dates of data delivery.
  - ✓ The information provided by the other DAs through their monthly Detailed Work Schedule to take into account any possible delay in the delivery of items to F4E that can cause delays to the EU in-kind procurements.
- The budget figures are based on the MFF 2021-2027 approved by the Council on 22/02/2021 plus ITER Host State and Membership contributions. The budget summary table of Work Programme 2024 (WP\_table 1) reflects the current status of the draft budget for the 2024 financing decision.
- In order to achieve an improvement of the quality of the PAs that need still to be signed, a common F4E/IO effort is still in progress to better identify the requirements that are linked to the specific procurement.
- Technically and commercially complex procurements will be implemented whenever appropriate through the competitive dialogue procedure or through the negotiated procedure, in order to improve the alignment of supply chain response to F4E needs and to proactively adopt cost containment measures. This will be done in compliance with F4E's Financial Regulation.
- Grants related to recurring and sequential R&D activities, with a well-defined development path eventually leading to an EU procurement package, will be implemented whenever appropriate, through Framework Partnership Agreements (FPA), in order to streamline and channel R&D funding, improve its effectiveness, and decrease the administrative burden to beneficiaries and F4E alike.
- Procurements which require a very close coordination between F4E and other entities will be implemented, whenever appropriate, through the Joint Procurement procedure.
- All the activities described in the overview of each Action and the list of contracts in WP\_Table 3 are intended as credited by PA or ITA. If an Action is not credited, then it is explicitly mentioned in the overview. This is not applicable for the Action "Broader Approach" (i.e. not credited).

- F4E endorsement of the Japanese Procurement Arrangement that foresees an EU financial contribution will be preceded by a budgetary commitment for the entire amount of the F4E contribution.
- Changes originated by IO, or other DA's, will be fully compensated by the IO Reserve Fund.
- The Art. 5 of the F4E Statutes states that the Joint Undertaking may award grants and prizes in accordance with the rules of its financial regulation. In this regard, Essential selection, award criteria and Upper funding limits are defined in these annexes.
- Article 74 (2) of F4E's financial regulation in conjunction with Article 1(5) of Annex III to the F4E Statutes provides for the possibility to make use of annual instalments for actions extending over more than one financial year. An annual instalment consists in breaking down a budgetary commitment into annual instalments. Annual instalments can be implemented according to the forecast of annual payment due, the forecast of progress in the implementation of the contract, or annual budget availability.

## Definitions and supporting information

1. "Action" for the purposes of Work Programme means "a coherent area of action with objectives and resources". The list of the Actions and their definition is defined in the main text of the SPD.

2. Each Action of WP2024 comprises:

(a) **General overview** that is split into two parts. The "Progress of Work" part aims at providing the information concerning the activities foreseen during 2024 in that area. The "Procurement Activities" part instead focuses on the legal commitments foreseen during the year and to be covered by the financial decision and to be financed under the budget 2024. Furthermore, it includes (even if not explicitly mentioned):

i. Provisions for urgent general support tasks as cost/risk analysis, engineering support/analysis, I&C develop and support, experts, quality assurance and quality control, nuclear safety, CE marking analysis, transportation, storage, material characterization and qualification activities, resolution of non-conformities (in line with the mechanism agreed at ITER level), metrology, low value purchase orders and external legal support, cost of legal proceedings and alternative dispute settlement, including arbitration, as needed<sup>1</sup>. These tasks will be mainly implemented through specific contracts under existing framework contracts.

ii. Provisions for payment of liquidated damages, late payment interests, cost escalation, claims, release of options, indexation and other financial compensations that F4E may be obliged to pay under its contracts.

iii. Provisions for amendments to ongoing contracts covered by a previous financing decision(s) in accordance with the Implementing Rules.

iv. Provisions for BREXIT-related contractual modifications.

v. Provisions for Covid 19 related contract modifications and Covid 19 related new contracts for ITER and Broader Approach

vi. Provisions for new contracts and contractual modifications related to expiry of Switzerland co-operation agreement

vii. Provisions for specific cash compensations to IO required in case of transfer of activities from F4E to IO approved by the ITER Management Advisory Committee.

viii. Provisions for contract modifications and new contracts linked to the new ITER baseline.

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<sup>1</sup> In accordance to F4E WBS implementation rules, whenever a procurement activity is in support of a specific WBS L3, the related procurement should be implemented under the mentioned WBS L3. This is not the case for general technical support activities to multiple WBSs (e.g. external resource to support overall risk management, etc.). In this case, they are included under Action 13

- (b) **Annual objectives** defined as the achievement on time of the following milestones:
- i. ITER Council/Governing Board (IC/GB) milestones in 2024;
  - ii. Milestones that will lead to the achievement of the future IC/GB milestones from the following years (defined as predecessor of future IC/GB milestones (if applicable)).
  - iii. Key milestones marking significant schedule progress (only in the event that none of the above are applicable).
  - iv. Link with the ITER Project multi-annual objectives (defined as the whole set of IC/GB milestones): when a WP annual objective is a predecessor of a multi-annual objective (IC/GB milestones), it is clearly identified to which milestone is linked in the column “type of milestone”.
- (c) The **expected results** define the main outcomes of the Actions.
- (d) The **target** is defined as the annual M-SPI reaching a minimum value.<sup>2</sup>
- (e) **Human resources** (see HR\_Table 1 of annexes to HR REP annexes). The table shows an indicative estimate of the Full Time Equivalent (FTE) staff assigned to the specific Action to cover all the activities carried out in 2024. Per each Action it is identified the “core” team and the additional staff (i.e. legal, financial, contractual, project management) assigned to the action according to the F4E matrix structure. Remaining staff from the Commercial Dept., Admin. Dept. and Office of the Director is instead allocated per action on a pro-rata basis.
- (f) **Procurement plan:**
- i. Main Procurement Initiatives (see WP\_Table 3 of these annexes): these are, per Action, the list of the foreseen main contracts with value higher than 139,000 Euros<sup>3</sup>. Amendments, claims, reimbursement, indexation, late interest and budget reserve are grouped together due to the sensitivity of this information. The list is based on the current information at the time of writing the Work Programme. During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2024. Contracts that do not fulfill the Work Programme scope identified for each Action are not covered by this financial decision and therefore will not be authorized. A change to this list shall be considered as a non-substantial for the purposes of the Article 32 point 4 of the F4E Financial Regulations if not affecting the available budget for 2024 within the limit of the flexibility rule and if any related changes to the scope of the annual Work Programme do not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.
  - ii. Value per Action: WP\_Table 2 presents an indicative value of financial resources corresponding to each Action. F4E has evaluated the level of commitments planned for the Actions in 2024 by taking into account the progress of the project and the available manpower. A good implementation of the annual commitment is one of the objectives for F4E (see PP\_Table 7 in Annexes to Project Plan). Any additional budget required and exceeding the currently available one will consist of unused appropriations adjusted to match the final needs.
  - iii. Indicative timeframe for launching the procurement and type of procedure/contract: the foreseen time of publication of calls and type of contracts is shown in WP\_Table 5 of these annexes. The dates are indicative only and based on the present understanding of the project development. For specific contracts and specific grants or use of Joint Procurements the foreseen time of publication of calls is not included as no formal publication will take place (the signature date is used to give anyway an indication of time). Publication of the call for tender is intended as the date of publication on the Industry Portal (for open procedures/call for proposals) and the date of the Invitation letter to be sent out to the Suppliers (for negotiated procedures). For restricted procedures and competitive dialogues this milestone refers to the date of the call for expression of interest (first phase of the procedure).
  - iv. The plan may cover some activities moved from previous years into WP2024 due to changes in the overall planning and priorities.

<sup>2</sup> For Action 12 Cash Contributions and Action 13 Technical Support Activities Annual M-SPI is not applicable.

<sup>3</sup> The threshold has been selected so to be in line with the FR.

v. The plan does not (and cannot) include the consequences for the Action of PCRs and deviations approved by the IO Director General or his delegates in the frame of Reserve Fund Management Plan. As a result, these will be implemented under the budget line 3.6. For information, F4E will present to the final meeting of the GB each year, in an amendment to the Work Programme, a summary of the PCRs agreed within the year and the activities that the PCRs (including those agreed in previous years) have funded.

vi. Grants and specific Grants are clearly identified and information is provided to fulfill art.58 of the Financial Regulation (see WP\_Table 4 of these annexes).

vii. Framework Partnership Agreements (FPA) or Framework Contracts (FWC) are included in the year of signature for clarification purposes only and do not constitute part of the financing decision.

3. Some of the Work Programme activities refer to provision for recurrent activities with the same ultimate objective of supporting the final achievement either of the design (e.g. CAD support, engineering analyses, etc.), the manufacturing process (e.g. QA/QC Inspectors, engineering support for deviations analyses, CE marking, etc.) as requested in ITAs/PAs, or the site support services (access control and security, Facility Management Services, etc.). Therefore the description in terms of the financing decision does not change significantly from one year to the next.

## 2. OBJECTIVES AND KEY PERFORMANCE INDICATORS

### Work Programme objectives

The Work Programme objectives are the achievement on time of a selected number of milestones. A minimum of 4 objectives is provided per Action as described in below section 3.

There is a close link between the long-term planning (i.e. Project Plan) and the short-term activities (i.e. work programme). In the Work programme, F4E is tracking as Work Programme objectives some selected existing milestones leading to the IC/GB ones (i.e. the predecessors) and in the chain of all critical and near-critical paths. Therefore such milestones in the short-term will act as an alert against the increasing risk of missing any critical and near-critical path milestones in the longer term.

### Annual objectives

From the full list of Annual objectives described in the Project Plan, the following ones apply directly to the Work Programme:

AREA	Objective
Annual M-SPI	SPI above defined value
Annual commitment budget	Implement a defined percentage of commitment appropriations by end of the year
Budgeted forecast of the Work Programme	Implement a defined percentage of allocated commitment appropriations the Work Programme Actions without reserves, by the end of the year

### Key Performance Indicators

From the full list of Key Performance Indicators described in the Project Plan, the following ones apply directly to the Work Programme:

#### Annual M-SPI

$$\frac{\text{Number of milestones with Status = Completed}}{\text{Number of milestones with reference date} \leq \text{Current month}}$$

#### Annual commitment budget

$$\frac{\text{Actual commitment executed to date} + \text{remaining commitment planned to be executed between date and year's end}}{\text{Latest approved annual commitment budget}}$$

#### Annual budgeted forecast of Work Programme

$$\frac{\text{Actual commitment executed to date} + \text{remaining commitment planned to be executed between date and year's end}}{\text{Latest approved budgeted forecast of the Work Programme Actions}^4}$$

<sup>4</sup> Excluding Reserves

### 3. LIST OF WP2024 ACTIONS

#### Action 1. Magnets

Action 1		Magnets		
<b>Poloidal Field Coils</b>				
<u>Progress of Work</u>				
The final manufacturing and testing activities of the last PF Coil #3 will be completed (some final assembly activities and cold test). The Coil will be delivered to IO.				
<u>Procurement Activities</u>				
Amendments and/or options for existing contracts may be signed (i.e., contract extensions, claims, deviation notices, etc.).				
Task orders related to quality inspection services or production support might be signed to reinforce the PF Coil manufacturing activities.				
Some task orders might be signed to cover for Engineering, Qualification and Testing activities related to the manufacturing of the coils.				
Some minor complementary Contracts and/or task orders might be signed, if needed, to support the production in the PF Building (i.e., Framework Contracts for materials, services, etc.)				
<b>WORK PROGRAMME OBJECTIVES</b>				
Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.3B.01160	IPL > Delivery of PF3 Coil by EU-DA to IO	Q3 2024	WP24 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
<b>EXPECTED RESULTS</b>				
The main expected results for this action are:				
Deliver the last PF Coil to IO and close Magnets Program.				
<b>TARGET</b>				
The target for 2024 is "Annual M-SPI $\geq$ 0.8"				

#### Action 2. Vacuum Vessel

Action 2	Vacuum Vessel
<b>Main Vessel</b>	

Progress of Work

The manufacturing of the Vacuum Vessel will continue during 2024. Sectors 5 and 4 are scheduled to be completed and delivered to Cadarache, subject to the extent of the field joint repairs needed. Sectors 9 and 3 will have entered in the final assembly phase. The segments of Sector 2 will all be welded and fully repaired.

Procurement Activities

Provisions will be made for the transportation of the sectors to the ITER site, resolution of non-conformities if required (including, but not limited to possible out of tolerances), possible continuation of incentive schemes and/or other actions for schedule stabilization, inspectors, additional ANB support and the possibility to add specialized resources to the project. Contractual options for the Main VV contract may be released, as needed.

Specific Contracts for support activities, like on-site Inspectors, Documentation Support, Engineering and Analysis, Project Management support, Experts etc... will continue to be issued depending on the project needs.

**WORK PROGRAMME OBJECTIVES**

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU15.1A.08500	IPL > Delivery of Sector 5 by EU-DA to ITER Site	Q2 2024	GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3081300	S5 START OF FAT	Q1 2024	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3097540	S9 Outer Shell welding completed	Q3 2024	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.80540	S9 Inner Shell welding completed	Q2 2024	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel

**EXPECTED RESULTS**

The main expected results for this action are:

1. Completion of Sector 4 and delivery to Cadarache (subject to the extent of the field joint repairs needed)
2. Final machining of all segments of Sector 3 completed
3. All segments of Sector 3 on the assembly frame.
4. Welding and full welding repair of all segments of Sector 2 completed

**TARGET**

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

## Action 3. In Vessel – Blanket

Action 3	In Vessel - Blanket
<p><b>Blanket First Wall project</b></p> <p><u>Progress of Work</u></p> <p>For the Blanket First Wall 2024 it assumes the decision to discontinue the Be activities will be taken by ITER Organisation in October 2023 (i.e. with the approval of the corresponding PA Change Notice). Therefore, it is assumed that only the non-Be activities will be continued during 2024 under the current contractual configuration, including the re-opening of competition. Additional commitments related to the development/qualification of the new armour design maybe executed in 2024. Shall be noted that these activities may be subjected to substantial modifications as consequence of the ITER project changes and decisions expected during the year 2023.</p> <p>In 2024, both contractors of the Blanket First Wall Series (F4E-OMF-900) will continue the manufacturing activities of the first wall panel structures (i.e. excluding the armour). Task 1, namely Engineering &amp; Production Line Setup, is expected to be completed by both contractors during 2024. The procurement of main raw materials (with the exception of Be) will continue to be implemented through task orders. These materials are being provided as free issued items to the Suppliers in charge of FW Panels manufacturing. In support of the main procedure OMF-900, material characterisation activities will be carried out through task orders of the OMF-1082. Since the F4E-OMF-900 is a cost-plus-fee type of contract, financial audits will be performed under the F4E-OFC-1094.</p> <p>The planned progress of work is subject to the availability of internal resources, which was an outcome of the workload balance exercise at the end of 2022.</p> <p><u>Procurement Activities</u></p> <p>Commitments for contingencies of the FW series (in both lots) may be implemented. A new task order for material characterization and related options in support to the F4E-OMF-900 will be signed. In addition, specific task orders for audit services of the cost-plus fee type of contract F4E-OMF-900 are planned. External support needed for the follow-up of the FW panels production will be sourced through specific contracts under existing framework contracts.</p> <p>Any decision following on-going discussions on the potential change of the First Wall armour material may significantly impact the scope of activities under WP2024. Provisions for additional commitments related to the development/qualification of the new armour design maybe executed in 2024.</p> <p>The planned procurement activities are subject to the requested allocation of internal resources, which was an outcome of the workload balance exercise at the end of 2022.</p> <p><b>Blanket Cooling Manifolds project</b></p> <p><u>Progress of Work</u></p> <p>In 2024, the main activity will be the continuation of the qualification phase and of the manufacturing of the first pipe bundles of three 10-degree sectors (Task 1 of OMF-1080, two suppliers). Moreover, activities under Task Order 8 will continue aimed at the procurement of</p>	

316L ITER grade raw material for the manufacturing of the blanket cooling manifolds. Additional activities for design and testing of alternative support will continue.

Technical specification for Task 3 finalized and re-opening of competition procedure to start

The planned progress of work is subject to the availability of internal resources. No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.

#### Procurement Activities

Additional activities for design and testing of alternative support are planned to be signed.

### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU15.2A.10200	Task Order Signed for Task 3 - Chimney Pipes	Q4 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds
EU15.2A.12115	Manufacturing Inspection Plan approved for Task 1.A (#01)	Q2 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds
EU16.01.12404210	MS2.A.2 Final Acceptance of the Production Line (Remaining Equipment)- AAC	Q3 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU16.01.221540	MS2.A.2 Final Acceptance of the Production Line (Remaining Equipment)- FBL	Q2 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall

### EXPECTED RESULTS

The main expected results for this action are:

1. Final acceptance of the Production Line for Blanket First Wall series production (both suppliers).
2. Approval of the manufacturing inspection plan for Task 1A (first supplier) of the Blanket Cooling Manifold -part of the qualification phase of the first pipe bundles of three 10-degree sectors.
3. Signature of Task 3 for the procurement of Chimney Pipes for Blanket Cooling Manifolds.

### TARGET

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

## Action 4. In Vessel – Divertor

Action 4	In Vessel – Divertor
<p><b>Cassette Body project</b></p> <p><u>Progress of Work</u></p> <p>In 2024, both contractors of the Divertor Cassette Body (CB) Series will continue the manufacturing activities. The focus will also be given to the continuation of the manufacturing activities of the contract OPE-1036 related to the fabrication of the transition pieces and Remote Handling flanges. Concerning the contract OPE-1112 of Ancillary Items of Pins, Sleeves and Links of the CB Series, the engineering phase and procurement of materials will progress as well.</p> <p>The planned progress of work is subject to the requested allocation of internal resources, which was an outcome of the workload balance exercise at the end of 2022. No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.</p> <p><u>Procurement Activities</u></p> <p>In 2024, the main commercial activities foreseen will be the indexation related to the CB series fabrication, TCWS &amp; RH Flanges, and Ancillary Items of Pins, Sleeves and Links. Additional external support (resident inspectors, metrology support, welding, etc.) will be provided through task orders under existing framework contracts.</p> <p><b>Inner Vertical Target project</b></p> <p><u>Progress of Work</u></p> <p>In 2024, the prototypes (under F4E-OMF-567) will be finished (after completion of HHF tests, which are planned in 2023).</p> <p>In 2024, the IVT Series production activities will continue, after the signature of the first specific contract in December 2022 and the signature of the second specific contract is planned in 2024. Focus will be on engineering, construction of the production lines, and procurement of materials. External support on ultrasonic testing will be provided during the qualification and production phases of the IVT Series.</p> <p>The planned progress of work is subject to the requested allocation of internal resources, which was an outcome of the workload balance exercise at the end of 2022. No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.</p> <p><u>Procurement Activities</u></p> <p>In 2024, the main activity foreseen is the signature of the second specific contract for the IVT series. Release of options and commitments for indexations related to the IVT Series are planned.</p> <p>Commitments for transportation of prototypes and test assembly are also planned (either through cash contribution to IO or under the manufacturing contracts). Given the current geopolitical situation, alternative solutions may have to be put in place by F4E, should HHF testing in Russia be not possible in the timeframe compatible with the IVT Series procurement schedule.</p>	

External support will be needed to closely follow-up the fabrication of the IVT series contracts. These needs are planned to be provided through task orders under existing framework contracts.

### Divertor Rails project

#### Progress of Work

The PA will be signed in 2024. In addition, activities will proceed for the launch of the contract for the components production, which is planned to be signed in 2025.

It shall be noted that the 2024 progress will depend on the timely availability of the Procurement Arrangement documentation and signature of the PA.

The planned progress of work is subject to the requested allocation of internal resources, which was an outcome of the workload balance exercise at the end of 2022. No acceleration actions at an additional cost are included at this stage for the systems that may be requested for the ITER new scenarios for the First Plasma.

#### Procurement Activities

N/A

### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.1022200	HP - Send of the Visual examination and Hydraulic Pressure Tests (M_CB-02 (CB#17)_S23)	Q2 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.01.1367140	Manufacturing approved for PFC Links Series by MRR Panel (M_PISLLI_04)	Q4 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.03.1040	< IPL PA 1.7.P2E.EU.01 for Divertor Rails Signed	Q2 2024	Predecessor of GB49	PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails
EU17.2B.140230	Manufacturing approved for the IVT Series by MRR panel (OMF-1139-01-01)	Q4 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.140310	OMF-1139-02-01 Signed for IVT Pre-Series and Series Stage I - OMF-1139-02-01	Q2 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target

### EXPECTED RESULTS

The main expected results for this action are:

1. Visual examination and Hydraulic Pressure Tests (Cassette Body#17)
2. Manufacturing approved for PFC Links Series by MRR Panel
3. PA signed for Divertor Rails.
4. Manufacturing approved for the IVT Series by MRR Panel (Specific Contract #1)
5. Second specific contract signed for the IVT Series contract.

### TARGET

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

## Action 5. Remote Handling

Action 5	Remote Handling
<p><b>Divertor Remote Handling System (DRHS)</b></p> <p><u>Progress of Work</u></p> <p>The focus will be given to the Final Design activities via two main development lines that will run in parallel: one for the Cassette Multifunctional Mover (CMM) and the other one for the Cassette Toroidal Mover (CTM). Final design activities will be accompanied with prototyping and laboratory test in some areas.</p> <p><u>Procurement Activities</u></p> <p>For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts. Contracts are also planned to be signed for final design and manufacturing.</p> <p><b>Cask and Plug Remote Handling System (CPRHS)</b></p> <p><u>Progress of Work</u></p> <p>Activities are organized in two parallel development lines. One focuses on the assembly casks that are first plasma components, the other one focuses on the nuclearized cask variants. Focus will be given to the manufacturing of the full scope of the first plasma systems. Final design activities will be accompanied with prototyping in some areas. Non-first plasma nuclearized casks will be continuing on the preliminary and final design development.</p> <p><u>Procurement Activities</u></p> <p>For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts.</p> <p><b>Neutral Beam Remote Handling System (NBRHS)</b></p> <p><u>Progress of Work</u></p> <p>Activities are organized by subsystems and prioritized by their delivery needs for the different assembly stages. Main focus is given to the Monorail crane system that is first plasma item. Final design development and preparation for manufacturing of the Monorail crane system will continue, other non-first plasma systems will continue preliminary design developments towards design review. Final design activities will be accompanied with prototyping and laboratory test in some areas.</p> <p><u>Procurement Activities</u></p> <p>For the different development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts. Contracts are also planned to be signed for final design and manufacturing.</p> <p><b>In-vessel viewing system (IVVS)</b></p>	

Progress of Work

Main focus will be given to the final design development to move towards the design review and preparation for the manufacturing. Final design activities will be prepared/accompanied by manufacturing and testing in some areas.

Procurement Activities

For the different development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts.

**Common activities (transversal)**Progress of Work

Engineering support and expert activities will be performed for the four main operational activities, where needed. Complementary RH technology related design activities, qualification and prototyping will be carried out with a great focus on the field of control system, radiation hard technologies like electronics and cameras. Activities will be implemented (design and tests) aiming at manufacturing of first components (e.g. rad hard cameras and electronics) to be integrated in the RH systems.

Procurement Activities

Specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts in order to carry out supporting activities for the four main operational procurement and for complementary RH technology related design activities, qualification and prototyping. Contracts are also planned to be signed in some areas.

**WORK PROGRAMME OBJECTIVES**

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.03.14046172	EU CPRHS Final Design Hold Point released MA- 1 Items (final report approved by SC) (577-02-02)	Q2 2024	Predecessor of GB41	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14047212	OMF-1034-01-06 Final manufacturing design approved Machine Assembly CPRHS Items	Q2 2024	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.14054760	Task Order signed Task Order Ansaldo PD & FD for TLOM	Q2 2024	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System
EU57.01.14062860	[M12] CMS Prototype tested successfully	Q4 2024	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

**EXPECTED RESULTS**

The main expected results for this action are:

1. Tendering the DRHS FwC for Design, Manufacturing of CTM, CMM and Tooling
2. Preparation for the final design review meeting of CPRHS MA CDS system

3. Final design development of NBRHS first plasma system
4. Final design development of IVVS Measurement and deployment system
<b>TARGET</b>
The target for 2024 is "Annual M-SPI ≥ 0.8"

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle
<b>Fuel cycle</b>	
<u>Progress of Work</u>	
<p>The type A radwaste treatment and storage system is expected to be transferred to IO.</p> <p>In the frame of the PA for REMS (Radiological and Environmental Monitoring Systems), the contract for design and manufacturing of individual monitoring system and environmental monitoring system needed for 1st plasma will focus on final design and manufacturing. Task Orders related to Design and risk mitigation activities of REMS for Tokamak complex will continue and additional Preparation activities for specific Framework contract for REMS Tokamak are planned.</p> <p><u>Tritium plant:</u></p> <p>For Isotope separation system work of the integrated team will focus on definition of technical requirement, de-risking activities and preparation of procurement arrangement.</p> <p>For water detritiation system work of the integrated team will focus on definition of technical requirement, de-risking activities and preparation of procurement arrangement.</p> <p><u>For vacuum pumping:</u></p> <p>Torus and Cryostat Cryopump system (TCCS) will focus on manufacturing and testing activities.</p> <p>The manufacturing of Neutral Beam scope for the Front-end Cryopump Distribution system (FECDS) will continue.</p> <p>The instrumentation and control (I&amp;C) cubicles needed for 1<sup>st</sup> plasma scope for the TCCS and FECDS will be manufactured. The design activities for the I&amp;C scope related to neutral beam FECDS will continue and contract to cover manufacturing phase will be signed (via new contract or amendment to an existing one).</p> <p>The scope of Cabling for Neutral beam Front end Cryopumps distribution system, is planned to be cash transferred to IO in 2024. There is the possibility that this transfer is postponed to 2025. For Neutral beam cryopumps system, activities will focus on definition of technical requirements and preparation of procurement arrangement signature.</p> <p>Qualification and manufacturing of leak Detection and localization systems will continue.</p> <p><u>Procurement Activities fuel cycle</u></p>	

- Contract signature for manufacturing of neutral beam instrumentation and control (via amendment to an existing contract or a new specific contract) <sup>5</sup>
- Cash transfer to IO of cabling activities for neutral beam Front end cryodistribution system.<sup>6</sup>
- Specific contract signature for I&C Leak Detection
- Amendment to an existing contract may be signed
- Specific Contracts for support activities like Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc, will continue to be issued depending on the project needs

## Cryoplant

### Progress of Work

The commissioning of the LN2 Plant and Auxiliary Systems located in the Cryoplant building at Cadarache will continue.

### Procurement Activities cryoplant

- Amendments to existing contracts may be signed.
- Specific Contracts for support activities like Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc. will continue to be issued depending on the project needs.

## WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU31.01.10261	IPL > Delivery of First Torus & Cryostat Cryopumps by EU-DA to ITER Site	Q2 2024	GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps
EU31.01.12290	Strategy proposal of PA Amendment 3.1.P1.EU.04 for NB Cryopumps	Q3 2024	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.03.26160	M.19 - FDR Meeting and categorize issues for Primary & Cryostat Leak Detection System	Q3 2024	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

<sup>5</sup> At the time of writing the Work Programme, there is a possibility that this commitment is anticipated to 2023 via an amendment to an existing contract. The budget is nevertheless allocated to 2024

<sup>6</sup> At the time of writing the Work Programme, there is a possibility that this transfer is postponed from 2024 to 2025. The budget is nevertheless allocated to 2024.

EU31.03.40260	Cryostat Direct Leak Detection System qualification completed	Q4 2024	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System
<b>EXPECTED RESULTS</b>				
<p>The main expected results for this action are:</p> <ol style="list-style-type: none"> <li>1. Leak localization system Factory Acceptance Tests will be completed.</li> <li>2. Commissioning LN2 compressors completed.</li> <li>3. First Torus and Cryostat cryopumps delivered.</li> <li>4. Manufacturing readiness review for Neutral Beam Cold valve boxes completed.</li> <li>5. Radiological and environmental monitoring system: Static magnetic field pre-testing for main Tritium monitors in Europe completed</li> <li>6. Neutral Beam cryopumping system: agreement on technical requirements with IO to be able to proceed with procurement arrangement amendment signature</li> <li>7. Water detritiation system: agreement in the integrated team on the procurement arrangement approach</li> <li>8. Isotope separation system: agreement in the integrated team on the procurement arrangement approach</li> </ol>				
<b>TARGET</b>				
The target for 2024 is "Annual M-SPI ≥ 0.8"				

### Action 7. Plasma Engineering & Operations

<b>Action 7</b>	<b>Plasma Engineering &amp; Operations</b>
<p><b>ITER Operations</b></p> <p>The activities preparation of ITER operation will focus on preparation for longer term actions (for ITER integrated commissioning and operation) as well as some short-term actions (for system commissioning and assembly phases)</p> <p>The preparation of the F4E contribution to the organization of ITER Operation (collaboration framework with IO and the ITER parties, EU representation) includes contributing to the definition of the EU position in the definition of the ITER Operation organisation as well as setting up in F4E of framework for personnel assignment and of F4E coordinating mechanisms</p> <p><b>Procurement Activities</b></p> <p>Not applicable</p> <p><b>Plasma Engineering</b></p> <p>A relevant part of the PE activity responds to (often urgent) requests and hence it is difficult to plan in advance.</p> <p>This will include support on scenario preparation for first plasma and specific simulations and code development as needed, support to the development of the ITER Tokamak Monitoring System. Transversal support to F4E procurement remains in the Plasma Engineering scope.</p> <p><b>Procurement Activities</b></p> <p>Not applicable</p>	

WORK PROGRAMME OBJECTIVES				
Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
Not applicable				
EXPECTED RESULTS				
The main expected results for this action are: 1. Provide support to ITER preparation for First Plasma.				
TARGET				
Not applicable				

### Action 8. Heating & Current Drive

Action 8	Heating & Current Drive
<p><b>Electron Cyclotron (EC) System Gyrotrons, Power Sources and Power Supplies (PS), EC Upper Launcher and EC Control System</b></p> <p><b><u>Progress of Work :</u></b></p> <p><b><u>EU EC Power Supplies</u></b></p> <ul style="list-style-type: none"> <li>• Installation of 52HV09 &amp; 52HV10 units of the EU EC Power Supply will be completed</li> <li>• Commissioning and site acceptance tests will continue subject to building and site interfaces availability</li> <li>• Technical support of the EU EC Power Supplies will continue</li> </ul> <p><b><u>EU EC Gyrotrons</u></b></p> <ul style="list-style-type: none"> <li>• Design activities will progress towards FDR, followed by starting of manufacturing activities</li> <li>• Preparation activities for the Framework contract for the engineering support to the EU Gyrotrons and other EC systems will be completed</li> <li>• Preparation activities for the specific contract for the control system for the European Gyrotrons will progress</li> <li>• Procurement of Long Lead components will start</li> </ul> <p><b><u>Electron Cyclotron (EC) Upper Launcher and ex-vessel waveguides</u></b></p> <ul style="list-style-type: none"> <li>• The Technical Integrator will proceed with the design of Ex-Vessel Waveguides and Upper Launcher Systems towards the finalization of the design</li> <li>• Preparation activities for the subsequent specific contracts signature with the Technical Integrator covering the manufacturing and assembly of the Ex-Vessel Systems and the manufacturing of the remaining UL Sub-systems will progress</li> <li>• Procurement of long lead materials for series production will start</li> </ul>	

- Optical testing of diamond disks will continue
- The design, validation and manufacturing of the isolation valve prototypes and valve qualification will continue

#### Electron Cyclotron Control System

- In recent negotiations with ITER IO it was decided to join the FDR of the Electron Cyclotron Plant Controller (ECPC) and of the Upper Launcher Subsystem Control Unit (EC-UL-SCU). The FDR is presently planned in 2025. Therefore, in 2024 the activity will focus on the preparation for FDR of the ECPC Stage 3 system and of EC-UL-SCU Stage 2

#### **Procurement Activities**

##### Common activities:

- The framework for engineering support services for EC projects will be signed
- Some Engineering Studies and Engineering Support activities will be performed, implemented via ITAs

##### Electron Cyclotron (EC) Power Supplies:

- Supporting activities for site support are foreseen

##### Electron Cyclotron (EC) Gyrotrons:

- The Task Order for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets for the EU Gyrotrons will be signed

##### Electron Cyclotron (EC) Upper Launcher and ex-vessel waveguides

- The Framework Contract and Task Order 1 for the Isolation Valves Framework Contract will be signed, covering manufacturing of the isolation valve prototypes and design and validation activities.
- Task orders for the prototype testing of isolation valves will be signed.
- Additional options for the Integrator Framework Contract will be signed, covering part of the remaining scope (e.g., material procurement for series production)

Other contracts are foreseen to support these main activities (e.g., engineering, design, analyses, resources, inspectors, prototyping), most of them specific contracts under existing frameworks

##### Electron Cyclotron Control System:

- Specific contracts for the preparation of the FDR will be signed
- Specific contracts for HW prototypes will be signed

Other contracts are foreseen for resources insourcing and technical support

#### **Neutral Beam Test Facility, Padua:**

##### **Progress of Work**

- MITICA Beam Source will be delivered to the NBTF

- MITICA Diagnostics – fabrication and assembly will be completed
  - MITICA Beam Line Components – Delivery of main sub-components of NED, ERID and CAL to NBTF, finalization of assembly and testing
  - NBTF Assembly - MITICA cryopump assembly tool will be delivered
  - NBTF Assembly - MITICA cryopump installation will be completed
- NBTF Control System (CODAS) - MITICA instrumentation (Interlock and Safety System) installation will start and contractual activities will progress for the remaining instrumentation

### **Procurement Activities**

- Some Engineering Studies and Engineering Support activities will be performed, implemented via ITAs
- MITICA Beam Line Component and Beam Source: supporting tasks for the final acceptance tests and delivery to RFX PRIMA site will be implemented.
- Specific contracts will be signed for the NB Test Facility within PRIMA Assembly Framework.

### **Neutral Beam for ITER - Cadarache:**

#### **Progress of Work**

- NB Vessels: Manufacturing design activities will proceed up to MRR
- Beam Sources and Beam Line Components – Pre-procurement activities and PA preparation will progress
- Drift-Duct: Preparation of technical documentation will proceed towards contract tendering
- Absolute Valve: Joint IO/F4E call for tender will progress
- PMS and ACC Coils: PA for 53.05 Neutral Beam Magnetic Shielding will be signed subject to timely IO FDR completion and tendering preparatory activities for contract signature will start.
- NB Power Supplies: Detailed design activities for ISEPS will progress towards FDR, delivery of AGPS-CS and GRPS will be completed and installation will start subject to building availability. High voltage bushing assembly manufacturing activities will be completed. HNB control testing tool will be completed.
- Pre-procurement activities will start for the ACC Power Supplies subject to timely availability of specifications from IO
- Assembly Tooling: Design activities for assembly phase II will start subject to contract signature/ progress.

### **Procurement Activities**

- NB Assembly Specific Tooling Contract will be signed
- Some Engineering Studies and Engineering Support activities will be performed, implemented via ITAs
- Contracts will be signed for technical follow-up of the HNB components
- NB Power Supplies: Specific tasks and options will be released, in accordance with the contract implementation status.

- Absolute valves: Feasibility studies by tenderers will progress

### Ion Cyclotron Antenna

No activities are foreseen in 2024.

Following agreement between F4E and IO, the IC antenna procurement scope was transferred through a Level-0 PCR (#1271) from the original share of F4E, without contractual impact, since the PA had not yet been signed.

#### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.01.3000010	Option 1 Signed for TO1 for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q2 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.4001240	Design Description Document for UL system - Completed	Q3 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.03.17200	Task Order Signed for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets	Q3 2024	WP24 objective	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons
EU52.03.228120	SCP-52HV07 - SAT Completed (M3.2.5)	Q2 2024	WP24 objective	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply
EU53.06.08190	Start of Installation of AGPS-CS of IHNB-1 (GB27)	Q3 2024	GB27	PA 5.3.P6.EU Neutral Beam Power Supply
EU53.TF.15690	Delivery of MITICA Beam Source by EU-DA to PRIMA Site	Q3 2024	WP24 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components
EU53.TF.4446460	Delivery On-Site Completed (M89) - MITICA Neutralizer and e-Dump-	Q3 2024	WP24 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components

#### EXPECTED RESULTS

The main expected results for this action are:

1. Final Design review for the EC Gyrotrons will be completed
2. Finalization of the design for the UL System
3. Optical testing to be completed for 44 diamond disks
4. Transfer back of HNB Assembly Phase II
5. Delivery of MITICA Interlock and Safety System
6. Grid Power Supply (GRPS) of IHNB-1 and IHNB-2 delivered to ITER site
7. Acceleration Grid Power Supply – Conversion System (AGPS-CS) delivered to ITER site
8. ISEPS design started
9. HV bushing assembly manufacturing completed
10. PA for NB Magnetic Shielding signed

#### TARGET

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

Action 9. Diagnostics

Action 9	Diagnostics			
<p><u>Progress of Work</u></p>				
<p>The Diagnostics Programme will continue during 2024 with the manufacture of several components or systems for delivery to ITER, mostly for First Plasma. These include mainly in-vessel supports, vacuum vessel feedthroughs, the equatorial port plug 12 wide angle viewing system components and front-end components of the collective Thomson scattering system and in port components and fission chambers for the radial neutron camera. Some of them will be delivered within the year.</p>				
<p>Several Diagnostics systems and subsystems will complete their design activities with approval of the final design review, including the tokamak services in-divertor components, the pressure gauges sensor head and electronics, the core plasma charge exchange recombination spectrometer port plug components and the port plug mounted bolometer cameras and bolometer sensors.</p>				
<p>The design of all remaining Diagnostics systems and subsystems will also progress, both under task orders within existing design framework contracts and framework partnership agreement for radial neutron camera ex-vessel design, as well as under a design grant that will cover the completion of the design of the equatorial visible/IR wide-angle viewing system for equatorial ports 3, 9 and 17.</p>				
<p>For ITER port structures and the integration of Diagnostics into the ports, work will continue under the existing framework contract to integrate tenant interface changes to the approved FDR design (ITER Baseline), consistent with associated PCRs.</p>				
<p><u>Procurement Activities</u></p>				
<p>Procurement activities will focus mainly on the placement of framework contracts for manufacture of Second Plasma components as well as task orders within these framework contracts and existing framework contracts for manufacture of First Plasma components and design of Second plasma components. The tendering process for port engineering system of six diagnostics ports will be as well on going.</p>				
<p>These will be complemented with contracts and task orders for the production and testing of prototypes and task orders for the provision of industrial expertise and for engineering analysis, as well as amendments of on-going grants and contracts (including specific contracts) as necessary. In-sourcing of personnel is foreseen to support the Programme during 2024, as is the use of Inspectors for manufacturing contracts and Experts in specialist areas, including in support of design reviews.</p>				
<p>It has been foreseen a possible cash transfer to IO of the entire support for commissioning activity related to the Magnetics electronics diagnostic.</p>				
WORK PROGRAMME OBJECTIVES				
Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA

EU55.02.106970	FDR approved by Steering Committee for Port-plug-mounted Bolom. Camera (EPP01, UPP01, UPP17)	Q3 2024	WP24 objective	PA 5.5.P1.EU.03 Diagnostics - Bolometers
EU55.06.107080	< Approval of Manufacturing Readiness Review for Feedthroughs components by MRR panel	Q3 2024	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.06.697140	IPL > Delivery of In-vessel clips, clamps and junction boxes for VV Sector 2 (Batch 9) by EU-DA to IO ITER site	Q4 2024	WP24 objective	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.13.908990	MRR Meeting for MfG PP EP12	Q4 2024	WP24 objective	PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System

**EXPECTED RESULTS**

The main expected results for this action are:

1. Completion of final design for tokamak services in-divertor components.
2. Completion of final design for the pressure gauges sensor head and electronics.
3. Completion of final design for the bolometer port plug mounted cameras and bolometer sensors.
4. Completion of final design for the core plasma charge exchange recombination spectrometer port plug components
5. Deliveries of tokamak services in-vessel supports.
6. Deliveries of in-vessel electrical feedthroughs

**TARGET**

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

**Action 10. Test Blanket Module**

Action 10	Test Blanket Module
<p><u>Progress of Work</u></p> <p>The Design and Safety Analysis activities for TBM Sets and Ancillary Systems will continue for the completion of the preliminary design and the first step of the final design.</p> <p>The consultancy of an Agreed Notified Body will continue as well as the handling and storage of EUROFER and other steel products.</p> <p>The activities for the development of the TBM sets Industrial Feasibility and Fabrication Technologies will continue, as well as for the EUROFER semi-finished product.</p> <p>The collaboration with EUROfusion and EFLs will continue.</p> <p>The definition and codification of EUROFER design limits in RCC-MRx design and construction code will continue.</p>	

Procurement Activities

It is planned to launch/conclude procurement procedures for the start or the continuation of the following activities among others:

- Completion of the preliminary design of the TBM sets, of Ancillary Systems and of the related Safety Analyses and studies;
- Final design of the TBM sets and of the related safety analyses and studies;
- Final design and manufacturing of the Ancillary systems;
- Consultancy of an Agreed Notified Body;
- Proof of the TBM-sets fabrication and assembly processes feasibility;
- EUROFER semi-finished products;
- Handling and Storage of EUROFER and steel materials;
- Definition and codification of EUROFER design limits in RCC-MRx;
- The transport of EUROFER and other materials/products to and from the storage facility.

In addition, specific contracts for support activities like engineering and analysis, experts, project management support, system engineering management and in-sourced staff may be issued depending on the project needs.

Moreover, if requested and approved by the TBM-Project Team Steering Committee, a cash contribution will be transferred to IO in order to execute TBM-PT activities common to several ITER Members.

The Test Blanket Module Systems procurement plan is not in response to PA or ITA but to the TBM Arrangements (TBMAs).

No activities are credited.

### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU56.01.1242855	Task Order Signed for TO1 for FwC for EUROFER design limits codification in RCC-MRx	Q2 2024	WP24 objective	NA
EU56.01.1259955	Task Order Signed for TO2 for Safety Studies in support of TBSs PD & FD	Q4 2024	WP24 objective	NA
EU56.01.1326800	TO 05 Signed for Preliminary Design HCPB TBS Ancillary Systems	Q3 2024	WP24 objective	NA
EU56.01.1327040	Task Order Signed for TO 06 for Preliminary Design of HCCP TBM set (Chit Resolution)	Q3 2024	WP24 objective	NA
EU56.01.1379930	Task Order Signed for TO 07 for First elements of design +	Q4 2024	WP24 objective	NA

	design by analysis in view of the FD gate			
EU56.01.81615	Task Order Signed for TO2 for WCLL TBM Set PD & FD	Q3 2024	WP24 objective	NA
EU56.02.1240200	TO4 Signed for Handling, Cutting Storage Serv for Steel Products related to the EU TBMs	Q2 2024	WP24 objective	NA
EU56.03.10470	Task Order Signed for TO 04 for WCLL Ancillary Systems PD	Q3 2024	WP24 objective	NA
<b>EXPECTED RESULTS</b>				
The main expected results for this action are:				
<ol style="list-style-type: none"> <li>1. Completion of the Preliminary design activities for WCLL TBS and the start-up of Final design phase.</li> <li>2. Completion of the Preliminary design activities for HCCP TBS in collaboration with KO-DA and the start-up of Final design phase.</li> <li>3. Transmission to IO of the consolidated set of data in view of the update of the ITER Preliminary safety Report.</li> </ol>				
<b>TARGET</b>				
The target for 2024 is "Annual M-SPI $\geq$ 0.8"				

Action 11. Site and Buildings and Power Supplies

<b>Action 11</b>	<b>Site and Buildings and Power Supplies</b>
<u>Progress of Work</u>	
<p>The focus of the Buildings works will be to complete the civil works of the Tritium building (B14); to deliver the Tritium building (B14) available for IO equipment installation up to R1 level including the painting works; to progress on the installation, test &amp; commissioning of the cargo lift in the Tokamak building (B11); to deliver and install the doors in the Tritium building (B14); to deliver the building services components (HVAC, piping, electrical, Instrumentation &amp; Control) to IO for installation in the Tokamak Complex; to complete the NB High Voltage Power supply Building (B37), the Control building (B71 Non PIC part), the Fast Discharge &amp; Switching Network Resistor building (B75), the NB Power supply building (B34) and the Busbar Bridges.</p> <p>The Emergency Power Supply Buildings (B44, B46), Medium Voltage Distribution Buildings (B45, B47), the Load Centers LC01, LC02, LC08, LC09, LC15 &amp; LC16 and the Medium Voltage MV04, MV05 &amp; MV06, construction will continue progressing.</p>	
<u>Procurement Activities</u>	
<p>Contracts to be signed by 2024 include:</p> <p>AE II - Commitment for Contract Architect Engineer Services II Q4 2024</p> <p>TB22: Civil, Architectural, Finishing and Retrofitting Works - planned remaining lot D (cladding roofing Tokamak complex) contract signature Q3 2024</p>	

TB25 – Site Infrastructure and remaining Building services in the auxiliary buildings Q3 2024

Specific contracts will be signed under ongoing framework support services and works contracts. This includes, for example, Task Orders, Facility Management, Site Security and Reception Services, Structural analysis, Building HMI Development, Engineering and Contract Management Consultancy Services (with special respect to cost and schedule assessment) and consultancy for advice on interpretation of French Regulatory Law 2012.

Changes and exercise of options to the ongoing services and construction contracts in relation with PCRs, input data delays, and re-allocation of scope between contracts, will be implemented through amendments to the ongoing contracts in line with the provisions of the Financial Regulation.

Cash contribution will cover the ITER site host agreement and the ITER Site Services Agreement.

Specific cash compensation to IO as required in case of transfer of some activities from F4E to IO

### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU62.05.235	IPL > NB Power Supply Building (34) RFE (RFE #9)	Q1 2024	WP24 objective	MAIN MILESTONES
EU62.05.275	IPL > NB High Voltage Power Supply Building (37) RFE (RFE #9)	Q1 2024	WP24 objective	MAIN MILESTONES
EU62.05.580	IPL > Construction of Control Building (71 non PIC part) Completed	Q1 2024	WP24 objective	MAIN MILESTONES
EU62.05.620	IPL > Construction of Fast Discharge & Switching Network Resistor Building (75) Completed	Q1 2024	WP24 objective	MAIN MILESTONES

### EXPECTED RESULTS

The main expected results for this action are:

1. To deliver the Neutral Beam Power Supply Building to the IO for its suppliers works (ready for equipment - RFE)
2. To deliver the Neutral Beam High Voltage Power Supply Building to the IO for its suppliers works (ready for equipment - RFE)
3. Construction completed of the control Building (71 non PIC part).
4. Construction completed on the Fast Discharge & Switching Network Resistor Building (75)

### TARGET

The target for 2024 is "Annual M-SPI  $\geq$  0.8"

Action 12. Cash Contributions

Action 12	Cash Contributions			
<p><b>Cash contribution to IO</b></p> <p>This action covers the EURATOM in-cash contribution that F4E<sup>7</sup> shall deliver to ITER International Organisation (IO) in cash together with its contribution in-kind for the ITER project in accordance with ITER Agreement<sup>8</sup>.</p> <p>The present Work Programme includes the cash contributions to IO due by F4E for the following year N+1. The whole amount is committed in advance based on estimates of the IO draft budget N+1 and under the terms approved by ITER Council<sup>9</sup>.</p> <p><b>Cash Contribution to Japan</b></p> <p>The action also covers the transfer of procurement responsibility from EURATOM to Japan under the supervision of the ITER Organization in accordance with ITER Agreement. This is financed through a cash contribution from EU to Japan paid by F4E. An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year.</p>				
<b>WORK PROGRAMME OBJECTIVES</b>				
Milestone	Scope Description	Forecast achievement date	Type of milestone	PA
EUCC.01.280	Cash Contributions to ITER Organization 2025	Q4 2024	WP24 objective	NA
<b>EXPECTED RESULTS</b>				
<p>The expected result for this Action is to pay to IO the cash contribution as agreed by the ITER Council and to Japan as defined in the schedule for the relevant credits assigned to JA DA for those components transferred by the EU to them. The target for 2024 is to commit the cash contribution to IO for 2025 according to the decisions due to be taken by the ITER Council in November 2024.</p> <p>There are no commitments planned in 2024 for Cash contribution to Japan.</p> <p>Annual M-SPI NA</p>				

<sup>7</sup> F4E is the European Domestic Agency that manages the EURATOM contribution to the ITER project.

<sup>8</sup> Article 8 "Resources of ITER Organization" (ITER Agreement 2006)

<sup>9</sup> According to Article 9 of ITER Agreement, the ITER Project Resource Management Regulations (PRMR Regulations) shall govern the administration of the resources of the ITER Organization. It provides a detailed description of the applicable rules for contributions in kind, cash income, commitments and payments for the ITER Organization. The final figures are approved or modified by the ITER Council.

## Action 13. Technical Support Activities

Action 13	Technical Support Activities
<p>The procurement of the supporting activities is mainly performed through Framework contracts and specific contracts.</p> <p><b>Technical Support to In-Kind Procurement</b></p> <p><b>Engineering Support activities</b></p> <p><u>Progress of Work:</u></p> <p>The Engineering Unit during 2024 will continue supporting the ITER Departments Programmes including BA department by providing them technical expertise in the key domains of engineering and fusion technologies. The unit will provide technical expertise in the following areas: Design office activities, Technical Data Management, System Design, Mechanical Engineering, Analysis: Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism, Nuclear Analyses; Plasma Engineering, Design Codes and Standards; Electrical Engineering; Instrumentation and Control; CODAC; Metrology, Material and Fabrication and Assembly Integration and Validation (AIV) and testing facility (FALCON).</p> <p><u>Procurement Activities:</u></p> <p>Beyond the preparation of task orders, the procurement activities in the Engineering Unit will be mainly focused on renewing Framework Contracts, for adapting the level of support to the needs of the Programmes.</p> <p><b>Nuclear Safety</b></p> <p><u>Progress of Work</u></p> <p>The scope includes the oversight of the implementation of all nuclear safety requirements by F4E and its contractors. The Nuclear Safety activities also provides support to the project teams involved in PIC/PIA (Protection Important Components/Activities) to ensure compliance with the necessary regulation. This includes support to nuclear safety management, identification of optimum positions for key nuclear safety issues, review of relevant documentation and nuclear safety inspections in F4E suppliers' premises. The Nuclear Safety Unit also organizes workshops, seminars and other activities to raise and re-enforce the nuclear safety awareness within F4E.</p> <p>In case F4E will seek for a ISO19443 certification, Nuclear Safety Unit will provide support and participate in these activities.</p> <p><u>Procurement Activities</u></p> <p>A framework contract will be signed for the implementation of Nuclear Safety inspections and dedicated Task Orders will be issued to provide this support in F4E suppliers' premises. Task Orders under the framework contract for Nuclear Safety support services will be issued and will continue to assist the F4E Project Teams both in Barcelona and in Cadarache. F4E will be supported by experts on Nuclear Safety expertise, funded by F4E through expert contracts. All</p>	

other activities will be implemented through Task Orders or Purchased Orders or Procurement Procedure for Direct Service Contracts based on the needs.

### **Quality Assurance and Quality Control**

#### Progress of Work

The scope includes the support to project teams to ensure that the F4E quality requirements are correctly implemented and managed for the F4E contribution to ITER. In particular, support is provided in both domains of Quality Assurance (QA) and Quality Control (QC). As for QA, support aims at ensuring that F4E's QA processes are properly followed in the development of the different ITER projects and in line with the F4E Quality Management Policy. As for QC, the support to the projects will be provided in the follow-up and control of the activities performed by F4E's contractors.

In case F4E will seek for a ISO19443 certification, Quality Assurance Unit will provide support and participate in these activities.

#### Procurement Activities

A framework contract will be signed for the continuation of Quality Control Inspectors for Protection Important Components (PIC) of ITER Project. Task Orders will be issued and, as well, Options of Task Orders already in force will be released for both the QA and QC activities.

### **CE Marking**

#### Progress of Work

The scope includes the support to F4E Project Teams in providing assessments and reviews, for each PBS, of the compliance with CE marking directives & regulations (mainly Pressure Equipment Directive, Machinery Directive, Low Voltage Directive, Electromagnetic Compatibility Directive, Explosion Protection and Construction Product Regulation).

#### Procurement Activities

Task Orders will be issued for the CE Marking activities.

### **Systems Engineering**

#### Progress of Work

The scope includes the development and implementation of Systems Engineering practices, processes and tools and to support their correct deployment by the Project Teams. To cover this scope, external manpower is contracted across several areas, including Requirements Management and Verification (RMV) with emphasis on Verification, Design and Manufacturing Readiness Reviews, Interface Management, and other Systems Engineering topics.

#### Procurement Activities

Task Orders will be issued and contractual Options will be released as well in Task Orders already in force to continue to support the F4E Project Teams both in Barcelona and in Cadarache.

### **Office of the Chief Engineer**

#### Progress of Work

The Office of the Chief Engineer supports the Head of ITER Programme Department with respect to the scope of the EU in-kind components for ITER and in representing F4E towards

the ITER Organisation. Among the main tasks are: the interaction with IO on the project technical baseline, including change control, and participation to the Configuration Control Boards, the management of transversal technical issues impacting several PTs, the coordination of F4E participation to ITER Independent Reviews and working groups focused on technical matters and the assurance of consistency, adequacy and maturity in relevant Design Reviews.

#### Procurement Activities

Task Orders under existing framework contracts will be issued and, as well, Options of Task Orders already in force will be released to continue to complement the in-house Configuration Management, Technical Integration and Issues Management capabilities with expert support from specialized companies.

### WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.ES.01.99200	Published Call for Tender for Provision of CAD Design Support Services	Q2 2024	WP24 objective	All
EU.ES.03.63480	Published Call for Tender for I&C integration services	Q2 2024	WP24 objective	All
EU.NS.01.35080	Framework Contract F4E-OMF-1532 signed for Nuclear Safety Inspections Support	Q2 2024	WP24 objective	All
EU.PM.3142420	Framework Contract F4E-OMF-1544 signed for Quality Control Inspectors for Protection Important Components (PIC) of ITER Project	Q2 2024	WP24 objective	All

### EXPECTED RESULTS

The main expected results for this action are:

1. Continuation of Implementation of the framework contracts which will allow Fusion for Energy to get external support in the field of Area of Nuclear Analysis and Neutronics, Seismic Analysis, CAD Design, I&C Control.
2. Signature of a new Framework contract to provide support services in the area of Nuclear Safety inspections.
3. Signature of a new Framework contract to continue to provide support services in the area of Quality Control Inspectors for Protection Important Components (PIC) of ITER Project .
4. The expected result for the activities in Nuclear Safety, Quality Assurance & Quality Control, CE Marking and Systems Engineering is to provide the requested support to all Project Teams on these matters.

In general, the target for 2024 is to contribute in achieving the cumulative credit forecasted for each action in this WP2024 thanks to the support granted to the work under each specific action.

5. The expected result for the activities performed by the Office of the Chief Engineer is to provide the requested support to the Head of the Department and to all Project Teams on the matters described in the Scope of Work. In general, the target for 2024 is to keep safeguarding the EURATOM's investment in ITER while achieving the cumulative credit forecasted for each action in this WP2023 thanks to the support granted to the work under each specific action.

## Transportation

### Transportation

#### Progress of work:

During 2024, Engineering Unit/Transportation will be in charge of the management, on the F4E side, of technical aspects of the joint procurement with IO for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of all ITER Components from the port/airport of entry (Fos or Marignane) to ITER site.

During 2024, this activity will mainly cover transportation of NON EU loads between Fos and Cadarache (EU-leg). The main cost driver is for Highly Exceptional Loads (HEL) that follow the dedicated ITER itinerary.

#### Procurement activities:

Task Orders for Transportation of Highly Exceptional Loads between Maritime Port of Marseille and ITER site. Gendarmerie Task Orders to escort the HEL convoys and Task Orders for Management fees and for component transportation with contractor Daher will be signed.

## WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.TR.406040	Task Order Signed for TO 20 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2024	WP24 objective	All
EU.TR.406280	Task Order Signed for TO 21 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2024	WP24 objective	All

## EXPECTED RESULTS

1. Transportation of Highly Exceptional Loads amongst others, US CS Coils and EU and KO-DA VV-sectors between Maritime Port of Marseille and ITER site.
2. Gendarmerie Task Orders to escort the HEL convoys and Task Orders for Management fees and for component transportation with contractor Daher will be signed.

## Other Technical Support and Administrative Activities

### Programme Management

#### Progress of Work

The main focus of Programme Management is on performance monitoring and reporting, preparation of the annual and multi-annual programme planning documents, scheduling support, change control, the maintenance and update of the cost situation, the continuous improvement of the risk registers in all project areas, increased standardization of reporting within the organization, the implementation of the Internal Compliance Programme for export control. Overall project management support and support to the use and maintenance of specific tools to support project and program management are also included.

#### Procurement Activities

Task Orders and contractual Options of Task Orders already in force, Purchased Orders and Procurement Procedure for Direct Service Contracts will be issued to continue to support the F4E Project Management Department and F4E Project Teams at Barcelona and Cadarache or at suppliers' premises.

#### **Administration (IT, POI, LSU, CSU)**

##### Progress of Work

A general provision is foreseen for technical support activities, including operational consultancy, legal, logistics and assurance services, improvement and change projects related to technical processes or documentation management system of technical documents. The action also includes operational meetings, missions as well as hardware and software tools used for the direct benefit of the operational projects .

#### Procurement Activities

The above scope will be implemented mainly by issuing Task Orders under existing/new framework contracts.

#### **Commercial (Finance, Insurance, CMP & CMM)**

##### Progress of Work

A general provision is foreseen for operational support to F4E Programme Teams in Pre-procurement (this covers Business Intelligence & Market Analysis), Commercial Reporting, Procurement areas and Commercial contract management.

This part also includes insurances related to risk occurring during construction activities on the ITER Site such as All Risk Insurance, Third Party liability, Faulty Design insurance. It does not include Decennial insurance, Third Party liability related to the escort of convoys of component transport to ITER Site .

#### Procurement Activities

The above scope will be implemented mainly by issuing Task Orders under existing/new framework contracts.

Insurances will be mainly implemented via reimbursement of IO according to the Agreement on provision of insurance services signed 20/07/2020 . For insurances not falling in the scope of this scheme, such as decennial insurance for buildings, complement to F4E Third Party Liability, they are procured or renewed by F4E directly.

### **EXPECTED RESULTS**

1. On time signature of the required Task Orders in order to support the Project Teams.
  2. Provide high quality Project Management Support Services to all Project Teams.
  3. The expected result for is to provide the requested support to F4E and all Project Teams on matters concerning Programme management.
  4. Signature of a new framework contract to provide support services in the area of Cost Management Support.
  5. The expected result for this Action is to provide the requested support to all Project Teams on matters concerning additional services (i.e. logistics, ICT, legal, POI, etc.) and to provide the requested support to all Project Teams on Operational Support Services and Insurance.
- Annual M-SPI NA

Action 14. Broader Approach

Action 14	Broader Approach
<p><b>JT-60SA</b></p> <p><u>Progress of Work</u></p> <p>The implementation of activities for the Operation/Enhancement phase of the project will continue. These activities include the procurement of critical spare parts and engineering services for EU already supplied systems and components, and selected machine enhancements and diagnostics in collaboration with EUROfusion (including maintenance and assistance to on-site assembly and commissioning). F4E is expected to take a larger role for machine on-condition maintenance and repair.</p> <p><u>Procurement Activities</u></p> <p>In year 2024 several contracts for the maintenance (on-condition) and spare parts are planned to be launched. These contracts cover all components supplied by the EU i.e., cryoplant, electron cyclotron resonance heating and magnet power supplies. Further contracts for the design and part of the manufacturing of the divertor remote handling system is foreseen.</p> <p>In the frame of capital protection activities and safety, contracts are going to be placed for the enhancement of the magnets active protection system and for local neutron and radiation shielding of EU diagnostics.</p> <p>As implementation of existing procurement arrangements, the contracts for the integration of cassette bodies, the high heat flux and normal heat flux elements of the JT-60SA actively cooled divertor, several studies and procurements for the enhancements of the power supply systems and the cryoplant will also be launched in 2024. The activities under the responsibility of F4E are carried out through task orders of existing/new framework contracts or existing/new supply and service contracts. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts and specific contracts. Specific contracts for support activities like engineering, inspections and analysis will be issued depending on the project needs.</p> <p>Beyond the cash contributions yearly transferred on the basis of the STP Work Programme on specific QST call for fund (covering EU Contribution to operation, maintenance and assembly)</p>	

additional cash transfers for partial funding of machine insulation repair activities (i.e. central solenoid extraction and repair) will also be made.

## **IFMIF/EVEDA**

### Progress of Work

In 2024 the LIPAc (Linear IFMIF Prototype Accelerator) activities at Rokkasho will focus on finalizing the assembly of the superconducting part (cryomodule) of the LIPAc accelerator and integrating it into the beam line. The assembly will be continued on Rokkasho site by a European company under responsibility of F4E. After the assembly in the clean room has been completed, the cryomodule will be moved to the accelerator vault, in the LIPAc building, for the final steps of the assembly, the integration into the beam line and then the checkout tests. The LIPAc accelerator will be then in its final configuration for the last stages of the beam operation campaigns aiming at demonstrating the nominal performance of the LIPAc accelerator. In parallel, the enhancement activities for the LIPAc injector, Control System and RF Power system of the RFQ will be carried out to improve their maintainability, reliability, and availability. In particular the prototype of the new solid state RF power amplifier will be tested. The enhanced subsystems are planned to be deployed after the completion of the LIPAc primary goal, namely, full demonstration of the IFMIF accelerator concept for a fusion neutron source (acceleration and transport of a 9-MeV, 125-mA deuteron beam meeting the beam characteristics requirements in continuous waves) and will aim to demonstrate both the reliability and availability required for the future Fusion Neutron Source.

### Procurement Activities

Contracts will have to be placed for the enhancement of key LIPAc subsystems and components such as the injector, the RF power system, and the control systems, as well as for demonstrating the operation and for optimizing the maintainability of the accelerator and subsequently the beam availability. Further contracts cover procurement of spare parts and services necessary for maintenance. Activities for the preparation of the LIPAc accelerator in its final configuration for the forthcoming operation phases will continue in 2024. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts, specific contracts, Agreements of Collaboration with European Institutes, and a multi annual programme plan signed with EUROfusion. Cash contributions as contribution to Common Fund and Common Expenses will also be made.

## **IFERC**

### Progress of Work

The IFERC project comprises three activities, CSC (Computer Simulation Centre), REC (Remote experimentation Centre) and DEMO design and R&D:

The CSC objective is to provide high power computer (HPC) resources for JA and EU scientists in order to advance simulation studies for ITER, JT-60SA and fusion reactors in general (e.g. DEMO). CSC fosters collaboration research projects between JA and EU by sharing computer resources and by further jointly developing state-of-the art models. A collaboration with ITER for high priority simulation projects will continue.

REC activities focus on the implementation of the remote collaboration tools agreed with JT-60SA, ITER, and the IFMIF-EVEDA LIPAc accelerator. The collaboration under the ITER BA agreement continues to advance test technologies for remote experiments and data transfer, including remote

CODAC application testing, remote data access, live data viewing for ITER, fast data transfer, and secure remote connection.

In the DEMO design activities, priority is given to activities relevant for ITER and JT-60SA exploitation, such as plasma scenario development, divertor and power exhaust, breeding blanket and tritium extraction and removal. The objective of activities in fusion materials R&D is to continue to support ITER in issues related to Tritium retention in first wall materials, and to contribute to the materials database for future reactors such as DEMO, which will be in part validated in a future IFMIF type installation. All activities are performed in collaboration with EUROfusion.

### Procurement Activities

There are contracts to be placed for preparation of remote participation rooms for tests with BA Projects and ITER, and testing activities. F4E will be supported by experts, funded by F4E through expert contracts and specific contracts. Cash contribution will also be made as EU contribution to the Project Team.

## WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.BA.01.23360	Placement of the contract for the Injector upgrade	Q2 2024	WP24 objective	LIPAc Enhancement – Injector
EU.BA.01.25080	Contract placement for the integration of cassette bodies, HHF and NHF elements of the JT-60SA actively cooled Divertor	Q2 2024	WP24 objective	Divertor for Operation Phase 3
EU.BA.01.27600	Completion of the SRF Linac assembly in the Joint Research Building	Q3 2024	WP24 objective	LIPAc Activities
EU.BA.01.38800	Supply of equipment or services for tests with BA Projects and ITER	Q4 2024	WP24 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator
EU.BA.01.38860	Delivery of vacuum components of the transmission lines	Q3 2024	WP24 objective	ECRH Transmission
EU.BA.01.38880	Delivery of the centrifuge accelerator for JT60SA pellet launching system	Q2 2024	WP24 objective	Pellet Injector
EU.BA.01.38960	Prototype engineering and manufacturing dossier of the RF System Enhancement pre-series	Q3 2024	WP24 objective	LIPAc Enhancement - RF Power System

## EXPECTED RESULTS

The main expected results for this action are:

### JT-60SA:

1. Delivery of the full Thomson Scattering system
2. Factory test report for transmission line components
3. Installation of the error field correction coils completed and acceptance on site
4. Delivery of VUV to the Naka site

### IFMIF/EVEDA

1. Delivery of the report for the 5 MeV pulsed and CW beam commissioning phase

<ol style="list-style-type: none"> <li>2. Completion of the cryomodule assembly</li> <li>3. Delivery of the prototype engineering and manufacturing dossier of the RF System Enhancement pre-series Technical Report on Modeling of erosion/corrosion process and the distribution of the Activated Corrosion Products and Be in ELTL (IFMIF-EVEDA Li Loop)</li> <li>4. Technical report on defining the experimental programme to be executed in the 1:1 pilot plant</li> </ol> <p>IFERC</p> <ol style="list-style-type: none"> <li>1. Testing functions of various ITER/CODAC applications (API) and examination of accessibility and operability to these APIs from Rokkasho and from Barcelona under the collaboration REC-IO (CODAC application testing)</li> <li>2. Start of the neutron irradiation for in-situ tritium release experiments on the Neutron Irradiation experiments of Breeding Functional Materials for the DEMO R&amp;D</li> <li>3. Complete development of detailed physics models in selected functional blocks of the DEMO fuel cycle on the development of Tritium inventory evaluation tool for DEMO fuel cycle design.</li> <li>4. Complete update design of Breeding Blanket (BB) segment for DEMO Design activities (Breeding Blanket design and tritium extraction and removal)</li> <li>5. Supply of high-performance computer resources and analysis and support of simulation projects</li> </ol>
<b>TARGET</b>
The target for 2024 is "Annual M-SPI $\geq$ 0.8".

Action 15. DONES

<b>Action 15</b>	<b>DONES</b>			
<u>Progress of Work</u>				
<p>The plan for 2024 is to validate the finale design of key components, integrating the design improvement as feedback of the ongoing LIPAc engineering validation phases, but also to increase the availability of LIPAc during the commissioning phases with the availability of spare parts. Additionally to consolidate the F4E contribution to the DONES Programme external support will be contracted to consolidate the current baseline and to provide support for the integrated activities during the ramp-up.</p> <p>It is worth to underline that those commissioning phases are identified in the DONES Programme milestones as interface points with the construction phase of the IFMIF-DONES facility (i.e. validation of the RFQ in high duty cycle and SRF Linac at low duty cycle).</p>				
<u>Procurement Activities</u>				
<p>Taking into account the possible F4E contribution to the DONES Programme, it is important to consider the continuation of early procurements of essential equipment for DONES for risk mitigation using LIPAc as support facility.</p> <p>The activities are carried out through task orders of existing/new framework contracts or existing/new supply and service contracts. F4E will be continuously supported by experts funded respectively by F4E through expert contracts and specific contracts.</p>				
<b>WORK PROGRAMME OBJECTIVES</b>				
<b>Milestone ID</b>	<b>Scope Description</b>	<b>Forecast achievement date</b>	<b>Type of milestone</b>	<b>PA</b>

EU.DO.00110	Placement of the contract for the Prototype components SRF Linac Coupler	Q3 2024	WP24 objective	SRF Linac
EU.DO.00120	Placement of the engineering support contract for DONES Project Management	Q2 2024	WP24 objective	Programme Team and System Integrated Management
EU.DO.00160	Placement of the contract for the Prototype components RFQ Coupler	Q3 2024	WP24 objective	RFQ

**EXPECTED RESULTS**

The main expected results for this action are:

1. System Engineering and Project Integrated Management set up
2. Components tested on LIPAc

**TARGET**

The target for 2024 is "Annual M-SPI  $\geq$  0.8".

## WP\_TABLE 1 WORK PROGRAMME 2024 BUDGET SUMMARY

## Budget Summary of the 2024 Work Programme

Budget article		Work Programme Commitment appropriations (EUR)
3 1	ITER construction including site preparation	416,958,505.88
3 2	Technology for ITER	10,012,547.00
3 3	Technology for Broader Approach & DEMO	49,583,165.00
3 4	Technology for DONES	1,800,000.00
3 5	External Support Activities	20,259,068.00
3 6	Other Operational expenditure	6,607,383.00
<b>Total Title III of the Budget</b>		<b>505,220,668.88</b>
4 1	ITER construction from ITER host state contribution	83,111,912.00
4 2	Activities linked to ITER Organization	
4 3	Other earmarked expenditure	
<b>Total Title IV of the Budget</b>		<b>83,111,912.00</b>
<b>Total amount available for the operational expenditure</b>		<b>588,332,580.88</b>

Work Programme		Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1 + 4 1 + 4 2 + 4 3	Expenditure in support of ITER Construction <b>Sub total ITER construction + RF</b>	1,200,000.00	286,334,234.88	212,536,183.00
3 2	Design and R&D in support of ITER, not credited <b>Sub total technology for ITER</b>		10,012,547.00	
3 3	Expenditure in support of Broader Approach <b>Sub total Technology for Broader Approach and DEMO</b>		35,533,165.00	14,050,000.00
3 4	Technology for DONES <b>Sub total Technology for DONES</b>		1,800,000.00	
3 5	External Support Activities <b>Sub total External Support Activities</b>		20,259,068.00	
3 6	Other Expenditure <b>Sub total Other Expenditure</b>		6,607,383.00	
<b>Totals Operational Expenditure</b>		<b>1,200,000.00</b>	<b>360,546,397.88</b>	<b>226,586,183.00</b>
		<b>588,332,580.88</b>		

## WP\_Table 1 . Work Programme Budget Summary

WP\_TABLE 2 - INDICATIVE VALUE OF FINANCIAL RESOURCES FOR THE ACTIONS IN WP2024

Action #	Action	WP2024			
		Budgeted forecast WP2024	Reserves	Total Resources allocated	
1	Magnets	1,608,267	Appropriations that have been cancelled in accordance with Art.12.1. of the F4E Financial Regulation may be entered in the Budget 2024 Amendment 1, provided that the late commitment forecasts are verified and confirmed by the end of April 2024	1,608,267	
2,3,4,10*	Main Vessel*	110,183,418		110,183,418	
5	Remote Handling	8,145,139		8,145,139	
6	Cryoplant & Fuel Cycle	3,818,495		3,818,495	
7	Plasma Engineering & Operations				
8	Heating & current drive	25,452,484		25,452,484	
9	Diagnostics	6,487,229		6,487,229	
11	Site and Buildings and Power Supplies	137,594,954		137,594,954	
12	Cash Contributions	211,979,980		211,979,980	
13	Technical Support Activities	30,391,391		30,391,391	
14	Broader Approach	50,651,225		50,651,225	
15	Dones	2,020,000		2,020,000	
	<b>Sub-Totals</b>	<b>588,332,581</b>		<b>0</b>	<b>588,332,581</b>

\*The Sub-actions Actions of Vacuum Vessel, In-Vessel Blanket, In-Vessel Divertor and Test Blanket Module are presented merged in one single line due to commercial sensitive information.

**WP\_Table 2 . Financial Resources per action**

WP\_TABLE 3 - 2024 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

Action		Type of contract	Signature
<b>Magnets</b>			
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Vacuum Vessel</b>			
CA14131	Commitment and Task Order Signed - F4E-OMF-789-MGR-A24 for 1 VV Resident Inspector & CP support	SC-PServ	Q2
CA14136	Commitment and Task Order Signed - F4E-OMF-789-MGR-B24 for 1 VV Resident Inspector & CP support	SC-PServ	Q2
CA14125	Commitment and Task Order Signed - F4E-OMF-789-WTO-A24 for 1 VV Resident Inspectors	SC-PServ	Q3
CA14128	Commitment and Task Order Signed - F4E-OMF-789-WTO-B24 for 1 VV Resident Inspectors	SC-PServ	Q3
CA13117	Commitment & TO signed for F4E-OMF-1153-01-XX for Option 1 for Mechanical Analysis Support for VV	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>In Vessel- Blanket</b>			
CA07883	Task Order for Inspectors QA inspector #1 #2 (2025)	SC-PServ	Q4
CA13073	Task Order Resources - Docs Management #1 #2 24/25	SC-PServ	Q3
CA13120	TO 02 OPE-319-01 High Heat Flux Testing (Mockups)	SC-PSupply	Q1
CA13069	Task Order Resources - Resident 23/24	SC-PServ	Q3
CA09865	Task Order Resources - PM Support (Junior) 24/25	SC-PServ	Q3
CA13079	Task Order Resources - Welding Engineer 24/25	SC-PServ	Q3
CA11618	Task Order for Auditors TO#05 - LOT 1	SC-PServ	Q1
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>In Vessel- Divertor</b>			
CA08583	OMF-1139-02-01 Signed for IVT Pre-Series Production	SC-PSupply	Q1
CA14199	TO-06 OMF-319-01 signed for HHF Tests for Stage 2 Prototypes -IVT	SC-PServ	Q1

CA11548	TO-38.01 OMF-1159-01-01 signed for Engineering Support - IVT (2 resources)	SC-PServ	Q4
CA13012	TO-XZ OMF-1327-01 Signed for Metrology Support	SC-PServ	Q4
CA13298	Task Order WY OMF-1321-01 Signed for Resident Inspector at Monoblocks Supplier #2 for IVT Series (China)	SC-PServ	Q2
CA12494	Task Order ZZ OMF-1321-01 signed for Resident Inspector OPE-1112	SC-PServ	Q1
CA12491	TO-52.01 OMF-1159-01 Signed for Senior Mechanical Engineer Support for CB Series Stage 2	SC-PServ	Q3
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Remote Handling</b>			
CA13770	CON for Production of BiSS Module and Controller	PSupply	Q3
CA10459	Task Order 1 for Development Tasks on Show Room Telbot	SC-PSupply	Q3
CA11593	TO for Engineering Insourcing Contract Control Sys 2024	SC-PServ	Q4
CA10461	CON for RH Viewing System Design	PSupply	Q4
CA12217	Task Order (OMF-1034) signed for PD and FD of TLOM	SC-PServ	Q2
CA11778	Task Order for Engineering Insourcing Contract NBRHS 2025 - S. Acosta, JL Fernandez, N. Martins	SC-PServ	Q4
CA10459	Task Order 1 for Development Tasks on Show Room Telbot	SC-PSupply	Q3
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Cryoplant and Fuel Cycle</b>			
CA11746	FECDS: Contract signed for Manufacturing and Delivery of NB I&C for CVBs	PSupply	Q3
CA10704	I&C Leak Detection	SC-PSupply	Q1
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Plasma Engineering &amp; Operations</b>			
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Heating and Current Drive</b>			
CA11035	OPE-1203: Contract Signed for NB Tooling NBI 1&2 Phases II and III	PSupply	Q2
CA01020	Task Order Signed for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets	PServ	Q4

CA01421	OFC-1111: Task Order 1 Signed for Manufacturing of Isolation Valve prototypes and FDR documentation	SC-PSupply	Q1
CA12859	OFC-582: Task Order 4 Signed for PRIMA#04 Assembly	SC-PSupply	Q3
CA14075	Tenderer Feasibility Studies for NB Absolute Valves Procurement	PServ	Q4
CA13240	OMF-1159 Task Order Signed for Engineering Support for EC UL Project (2024-2025) - Part I	SC-PServ	Q3
CA13229	OMF-989 Task Order Signed for FDR preparation for ECPC & EC-UL-SCU	SC-PServ	Q2
CA11785	Engineering support and Quality Inspector activities 2024 for Vessel	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Diagnostics</b>			
CA06777	Task Order Signed for Radial Neutron Camera Port Plug Components Manufacture	PSupply	Q2
CA10542	Task Order Signed for MfG Ex-v & cameras EP12	SC-PServ	Q3
CA10541	Task Order Signed for MfG PP EP12	SC-PServ	Q1
CA12556	Task Order signed for Final Design and Manufacturing of Bolometer bespoke electronics	SC-PServ	Q4
CA14298	Commitment for In-source activities 2024 and part of 2025	SC-PServ	Q4
CA10652	Task Order Signed for Development of Bolometer data-analysis Software	SC-PServ	Q1
CA13043	Task Order Signed for WAVS I&C EP12	PSupply	Q2
CA11732	Contract Signed for Commissioning support of Entire Magnetic Diagnostics (without Plasma) - Cash transfer to IO	PServ	Q2
CA13397	Compound uncertainty related to include five projects in one framework contract (OMF-1244)	PServ	Q2
CA11886	Compound uncertainty related to include four projects in one framework contract (OMF-1126)	PServ	Q1
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Test Blanket Module</b>			
CA09804	TO 03 for Proof of the TBM-sets fabrication and assembly processes feasibility	SC-PServ	Q4
CA08690	Eurofer Procurement (TBM Box Qualification)	PSupply	Q3
CA10940	TO#02 for WCLL TBM Set PD & FD	SC-PServ	Q3
CA10944	TO#02 for Safety Studies in support of TBSs PD & FD	SC-PServ	Q3

CA10946	TO#01 for EUROFER Codification Database	SC-PServ	Q2
CA14305	TO#7 - First elements of design + Design by analysis in view of FD gate	SC-PServ	Q4
CA12701	Execution of TO 05 for Preliminary Design of HCPB Ancillary Systems	SC-PServ	Q2
CA13469	Task Order Signed for TO 04 for WCLL Ancillary Systems PD - Chit resolution	SC-PServ	Q3
CA12838	TO 2 for Senior System Engineering Management support (Tools development - WCLL)	SC-PServ	Q2
CA12841	TO 2 for System Engineering Management support (implementation - HCPB)	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Site and Buildings and Power Supplies</b>			
CA14018	TB21 - Lot 201 Commitment for B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04)	SC-PSupply	Q2
CA14052	TB21 - Lot 101 Commitment for B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04)	SC-PSupply	Q2
CA14270	AE II - Commitment for Contract Architect Engineer Services II - Core activities 2025-2030 (including indexation)	SC-PServ	Q4
CA14348	AE II - Commitment for AE Servs. II - Core activities 2025-2030 – (TB04) TB04 VCC related topics (including indexation)	SC-PServ	Q4
CA14019	TB21 - Lot 201 B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04) (Increase of Raw Material)	SC-PSupply	Q2
CA14053	TB21 - Lot 101 B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04) (Increase of Raw Material)	SC-PSupply	Q2
CA13223	TB22 - Commitment for Raw Material for Lot B	SC-PSupply	Q2
CA14047	TB25 - Infrastructures, Facility management services & buildings and Finishing works	PSupply	Q3
CA12406	TB22 - Commitment for Secondary structural works - TO#02 Lot B	SC-PSupply	Q3
CA12407	TB22 - Commitment for Secondary structural works - TO#03 Lot B	SC-PSupply	Q4
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Supporting Activities</b>			
CA08979	2024 Commitments and Budget Reserves for Legal Services charged against Operational Budget	SC-PServ	Q4
CA06505	Commitment 2024 - Global transportation of HEL NON-EU ITER components	SC-PServ	Q4
CA07547	Commitment 2024 for Convention 3 (affectation temporaire)	SC-PServ	Q4
CA09710	Commitment 2024 for Operational Missions	PServ	Q4

CA10632	Third Party Liability insurance 2020-2025	PServ	Q1
CA11814	TO 02 OMF-1115-01 for FP Diagn., BIPS I&C, Add. Heating and Real Time Software Support Activities	SC-PServ	Q1
CA11299	Correction of premium on the basis of building values declared	PServ	Q4
CA13096	Commitments 2024 for Software Maintenance	SC-PServ	Q4
CA06469	TO for Management fees 2025	SC-PServ	Q4
CA14409	Commitment for I&C support for the EC Control System integration ITA 4700000234	SC-PServ	Q3
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>Broader Approach</b>			
CA11577	Supply of JT-60SA actively cooled Divertor - integration of cassette bodies, HHF and NHF elements	PSupply	Q1
CA14163	Contract signed for RFPS enhancement RFQ series - Part I 2024	PSupply	Q2
CA14123	Contractual activities for Equipments/Design and Fabrication for Divertor Remote Handling	PSupply	Q2
CA14156	Local Diagnostics Shielding	PSupply	Q2
CA14157	Magnets active protection systems and In Cryostat Helium Cryopumps	PSupply	Q2
CA14158	Operation Support for JT-60SA	PServ	Q2
CA14164	CON Spare Parts for Additional Heating, Diagnostics and Magnets	PSupply	Q2
CA14162	TO02 for LIPAc injector enhancement	SC-PSupply	Q2
CA11810	On site LIPAc Control System support TOXX	SC-PServ	Q2
CA14159	Additional Diagnostics	PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
<b>DONES</b>			
CA14171	Engineering support contract for DONES Project Management	PServ	Q2
CA14170	Prototype components SRF Linac Coupler 2024	PSupply	Q3
CA14353	Prototype components RFQ Coupler 2024	PSupply	Q3
CA14362	Supply of a superconductive Cavity	PSupply	Q3

CA14363	Additional spare parts (cavity, solenoid etc.)	PSupply	Q4
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A

**Table 3 . Main procurement activities per action**

## WP\_TABLE 4 – PLAN FOR GRANTS

## 2024 GRANTS

Grant Agreements Reference	Expected date of Signature	Forecasted value to be committed	Duration	Counterpart (Leader Company)	Short Description
<i>Unknown</i>	Q4 2024	€ 1,200,000.00	48	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY*T	Remote Handling: Grant for Integration of Control System technologies at DTP2
<b>Total</b>		<b>€ 1,200,000.00</b>			

ON-GOING GRANTS<sup>10</sup>

Grant Agreements Reference	Date of Signature	Committed Value	Duration (in months)	Counterpart (Leader Company)	Short Description
F4E-FPA-327 (PMS-DG)-07	20/02/2020	€2,081,637.00	50	AGENZIA NAZIONALE PER LE NUOVE TECN	FPA-327-07_Development of the Final Design and Prototyping
F4E-FPA-364-06	22/10/2018	€1,485,307.76	62	MAX-PLANCK-GESELLSCHAFT ZUR FORDERU	Development of the Design and Critical Prototyping
F4E-FPA-384 (DG)-05	30/07/2018	€2,602,067.56	65	MAX-PLANCK-GESELLSCHAFT ZUR FORDERU	F4E-FPA-384-SG05 Development of the Design and Prototyping
F4E-GRT-0901-01	09/03/2018	€1,731,559.13	64	TEKNOLOGIAN TUTKIMUSKESKUS VTT OY*T	Development and integration of 3D Machine Vision, HLCS modules and GENROBOT at DTP2
F4E-GRT-0974-01	20/12/2018	€368,536.00	54	TUOTEKEHITYS OY TAMLINK*	PROTOTYPING AND TESTING OF HYDRAULIC DIGITAL VALVES FOR THE DIVERTOR REMOTE HANDLING SYSTEM
F4E-GRT-1146-01	25/07/2021	€2,260,574.00	48	COMMISSARIAT A L ENERGIE ATOMIQUE E	Completion of the design of Equatorial Wide Angle Viewing System (EP-WAVS) in EP12 and post-design technical support
F4E-GRT-553	09/07/2014	€2,562,993.00	88	ECOLE POLYTECHNIQUE FEDERALE DE LAU	DESIGN, DEVELOPMENT AND VALIDATION OF THE EUROPEAN GYROTRON
<b>Total</b>		<b>€13,092,674.45</b>			

WP\_Table 4. Plan for grants<sup>11</sup>

<sup>10</sup> Any 2023 Grant that was included in the original WP2023 but was not signed by the cut-off date of 31<sup>st</sup> March 2023 is not reflected in this table. Grants that were not known when the original WP2023 was drafted and that would be signed following a related WP2023 amendment are not listed neither.

<sup>11</sup> The Commission guidelines require to produce two additional tables covering Service Level agreement and Contribution Agreements. These are not displayed since F4E has no Service Level agreement nor Contribution Agreements under operational expenditure.

**WP\_TABLE 5 TIME OF CALL FOR THE PROCUREMENT PLAN**

**Indicative number, type of contract and timeframe for launching the procurement procedures.**

Procurement Procedures	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024
P Serv - Contract	5	5	3	6	7	4
P Supply - Contract	6	8	1	10	8	2
Pserv - Specific Contracts	23	30	12	14	23	39
PSupply - Specific Contracts	8	6	3	10	7	5

***WP\_Table 5 . Indicative number and type of contracts per quarter***

NB:

- During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2024.
- When a call for tender is not defined yet, the call is indicatively assigned to 6 months before the signature of the contract.
- For the specific contract, as they do not have call for tender, the table refers to its signature date.

## ESSENTIAL SELECTION, AWARD CRITERIA AND UPPER FUNDING LIMITS FOR GRANTS

With regard to grant actions referred to in this Work Programme, the essential selection and award criteria are:

### Essential Selection Criteria

- The applicants' technical and operational capacity: professional, scientific and/or technological competencies, qualifications and relevant experience required to complete the action.
- The applicants' financial capacity: stable and sufficient sources of funding in order to maintain the activity throughout the action.

### Essential Award Criteria

- Relevance and quality of the proposal with regard to the objectives and priorities set out in this Work Programme and in the relevant call for proposals.
- Effectiveness of the implementation as well as of the management structure and procedures in relation to the proposed action.
- Cost-effectiveness and sound financial management, specifically with regard to F4E's needs and objectives and the expected results.

With regard to the specific action, more details will be provided in the call for proposals. Thresholds and weighting for the essential and additional award criteria will also be indicated in the call for proposals.

A proposal which does not fulfill the conditions set out in the Work Programme or in the call for proposals shall not be selected. Such a proposal may be excluded from the evaluation procedure at any time.

The timetable and indicative aggregated amounts for the actions are defined in this Work Programme.

### Upper funding Criteria

With the entry into force of the recast F4E Financial Regulation and Implementing Rules on 1<sup>st</sup> January 2016, the following upper funding limits apply for grants:

1. Research, technological development and demonstration activities	40%
2. Purchase/manufacturing of durable equipment or assets and of ancillary services approved by the Joint Undertaking as necessary to carry out such activities	100%
3. Coordination and support actions, including studies	100%
4. Management activities, including certificates on the financial statements, and other activities not covered by paragraphs 1 and 2	100%

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