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[1] (hereinafter "the Statutes") and in particular Article 9 (a) thereof, last amended on 10 February 2015[2] by Council Decision Euratom 2015/224;

HAVING REGARD to Council Decision (Euratom) No 791/2013 of 13 December 2013 amending Council Decision (Euratom) No 198/2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it;[3]

HAVING REGARD to the Financial Regulation of Fusion for Energy[4] 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[5] 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 Bureau, on behalf of the Governing Board, of the draft SPD[6] 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;

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[1] O.J. L 90 , 30.03.2007, p. 58.

[2] O.J. L 37 , 13.02.2015, p.8.

[3] OJ L 349, 21.12.2013 p100-102.

[4] F4E (19) GB45 21.1 adopted on 10.12.2019.

[5] OJ L 122, 10.5.2019, p. 1–38.

[6] F4E(19) GB45 SOD, point n.25.

(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:

Article 1

The SPD 2021-2025 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 nonsubstantial 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.

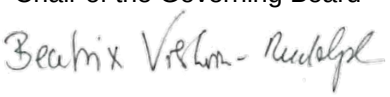
Article 3

This Decision shall have immediate effect.

Done in Barcelona, 10 December 2020.

For the Governing Board

Beatrix Vierkorn Rudolph
Chair of the Governing Board



For the Secretariat

Romina Bemelmans
Secretary of the Governing Board

Annex: Single Programming Document 2021-2025

FUSION FOR ENERGY

Single Programming Document

Years 2021-2025

F4E_D_2MXBS2

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Fusion for Energy

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Section I. General Context

1. Introduction

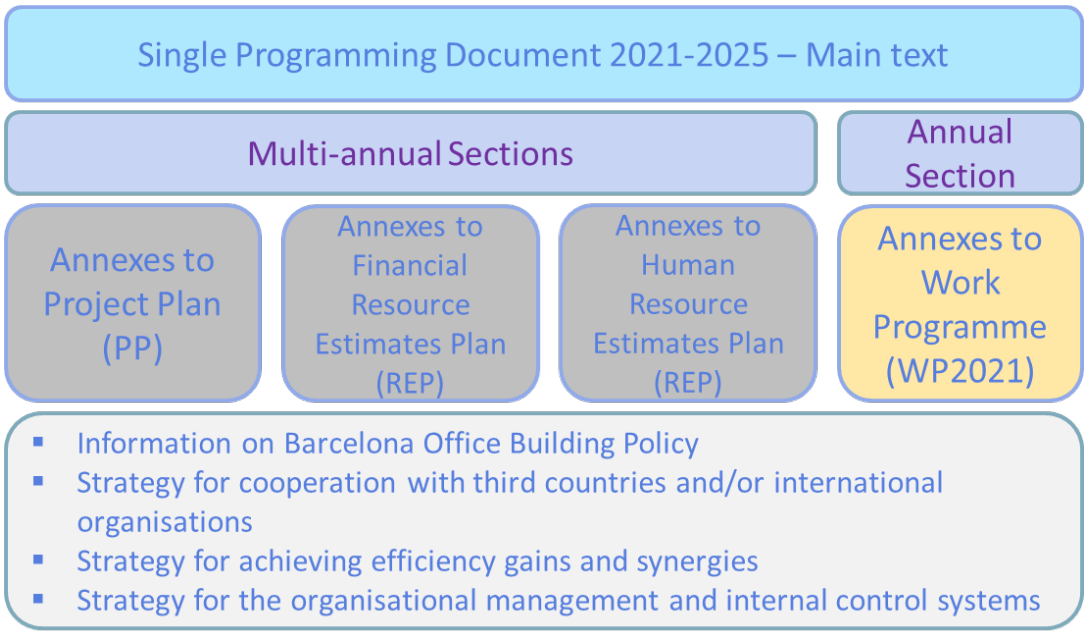
1.1 Purpose of the Annual and Multi-Annual Programming document

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+5 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 Commission proposal for the MFF 2021-2027 No 442 (2020) dated 27/05/2020.

The reference date for the planning information in the present document is end of March 2020 with some adjustments to align the planned activities with the budget define in May 2020.

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.

1.2 Vision and Overall F4E mission

"*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.

1.3 F4E Projects

ITER[1]

The task of F4E, 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 in Cadarache.

BROADER APPROACH (BA)

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 are also provided voluntarily by several participating European states (Belgium, France, Germany, Italy, Spain and, in the past, Switzerland) as well as EUROfusion[2].

DEMO

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

1.4 Key Performance Indicators

F4E is using specific Key Performance Indicators (KPI) in order to measure how effectively the organization achieves the target 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

[1] Info on ITER can be found on www.iter.org and https://f4e.europa.eu/understandingfusion/iter.aspx

[2] www.euro-fusion.org

these KPIs and reports internally to the Project Steering Meeting (PSM) to discuss any possible event or risk that could threaten their achievement.

1.5 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.

2. General background

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.

The main characteristic of ITER is that about 90% 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 first stage is referred to as First Plasma which is due in December 2025. The full configuration of DT operation is 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 around 2030.

(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:

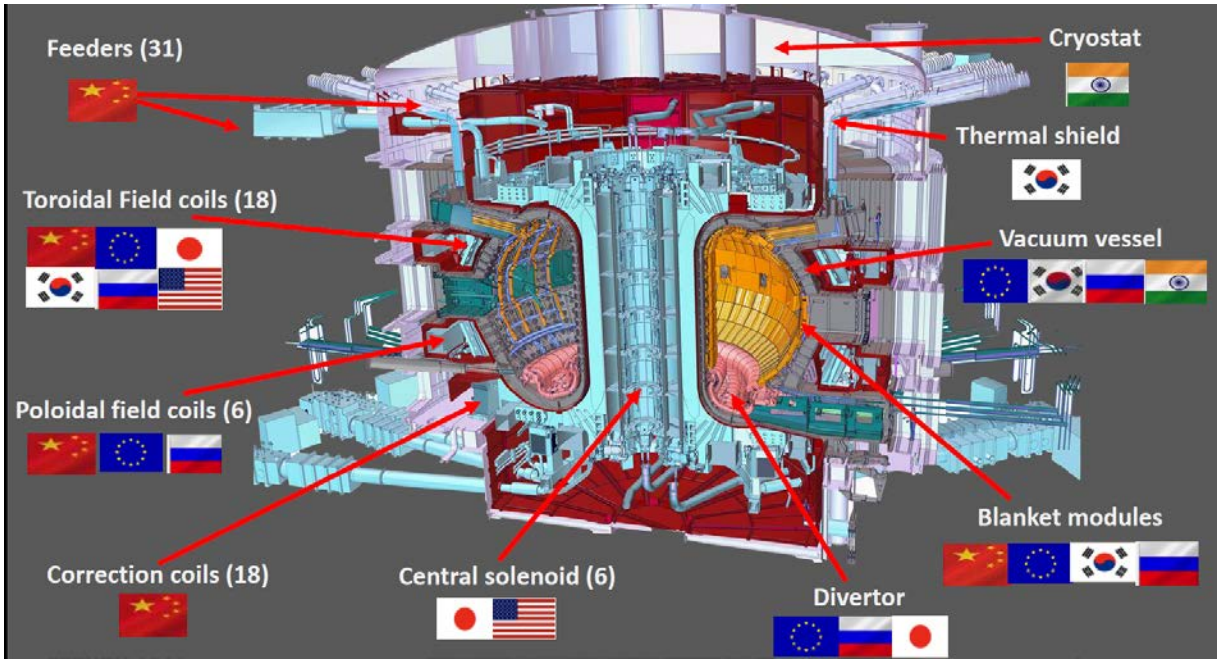
- ITER construction phase through to the build of the machine for the final DT configuration in 2035
- ITER operations phase running from 2026 through to the planned end of operation in October 2037
- ITER deactivation phase from October 2037 until the end of the ITER Agreement in October 2042. During 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.

ITER Construction Phase	Overall cost IC[3]-25 (kIUA[4])	EU share (kIUA)	EU share already released (kIUA)
In-kind	2876.06	1133.16	424.33
In-kind cash to Japan	*NA*	227.65	170.74
In-cash	4870.14	2160.62	684.41
Total	**7746.2**	**3521.43**	**1279.48**

SPD_table 1. Summary table of European contribution to ITER

[3] ITER Council
[4] Kilo ITER Unit of Account



SPD_figure 2 . Main DAs obligation toward ITER IO

IN KIND CONTRIBUTIONS TO IO

The Procurement Arrangements (PA), 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 list of the EU deliverables.

System	PA	Description of Deliverables	Total Credits[5] (kIUA)	Released Credits in kIUA
Magnets	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings	89.74	36.30
	1.1.P2A.EU.01	9 Pre-Compression Rings	0.60	0.00
	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)	40.86	9.47
	1.1.P6A.EU.01	20% of the TF magnet conductors	43.39	43.39
	1.1.P6C.EU.01	14% of the PF magnet conductors	11.22881	11.22881

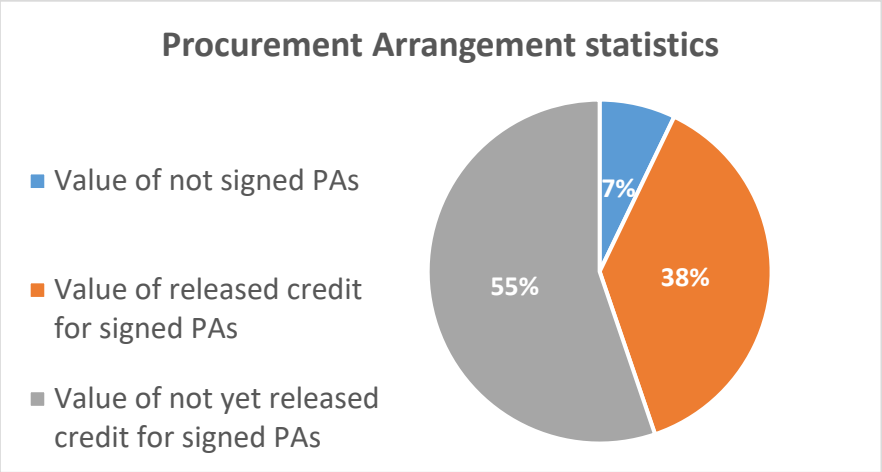
[5] IC-25/05.3 Proposal for the Update of the Overall Project Cost (OPC) – November 2019

Vacuum Vessel	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors	87.00393	37.661
Blanket System	1.6.P1A.EU.01	Blanket First Wall (215 panels)	40.33	0.00
	1.6.P6.EU.01	Blanket Cooling Manifolds	4.42901	0.00
Divertor	1.7.P1.EU.01	54 Divertor cassette bodies	6.04	0.53
	1.7.P2B.EU.01	Divertor inner vertical targets	19.62	1.66
	1.7.P2E.EU.01	Divertor rails	2.33061	0.00
Remote Handling (RH) Equipment	2.3.P2.EU.01	1 Divertor RH system	9.62	0.00
	2.3.P3.EU.01	15 Cask and Plug RH systems	17.31337	0.00
	2.3.P5.EU.01	1 Neutral Beam RH system.	6.23974	0.00
	5.7.P1.EU.01	6 In-Vessel Viewing systems	6.80	0.80
Vacuum Pumping & Fuelling	3.1.P1.EU.01	Warm Regeneration lines	0.20	0.06
	3.1.P1.EU.02	Front-End Cryopump distribution	0.76518	0.0766
	3.1.P1.EU.03	Cryopumps: 6 Torus and 2 Cryostat Cryopumps	4.8220	0.00
	3.1.P1.EU.04	Cryopumps for the Neutral Beam system (ITER and MITICA)	3.6640	0.18
	3.1.P3.EU.01	Leak detection and Localisation System	4.40	0.00
Tritium Plant	3.2.P3.EU.01	Hydrogen Isotope Separation System (ISS)	5.19406	0.00
	3.2.P5.EU.01	Water Detritiation System (WDS): water holding tanks and Emergency Tanks	3.2520	3.252
	3.2.P5.EU.02	Water Detritiation System Tanks, Water Detritiation Main System and Water Detritiation	8.26914	0.00
Cryoplant	3.4.P1.EU.01	Cryoplant system - LN2 Plant and Auxiliary Systems	26.3711	22.98294
Ion Cyclotron Heating & Current Drive	5.1.P1.EU.01	Ion Cyclotron Resonance Heating (ICRH) System (Equatorial port plugs incorporating 2 IC antennas)	14.73	0.00
Electron Cyclotron Heating & Current Drive	5.2.P1B.EU.01	Electron Cyclotron (EC) Control System	1.40	0.50
	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)	11.2820	0.00
	5.2.P3.EU.01	25% EC Gyrotron Sources	7.95511	0.00
	5.2.P4.EU.01	67% EC High Voltage Power Supplies	11.628	3.556
Neutral Beam	5.3.P1.EU.01	Neutral Beam (NB) Assembly and testing	3.80	0.00

Heating & Current Drive	5.3.P2.EU.01	NB Beam Source and HV Bushing	3.893	0.00
	5.3.P3.EU.01	Beam Line Components	3.90	0.00
	5.3.P4.EU.01	NB Pressure Vessel, Magnetic Shielding	10.65795	0.00
	5.3.P5.EU.01	Compensation and Active Correction Coils	4.16428	0.00
	5.3.P6.EU.01	NB Power Supply	31.28571	12.76
	5.3.P9.EU.01	NB Test Facility Components	25.80	7.31
Diagnostics	5.5.P1.EU.n	Diagnostics (roughly 25% of all diagnostic systems)	32.04861	0.38491
Buildings & Electrical Power Supply & Distribution System	6.2.P2.EU.01	PF Coil Fabrication Building	12.80	234.2407
	6.2.P2.EU.02	Architect Engineering Services	55.77490	
	6.2.P2.EU.03	TKM Excavation & Ground Support Structure	31.00	
	6.2.P2.EU.04	Anti-seismic Bearings	6.20	
	6.2.P2.EU.05	Building Construction	348.60126	
	6.2.P2.EU.06	IO Office building	13.85	
	4.1.P1A-8B.EU.01	Steady-State Electrical Network and Pulsed Power Electrical Network Detailed System Engineering Design	6.93810	
	4.1.P1A-8B.EU.02	Steady-State Electrical Network and Pulsed Power Electrical Network Installation	29.48893	
	4.1.P8A.EU.01	Emergency Power Supply System	4.22273	
	4.1.P8C.EU.01	Steady-State Electrical Network Components	5.00	
Waste	6.3.P1.EU.01	Waste treatment and storage	10.05610	0.00
Radiological Protection	6.4.P1.EU.01	Radiological protection for Design	4.2	0.00

SPD_table 2. List of EU Deliverables

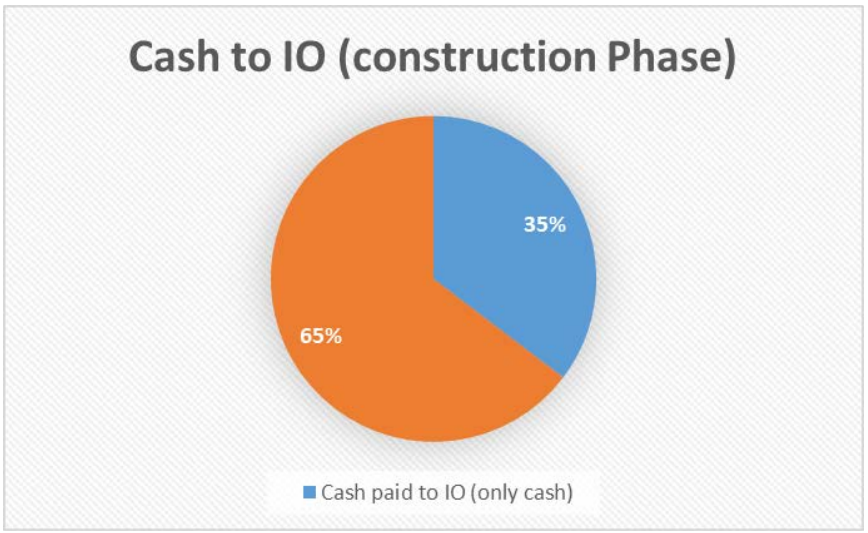
For more details see list of PAs in PP_table 17 of Annexes to Project Plan.



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 of end March 2020)

CASH CONTRIBUTION TO IO

F4E provides a yearly payment according to the decisions taken at the ITER Councils.F4E has provided 561.72 kIUA amount of cash contribution until the end of March 2019.



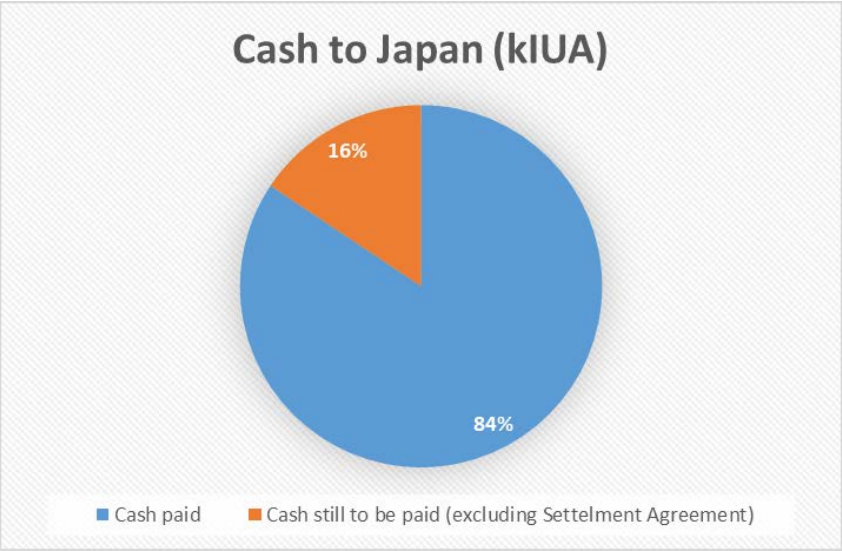
SPD_figure 4. Ratio cash paid to IO (only cash) versus total expected cash contribution (status end of end March 2020)

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, equivalent to 227.65183 kIUA. This is financed through a cash contribution from EU to Japan paid by F4E.

Commitments of two new PAs are foreseen in 2020 at the earliest. In addition, F4E will pay a specific contribution to Japan in 2020 to fulfill a settlement agreement between EU and Japan agreed in 2014.

F4E provides a yearly payment based on the documented achievement of progress. The full payments of five PAs have already been completed.



SPD_figure 5. Cash paid to Japan / cash still to be paid to Japan (status end of end March 2020) (excluding settlement agreement)

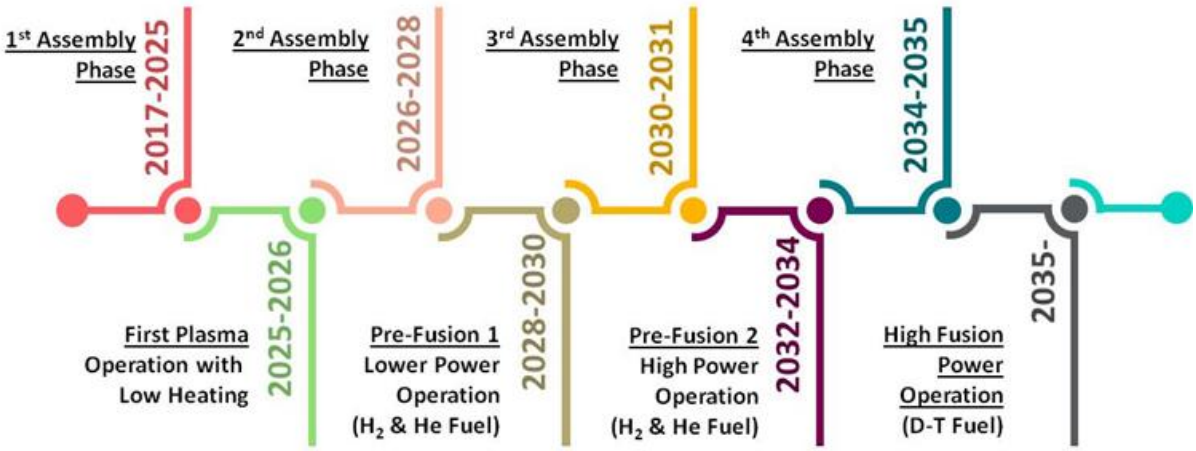
RECENT CHANGES AND DEVELOPMENT AT OVERALL ITER LEVEL WHICH AFFECT F4E OPERATIONS

The updated Project Baseline (Baseline 2016) is based on the Staged Approach (SPD_figure 6). It foresees Cryostat Closure in December 2024 and First Plasma in December 2025.
Work has progressed in all areas with continuous interactions between F4E and ITER IO to stabilize and optimize the ITER schedule, the risks with their mitigation and the cost of the in-kind procurements. The detailed planning continues to evolve through the so-called Revised Construction Strategy (RCS). This is a series of more detailed iterations on the planning to First Plasma with the objective to optimize the assembly sequencing to reflect evolving DA delivery forecasts.

The following main significant points should be mentioned:

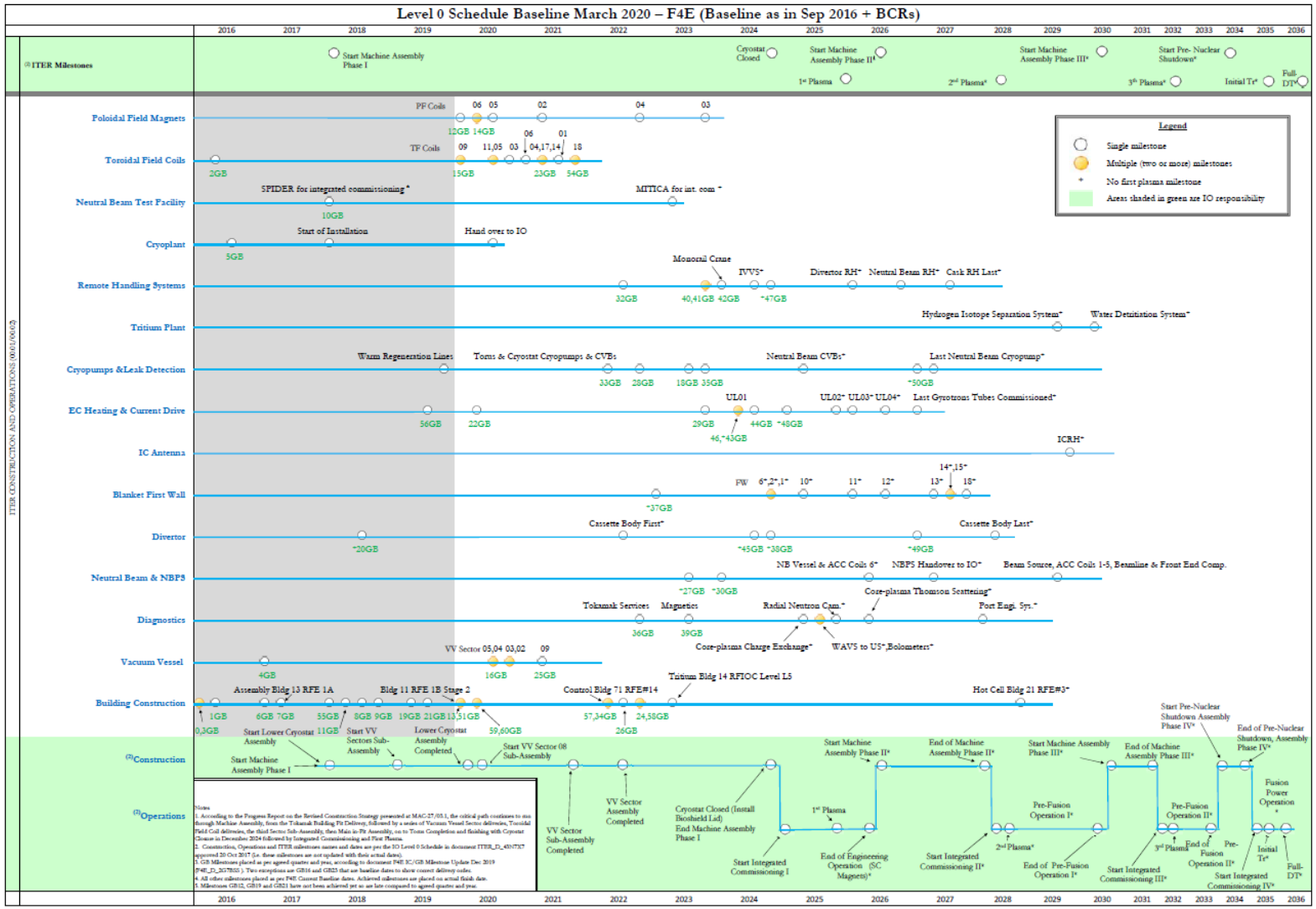
- The cost and planning impacts of Covid19 on F4E activities are highly uncertain at the time of drafting this Single Programming Document. Some changes to the planned activities, in particular concerning claims from suppliers and potential schedule recovery measures may be necessary. These will be addressed via future Amendments to the Work Programme as necessary.
- Discussions with IO were held in the past months to confirm the Revised Construction Schedule (RCS) and also define the Required Arrival Dates (RAD) for the deliveries of the components to IO. Specific meetings aimed at finding agreements on dates for some critical components. The final agreements had some impacts on the ITER Council (IC) and Governing Board (GB) milestones that were moved accordingly. In some cases IO has requested the advancement of deliveries to a date which is probably not achievable by F4E. These remain under discussion with IO.

- As of the end of March 2020, the EU has achieved a total of 18 IC and GB milestones out of a total of 57 (29 to be achieved by end of 2021). 8 milestones are at risk of experiencing delays with respect to the agreed quarter. 12 milestones show some delays, in some cases due to be recovered when the new RAD dates will be implemented into the baseline. While the remaining 19 are on track;



SPD_figure 6. Detail of the Staged Approach

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 7 . F4E Level 0 baseline schedule for ITER with summary up to the DT Operation Phase (end of March 2020)

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 organization delegated to agree and execute Procurement Arrangements (PAs) with the Japanese Implementing Agency (QST).

To a large extent and up to now, the EU activities undertaken in the frame of the BA agreement have been provided in-kind by Voluntary Contributors (VC). These are some of the EU member states represented in the GB of F4E which pledged to contribute to the BA projects, namely Belgium, France, Italy, Germany and Spain. In turn, each VC has channeled its contributions through the procurement arm of "Designated Institutions" (VC-DIs). F4E leads and integrates activities and concludes Agreements of Collaboration (AoCs) with the VC-DI, to secure delivery of the Euratom contributions and hence meet the requirements of each Procurement Arrangement. The direct contribution of F4E through its own budget has so far been largely limited in general to a supporting, qualifying or integration role, with some direct procurement for agreed Euratom contributions not covered by the VCs.

The second phase of the BA activities, the so called "BA Phase II", started from April 2020 on the basis on 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 2nd 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.

Each of the BA Projects, while having some important differences, shares 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.

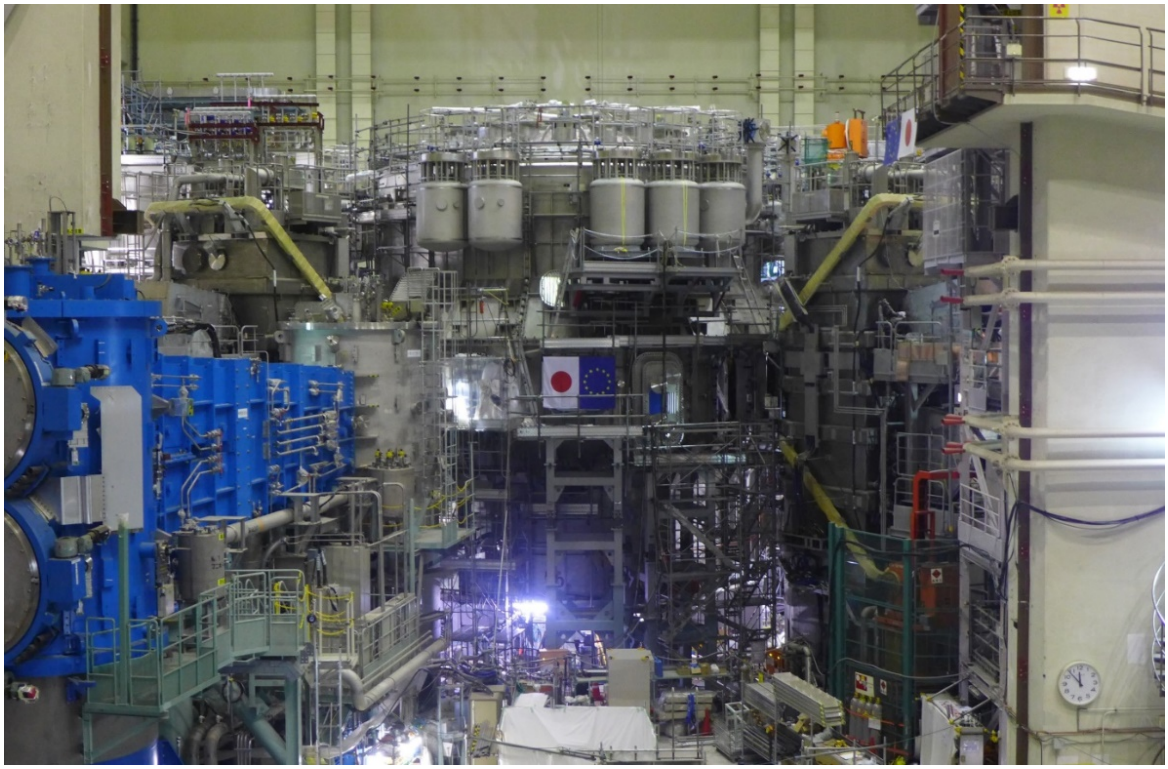
The table below defines a summary of the BA action value and the already released credit for BA Phase I as well as the planned contribution in summary for BA Phase II.[6]

Further details are available in PP_table 18 and PP_table 19 of Annexes to Project Plan.

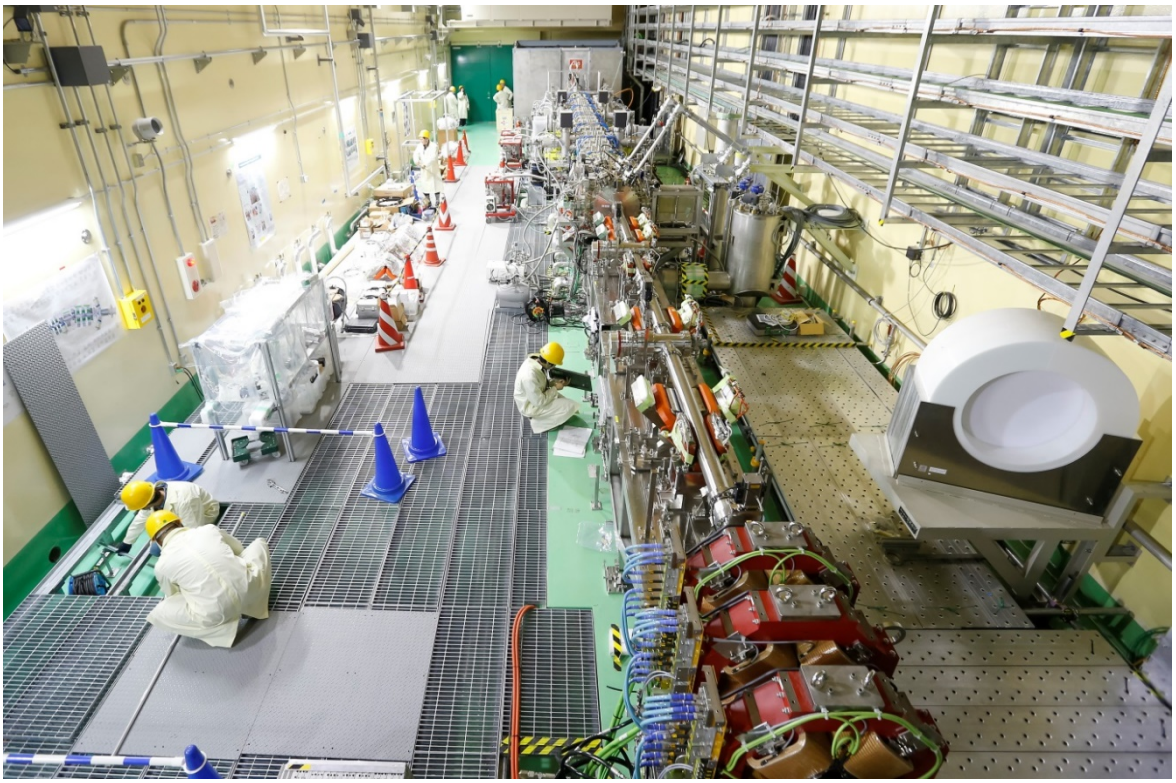
		BA-Phase I EU Scope			BA-Phase II EU Scope
Actions	**Name**	**Commitment Credit (kBAUA)**	***Of which committed***	***Of which completed***	**Planned (kBAUA) Apr 2020 Mar 2025**
14-Broader Approach	Satellite Tokamak (JT-60SA)	236,413	*100%*	*99.7%*	178,500
	IFMIF/EVEDA	148,025	*100%*	*98%*	39,500
	IFERC	115,550	*100%*	*100%*	14,400

SPD_table 3 . Correspondence between Actions, WBS and WP ref for BA

[6] No PAs are signed yet.



SPD_figure 8 . JT-60SA – Assembly completed



SPD_figure 9 . IFMIF/EVEDA - View of LIPAc (Linear IFMIF Prototype Accelerator) during the installation of the components to allow operation with a deuterium beam of 125 mA at 5 MeV in continuous operation during at least 30 minutes.

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

- Satellite Tokamak (JT-60SA):
  There has been a steady progress of procurements, assembly, installation and commissioning activities. The 1st Spare Coil and the Spare Toroidal Field Coil winding pack were delivered to the Naka site and the acceptance tests were successfully performed. As for the Electron Cyclotron Resonant Heating Power Supply (ECRH PS), after the successful factory tests the components were shipped to Japan, where the on-site activities for their installation as well as the voltage insulation tests have been completed. The Event Detection Intelligent Camera (EDICAM) was delivered to Japan, and has demonstrated successful communication between the central JT-60SA control system and the EDICAM control computers under a range of scenarios, including simulated plasma experiments. The Displacement and Stresses Monitoring System (DSMS) for the JT-60SA TF coils have been delivered to the Naka site. The installation of critical elements and feedthroughs was completed. The first part of the spare parts cover the Quench Protection System (QPC), the Switching Network Units (SNU) and the Superconducting Magnet Power Supplies (SCMPS) have been delivered to Naka.

- IFMIF/EVEDA:
  The first deuterium injection was carried out in March 2019. After this successful test, the commissioning of the LIPAc continued with the optimization and the characterisation of the proton beam, in accordance with the experimental programme, which ended in April 2019. After a short-term maintenance the deuteron beam commissioning commenced early June and the acceleration of a 125 mA Deuteron beam by the Radio Frequency Quadrupole (RFQ) and transported to the Low Power Beam Dump (LPBD) was achieved in July. After the completion of the Phase B commissioning, the installation of the MEL (Medium Energy Beam Transport Extention Line) started (and completed in March 2020) as well as the cabling and alignment of the HEBT (High Energy Beam Transport) equipment. In parallel, the maintenance of the LIPAc equipment started with the enhancement of some systems to improve the reliability.

- 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 investigating 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 JET tile/dust analysis provided important knowledge on the tritium accumulation in the wall components with results of interest for ITER and DEMO.
  - In the CSC activity, joint EU-JA simulation project activities have continued, sharing Japanese and European supercomputers.

DONES

DONES (DEMO-Oriented Neutron Source) is a facility to provide a source of neutrons to test materials under conditions expected in fusion reactors so 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 any European host state candidate 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).

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 2021-2025

In accordance with the Financial Regulation of F4E, this programming document is composed of a Project Plan (PP) that lays down an overall strategic programing foreseen to cover five years (i.e. 2021-2025). 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 IFERC (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, covered by this SPD, represent the peak workload for the organization. Very significant efforts will be required to maintain the programme schedule through to the major milestone of First Plasma and for the preparatory work for the subsequent assembly phases. 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 and Schedule challenges

The budgetary sections of the document have been updated to comply with the figures stated in the revised Commission proposal for the MFF 2021-2027 No 442 (2020) dated 27/05/2020, see below.

The F4E budget is mainly funded by EURATOM members (mainly through the European Commission), France (additional host state funding) and Switzerland, in future possibly also by the UK. While the likely EURATOM budget reduction (relative to the Commission's 2017 communication on the "reformed ITER project") as known at the time of preparing this document have been taken into account, a period of uncertainty about the funds available from the other sources mentioned above may well last until 2021.

The revised MFF2021-27 budget mentioned above represents a 7.5% reduction compared to the previous F4E assumption. The planned activities for 2021 have been adjusted to correspond to the available budget. The longer term planning implications of the reduced budget remain under review.

The additional very high challenge for F4E will be to avoid any significant cost increases as the project progresses through the increasingly challenging manufacture and test phases, while maintaining the

delivery schedules. In the event of schedule delays, the possibility to fund acceleration measures will be limited by budget constraints.

Human Resources challenges

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 endeavour for the organisation.

Further, F4E is heavily overloaded as the constraints of the Establishment Plan limit F4E's ability to adapt its workforce to the needs. F4E is compensating by engaging external support, which entails the well-known risks and challenges.

In addition, looking ahead F4E recognizes that its staff population will need to adapt to the evolving needs of the project. There will be a reducing need for staff working in the initial contracting phases and an increased requirement for staff experienced in supplier management and technical integration.

Schedule challenges

The dates provided in this document are according to the F4E Detailed Work Schedule (DWS) at the end of March 2020.

1. PROJECT EVOLUTION

1.1 ITER

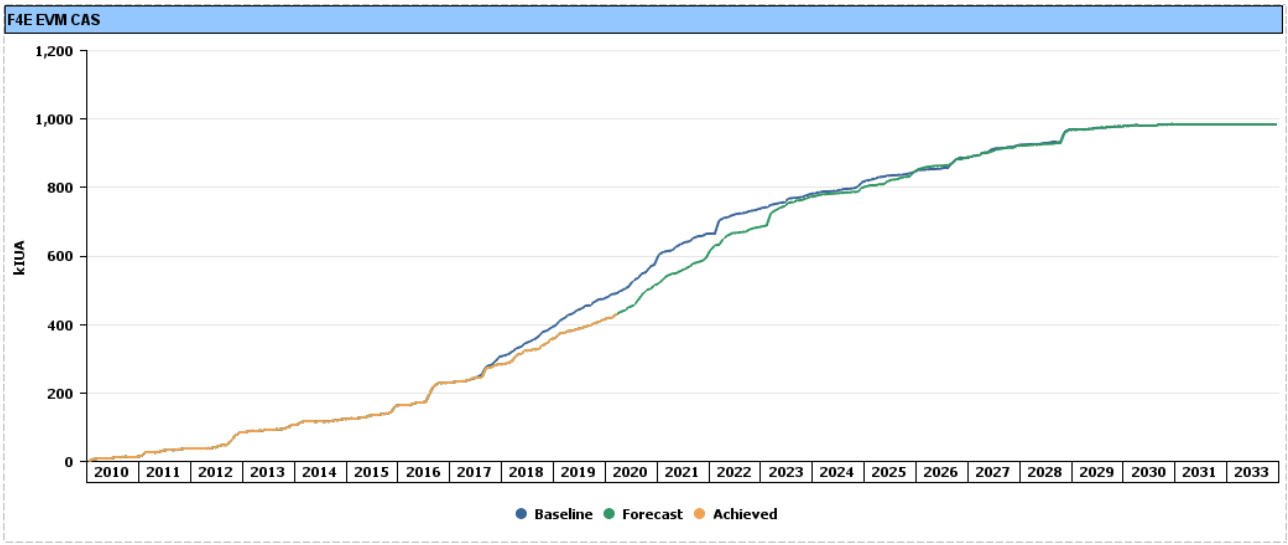
F4E is operating within the classical project 'iron triangle' of time, cost and quality, with quality interpreted in the general sense of achieving all the project scope objectives. This requires a continual balance of prioritisations made at management level, and in the daily work of all the staff.

In 2016, the management of the Project decided to assign the main priority to those activities that are relevant for achieving a FP in 2025. 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 dates of Cryostat Closure by December 2024 and First Plasma by December 2025.

As noted above, F4E is now at the peak period of its activities to deliver 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 IO and F4E to achieving a stability in requirements and design.

The graph in Fig. 10 shows the ITER credit achieved until end of March 2020, and the forecast, compared to the 2016 baseline.



SPD_figure 10 . Credit Graph for all EU in-kind procurements

SPD_table 4 hereafter shows the progress, for all actions, 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).

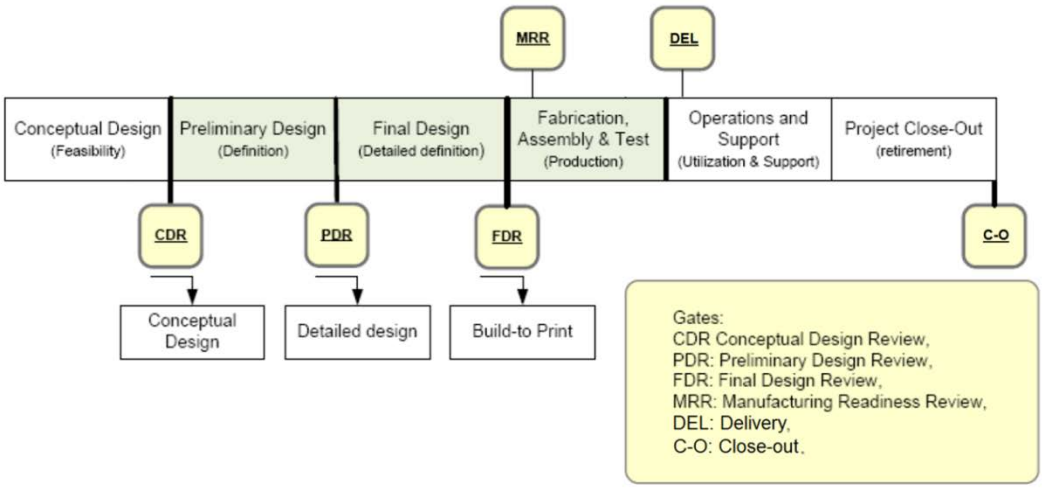
				Forecast (kIUA) Current year includes only part not yet achieved						
Action	Baseline to end March 2020 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2020	2021	2022	2023	2024	2025	2026+
	543.10280	482.23694	425.83196	87.34223	80.55999	88.87842	88.09686	27.00276	46.29069	141.95540
Magnets	118.19681	118.19281	100.38881	26.10800	24.16600	11.70700	5.24500	0.40000	0.00000	0.00000
Vacuum Vessel	68.84400	48.82700	37.15000	11.73500	22.09800	6.90000	0.00000	0.00000	0.00000	0.00000
In Vessel- Blanket	0.10000	0.07500	0.00000	0.02500	0.10000	0.50000	0.50000	8.40000	4.80000	25.93000
In Vessel- Divertor	3.65500	2.93000	2.19000	0.02000	0.72500	0.11500	0.85500	1.92000	3.80000	15.29500
Remote Handling	2.80000	2.40000	0.80000	2.54000	1.25974	7.07000	4.62000	2.58000	6.07000	13.43337
Cryoplant and Fuel Cycle	27.98470	26.69154	26.55154	0.15319	4.04066	5.79970	4.47200	0.55000	0.15319	5.81400
Antenna and Plasma Engineering	1.00000	0.50000	0.50000	0.62410	0.37230	0.00000	0.00000	0.00000	0.00000	11.18560
Neutral Beam and EC Power Supplies and Sources	35.01600	32.46600	23.62600	5.18700	3.95400	6.74800	8.37000	7.01300	0.95000	4.77571
Diagnostics	2.18945	0.50983	0.38491	2.16848	0.63748	2.14766	1.06178	0.87576	4.49710	3.95010
Site and Buildings and Power Supplies	283.31684	249.64477	234.24070	38.78145	23.20681	47.89106	62.97308	5.26400	26.02040	61.57162

SPD_table 4 . Credit per Action[7]

The maturity of each component evolves through a series of phases from design to delivery as normal for any engineering project. The transition from one phase to the next is possible through gates where the readiness of the component to move to the next phase is analyzed by an independent panel. Approval of starting the next phase might be granted only after resolution of chits raised during the review.

While the design phases and the correspondent reviews could be competence of either ITER IO 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 manufacturing are always a F4E responsibility. A policy for the management of the phase gates across F4E has been approved and is being implemented.

[7] **Achieved credit** corresponds to milestones completed by F4E. **Release 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 2020”,
Figures in column **Achieved** Credit correspond to “Total achieved credit at the end of March 2020”.
Figures in column **Released** Credit correspond to “Total released credit at the end of March 2020”.
Figures in columns **Forecast** correspond to the “yearly credit to be achieved”.



SPD_figure 11 . Progress in the delivery of the European contributions

Considering the importance that a component is declared ready to progress from one phase to the next one, the dates of the reviews entail an important information on the evolution of the procurements to reach delivery and therefore the total discharge of the EU obligations towards IO.
The details of the main reviews for each PA is provided in PP_table 3 of the Annex to the Project Plan.

In-cash contribution to IO

The table below shows details of the provided/expected cash contribution through the construction years with indication of the associated ITER credits (in kIUA).

IO Contribution Year	Gross In-Cash Contribution to IO (A)		In-Cash from Staff Secondments to IO (B)	In-Cash from ITAs (C)	In-Cash Contribution to IO	
	In-Year Value		In-Year Value	In-Year Value	In-Year Value	In-Year Value
	(EUR)	IUA	(EUR)	(EUR)	(EUR)	(IUA)
2006	2,046,000.00	**1,425.04**	0.00	0.00	2,046,000.00	**1,425.04**
2007	25,762,255.00	**17,557.11**	5,814,255.00	0.00	19,948,000.00	**13,594.67**
2008	40,559,448.60	**27,072.84**	4,174,642.71	149,815.55	36,234,990.34	**24,186.33**
2009	45,542,005.03	**29,427.69**	4,220,556.69	309,518.00	41,011,930.34	**26,500.51**
2010	65,247,558.94	**42,034.45**	3,510,933.10	6,019,586.72	55,717,039.12	**35,894.60**
2011	82,538,412.26	**52,336.56**	3,155,372.37	10,519,813.89	68,863,226.00	**43,665.29**
2012	97,799,847.80	**60,383.32**	2,810,278.03	7,714,938.77	87,274,631.00	**53,884.87**
2013	70,574,478.68	**42,510.90**	2,092,787.90	6,108,338.78	62,373,352.00	**37,570.91**
2014	96,449,698.00	**57,294.92**	2,412,032.00	14,618,812.00	79,418,854.00	**47,177.93**
2015	86,113,178.00	**50,950.93**	2,247,024.00	3,855,001.00	80,011,153.00	**47,340.52**
2016	125,364,099.01	**74,174.67**	1,914,730.00	5,630,831.00	117,818,538.01	**69,710.16**
2017	139,529,383.36	**82,391.13**	1,550,905.00	4,727,379.00	133,251,099.36	**78,683.85**
2018	144,151,729.00	**83,862.78**	1,419,501.00	1,720,228.00	141,012,000.00	**82,036.19**
2019	217,380,879.68	**124,229.00**	1,573,102.00	1,028,344.00	214,779,433.68	**122,742.33**
2020 (Forecast) *	213,281,495.51	***119,730.93***	1,108,682.00	8,632,470.95	203,540,342.56	114,262.49
2021 (Forecast)*	219,141,640.00	***120,845.45***	1,128,638.00	8,742,993.00	209,270,009.00	115,401.75
2022 (Forecast)*	273,988,504.00	***148,419.16***	1,148,953.00		272,839,551.00	147,796.77
2023 (Forecast)*,**	356,128,176.55	***189,503.04***			356,128,176.55	189,503.04
2024 (Forecast)*,**	338,157,880.03	***176,759.02***			338,157,880.03	176,759.02
2025 (Forecast, const)*,	249,084,929.69	***127,897.41***			249,084,929.69	127,897.41
2025 (Forecast, oper)*,	59,989,623.37				59,989,623.37	
Total	2,948,831,222.51	1,628,806.37			2,519,696,205.98	1,556,033.68

*Estimations taking into account the adjustment to the Cash Contributions due to the variance in the share of in-kind contributions vis-à-vis the cost-sharing ratio amongst the ITER members

** Assuming Contribution for operation starting in 2025 (Profile PPRE[8] 2019 WP)

SPD_table 5 . EU cash contribution to IO (status end of end March 2020)

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.

8 Project Plan and Resource Estimates document by IO

System	Description	Percentage of System financed by EU through cash contribution	Value of Cash Contribution (kIUA)	Forecasted Commitment Date	Paid by F4E until end March 2020 (kIUA)
Magnets	Toroidal Field Magnet windings 1B	8.96%	7.7362	Already Committed	**6.4981**
	Toroidal Field Magnet Structure 2A-B	54.92%	49.3605	Already Committed	**49.3605**
	Toroidal Field Magnet Conductors	40.14%	21.5	Already Committed	**21.5**
	Central Solenoid Magnet Conductors	100%	90	Already Committed	**90**
Tritium	Atmosphere Detritiation	50%	14.06213	2020	**0**
Neutral Beam H&CD	Beam Source and High Voltage Bushing	100%	2.075	Already Committed	**2.075**
	Power Supply for NBTF	46.50%	22.622	Already Committed	**22.622**
	Power Supply Heating Neutral Beam-Cadarache		20.296	2021	**0**
	Settlement Agreement between EU and Japan agreed in 2014		75 $MEuro_{2014}$	2020	**0**

SPD_table 6. EU cash contribution to Japan (status end of end March 2020)

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 also for the period beyond 2020, that is when the facility will be jointly operated and enhanced by the EU and JA. For IFMIF/EVEDA the R&D results planned to be achieved by the beam commissioning of the LIPAc accelerator should provide solid grounds for both for its full experimental phase, to follow after 2020, as well as for the design and specification 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 take the lead in Remote Experimentation (REC) activities with IFMIF-EVEDA, ITER and JT-60SA.

1.4 DEMO

EUROfusion is currently most active in 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[9]. 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 and is linked in the EUROfusion Project

[9] Management / Governance Assessment of EUROfusion & Industry Engagement, 11/07/2016, Ernst & Young

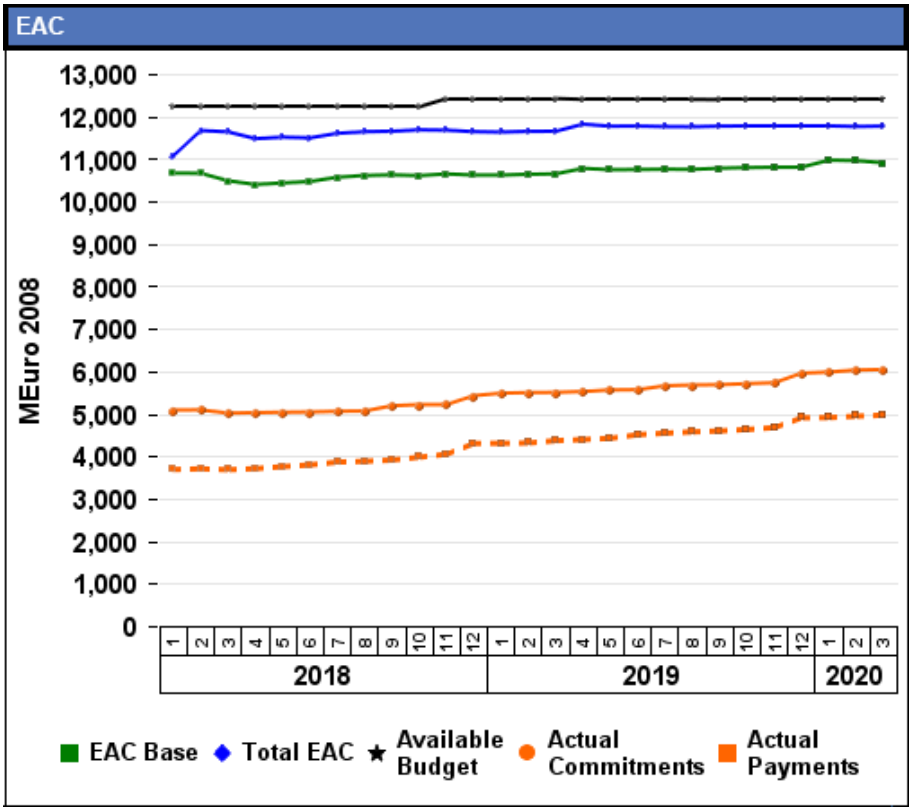
Governance of the DEMO design activities and other associated supporting technology projects (e.g., ITER TBM and DEMO breeding blanket work packages).
As a step in this direction, a DEMO Programme Steering Board has been established at the end of 2017, with the aim to establish high-level coordination of 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, EUROfusion is represented by the Programme Manager, 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.

1.5 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, IFERC), etc… 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 will be further specified in a Multiannual Programme Plan, drawn up and agreed by the Parties.

1.6 F4E financial evolution

The F4E financial evolution since January 2018 is described in the below chart.



SPD_figure 12. EAC, Available Budget, Actual commitments and Payments

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 budget will be subject to the final decision by the EU Budgetary Authority for MFF 2021-2027 and subsequent MFF.

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 pick 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 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"
Schedule Performance Index	SPI above a defined value[10]
Overall Costs	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.

[10] Targets are defined in the Project Plan under section "Objectives and KPIs"

The GB/IC milestones have been selected by ITER Council and F4E Governing Board to represent at best critical achievements for the project and therefore their completion is very important 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 4 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 5 of the Annexes to the Project Plan.

2.3 Multiannual objectives for Broader Approach

The objective for the European part of the BA projects for BA Phase I, 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 PP_tables 6, 8 and 10 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 relevant Procurement Arrangements.
From 2020, the Broader Approach will focus 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 this period up to March 2025 are listed in PP_tables 7, 9 and 11 of the Annexes to the Project Plan.

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 2022. Some of them are also partially conducted as part of the BA effort.

2.5 Annual objectives

In addition to the multiannual objectives, 6 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[11]
Work Programme objectives	Implement a minimum percentage of Work Programme objectives *[including GB milestones and predecessors]* by end of the year
Credit Allocation Scheme [CAS]	Reach a minimum percentage of achieved CAS by end of the year
Quality	Reduce number of long aging NCRs compared to total number of open NCRs
Annual budget	Implement minimum percentage of Commitment Appropriations by end of the year
Annual payment	Implement minimum percentage of Payment Appropriations by end of 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 additional 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 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:

[11] Targets are defined in the Project Plan under section "Objectives and KPIs"

- 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

1. Introduction

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[12].

For the period 2007-2020, the maximum European contribution dedicated to ITER project amounts to EUR 6 600 million while the total actual budget amounts EUR 6 545 million (2008 reference value)[13]. From this amount, EUR 2 915 million (current value) corresponds to the ITER budget foreseen under the current Multiannual Financial Framework (MFF) 2014-2020[14].

For the next MFF period 2021-2027, the European Commission has communicated in May 2020 the revision of its 2018 proposal[15] in order to put in place the Recovery plan for Europe. The revised proposal[16] foresee a cut of 7.5 % in the EURATOM contribution (in commitments) to F4E for the whole period 2021 to 2027 that results in to a total value of EUR 5 614 million of which EUR 5 560 million (in current value) of direct contribution to the project. The ITER Host State and Membership contributions will be added to these figures, that are still subject to negotiations with the EU Budgetary Authority on the whole budgetary package MFF 2021-2027.

[12] Article 32 of the F4E Financial Regulation and Communication from the Commission on the Guidelines for Programming Documents for decentralised agencies)

[13] Draft Council conclusions on ITER status and possible way forward (11902/10 from 07 July 2010)

[14] Council decision 2013/791/Euratom amending the Decision 2007/198/Euratom, establishing the European Joint Undertaking for ITER and the Development of Fusion Energy.

[15] Legislative financial statement annexed to the Commission Proposal (2018) 445 for a Council Decision amending Decision 2007/198/Euratom, establishing the European Joint Undertaking for ITER and the Development of Fusion Energy.

[16] Communication 2020/442 final, from 27 May 2020, from the Commission to the European Parliament, the European Council , the European Economic and Social Committee and the Committee of the Regions

1. FINANCIAL OUTLOOK FOR 2021 – 2025

Overview of the past and the current situation

2019 Budget: Execution

In 2019, F4E has implemented its budget with the continuous engagement on in-kind deliveries to ITER project.

As regards the administrative budget, a full implementation was reached at the year-end of 2019.

As regards the operational budget, 97.1% was implemented in payment appropriations.

EUR 21.4 million were automatically carried over to 2020 budget, mainly linked to operational expenditure based on revenue received by the end of the year from IO Reserve Fund and and the normal carry over to 2020 in the administrative expenditure.

The main F4E operational commitments done in 2019 included: In-cash contribution to ITER Organization (EUR 224 million); buildings (EUR 120 million); funding the additional scope and complexity increases for buildings contracts, Magnet Supply Contract, Torus and Cryostat CryopumpingSystem, and Beam Line Components Stage 2 (together EUR 195 million) and under smaller contracts (EUR 189 million covering 600 commitments).

Commitments	99.8%	of Implementation of the final available budget		
		Final Budget: 729.71	Execution: 728.10	EUR million
	107.9%	compared to the original budget		
		Original Budget: 674.71	Execution: 728.10	EUR million
	100.0%	in individual commitments		
		Execution: 728.10	Ind.Commit.: 728.10	EUR million
Payments	97.1%	of implementation of the final available budget		
		Final Budget: 761.19	Execution: 738.90	EUR million
	94.6%	compared to the original budget		
		Original Budget: 781.35	Execution: 738.90	EUR million

SPD_Figure 13. Execution of 2019 Budget

2020 Budget:

The F4E Governing board adopted 2020 Original F4E budget in December 2019. The budget is aligned with the Euratom contribution to F4E set by the final adopted 2020 EU budget.

The July amendment corresponds to (i) the recovery of EUR 17.5 million called from the unused commitment appropriation from previous years, (ii) the increase of EUR 1.5 million in the assigned revenue to be provided by France in order to comply with its obligation as ITER Host State to 20% for the period until 2020, (iii) the additional miscellaneous revenue received by the end of April 2020 in

commitment and payment, linked to liquidity damages, (iv) in line with the new FFR (art. 6)[17], the revenue from ITER Organization amounting to EUR 7.9 million in commitments and EUR 0.01 million in payment, and miscellaneous revenue from recoveries.

A second amendment is proposed to the Governing Board for its December meeting with the purpose to approve (i) the recovery of EUR 30.6 million from the European Defence Funds, pending the confirmation of the corresponding transfer in General EU Budget, (ii) the recovery of additional EUR 4.8 million called from the unused commitment appropriation from previous years, (iii) and additional miscellaneous revenue from recoveries.

With the transfer proposed for the European Defence Funds, a full compensation will be reached of the initial budget cut for the EU Defence Programme. It shall be noted that this transfer has no impact on the French contribution in 2020. The impact will be assess in 2021 when the final figures and the new method of calculation will be confirmed.

Further, F4E is planning to use the entire amount of unused appropriations to complete the execution of the global envelope made available to its projects until 2020.

Financial programming for the years 2021-2025

For the period 2021-2025, the figures for EURATOM contribution to F4E are indicative and subject to the approval by the EU Budgetary Authority of the Commission proposals on the next MFF 2021-2027.

The figures for the 2021 Initial Draft Budget differ for the original request for commitment and payment, and take into consideration the envisaged 7.5% cut in the EURATOM contribution to F4E communicated by the Commission in May 2020 and are therefore subject to the final approval of the 2021 budgets of each contributor to F4E.

It shall be noted that the amount of the ITER Host State Contribution adjusted according the cut in the EURATOM contribution, is provisional and will be recalculated when all underlining figures will be known. The possible correction of this contribution will be submitted again to the Governing Board via an amendment to the 2021 budget.

The F4E administrative budget for 2021 will be covered by EURATOM and the membership contributions to the Joint Undertaking. The staff expenditure in 2021 will increase by 5.0 % according to the latest update of the F4E salary costs by September 2020 (compared to the forecast of implementation for 2020 by the end of September 2019) mainly due to the annual salary adjustment and other factors (allowances, promotions, advancements in step). The forecast for budget 2021 is based on the following main assumptions:

- Annual salary adjustment: 0.9% for 2021 based on Brussels as reference with correction for the cost of living in Spain;
- Vacancy rate: 2.5%;
- Inflation coefficient on other administrative expenditure: 2%;
- Other factors (yearly allowances, promotions, advancements in step).

[17] OJ L 122, 10.5.2019, p. 1–38. Article 6 “Scope of the budget of the Union Body” from Commission Delegated Regulation (EU) 2019/715 of 18 December 2018 on the Framework Financial Regulation (FFR) 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, C/2018/8599

The F4E operational budget for 2021 is based on the EURATOM proposal taking into consideration the envisaged cut of 7.5% in the EURATOM contribution to F4E budget foreseen by the Commission communication from May 2020, the contributions from the ITER Host state and the F4E members for 2021.

The main F4E operational activities are 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 2021 will be spent for the provision of the cash contribution to ITER due for year 2022, followed by the Buildings and Power supplies for the ITER site in Cadarache, “In-Vessel”, Broader Approach, Cash to Japan, Antenna and Plasma Engineering, Diagnostics, Cryoplant and Fuel cycle, Remote handling, Neutral Beam, Test Blanket Module, Vacuum Vessel and Magnets.

The below tables show the revenue and expenditure for the next five years, 2021 to 2025, with a reference to the previous and current budgets, respectively 2019 and 2020. The detailed figures are provided in the annexes.

Estimate of Revenue

REVENUE Commitment appropriations (EUR)	2019 Execution Annual Accounts	2020 Estimated Budget available AM2	2020 Forecast	2020 VAR 2020/19	2021 Budget	2021 Forecast	2021 VAR 2021/20	2022 Planned needs	2022 VAR 2022/21	2023 Planned needs	2023 VAR 2023/22	2024 Planned needs	2024 VAR 2024/23	2025 Planned needs	2025 VAR 2025/24
EU CONTRIBUTION	403.5	390.1	390.1	-3%	857.6	857.6	120%	702.7	-18%	1 012.3	44%	798.6	-21%	682.3	-15%
ITER HOST STATE CONTRIBUTION	130.0	80.5	80.5	-38%	184.7	184.7	129%	143.8	-22%	215.1	50%	162.7	-24%	134.3	-17%
MEMBERSHIP CONTRIBUTION	5.6	6.1	6.1	9%	6.5	6.5	7%	6.7	3%	7.0	4%	7.2	3%	7.3	1%
MISCELLANOUS REVENUE	1.2	0.9	0.9	-25%											
UNUSED APPROPRIATIONS FROM PREVIOUS YEARS	14.9	0.7	0.7	-95%											
UNUSED APPROPRIATIONS - MADE AVAILABLE AGAIN	149.2	390.7	390.7	162%											
TOTAL REVENUE	704.5	869.0	869.0	23%	1 048.8	1 048.8	21%	853.2	-19%	1 234.4	45%	968.5	-22%	823.9	-15%
ADDITIONAL REVENUE	25.2	14.4	14.4	-43%	25.0	25.0	73%	17.2	-31%	17.5	2%	41.9	139%	18.2	-56%
TOTAL REVENUE AVAILABLE	729.7	883.4	883.4	21%	1 073.8	1 073.8	22%	870.4	-19%	1 251.9	44%	1 010.4	-19%	842.1	-17%

REVENUE Payment appropriations	2019 Execution Annual Accounts	2020 Estimated Budget available AM2	2020 Estimated Budget available AM2 (including admin carry over)	2020 Forecast	2020 VAR 2020/19	2021 Budget	2021 Forecast	2021 VAR 2021/20	2022 Planned needs	2022 VAR 2022/21	2023 Planned needs	2023 VAR 2023/22	2024 Planned needs	2024 VAR 2024/23	2025 Planned needs	2025 VAR 2025/24
EU CONTRIBUTION	569.3	633.6	633.6	633.6	11%	607.2	607.2	-4%	688.7	13%	674.4	-2%	676.4	0%	585.5	-13%
ITER HOST STATE CONTRIBUTION	145.0	150.0	150.0	150.0	3%	129.1	129.1	-14%	148.8	15%	143.4	-4%	141.5	-1%	117.3	-17%
MEMBERSHIP CONTRIBUTIONS	5.6	6.1	6.1	6.1	9%	6.5	6.5	7%	6.7	3%	7.0	4%	7.2	3%	7.3	1%
MISCELLANOUS REVENUE	1.2	0.1	0.1	0.1	-88%											
UNUSED APPROPRIATIONS FROM PREVIOUS YEARS	7.7	0.0	4.5	4.5	-41%											
TOTAL REVENUE	728.7	789.8	794.4	794.4	9%	742.8	742.8	-6%	844.2	14%	824.8	-2%	825.1	0%	710.1	-14%
ADDITIONAL REVENUE	32.4	24.8	24.8	24.8	-24%	30.0	30.0	21%	25.0	-17%	25.0	0%	24.0	-4%	25.0	4%
TOTAL REVENUE AVAILABLE	761.2	814.6	819.2	819.2	8%	772.8	772.8	-6%	869.2	12%	849.8	-2%	849.0	0%	735.1	-13%

SPD_table 7. Estimate of Revenue for the period 2021-2025 in commitment and payment appropriations

Estimate of Expenditure

EXPENDITURE In Commitment Appropriations (EUR)	2019	2020			2021			2022		2023		2024		2025	
	Execution Annual Accounts	Estimated Budget available AM2	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
Title 1 Staff Expenditure	**50.1**	**52.0**	**52.0**	4%	**54.8**	**54.9**	5%	**57.7**	5%	**61.1**	6%	**62.4**	2%	**63.8**	2%
Title 2 Operating expenditure	**7.5**	**8.0**	**8.0**	6%	**8.5**	**9.3**	17%	**9.4**	1%	**9.6**	2%	**9.8**	2%	**10.0**	2%
Title 3 Operational expenditure	**670.5**	**823.4**	**823.4**	23%	**1 010.5**	**1 009.6**	23%	**803.3**	-20%	**1 181.3**	47%	**938.2**	-21%	**768.4**	-18%
TOTAL EXPENDITURE	**728.1**	**883.4**	**883.4**	21%	**1 073.8**	**1 073.8**	22%	**870.4**	-19%	**1 251.9**	44%	**1 010.4**	-19%	**842.1**	-17%

EXPENDITURE In Payment Appropriations (EUR)	2019	2020				2021			2022		2023		2024		2025	
	Execution Annual Accounts	Estimated Budget available AM2	Estimated Budget available AM2 (including Admin carry over)	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
Title 1 Staff Expenditure	**50.4**	**52.0**	**53.4**	**53.4**	6%	**54.8**	**54.9**	5%	**57.7**	5%	**61.1**	6%	**62.4**	2%	**63.8**	2%
Title 2 Operating expenditure	**7.2**	**8.0**	**11.2**	**11.2**	55%	**8.5**	**9.3**	17%	**9.4**	1%	**9.6**	2%	**9.8**	2%	**10.0**	2%
Title 3 Operational expenditure	**681.3**	**754.7**	**754.7**	**754.7**	11%	**709.5**	**708.7**	-6%	**802.1**	13%	**779.1**	-3%	**776.9**	0%	**661.3**	-15%
TOTAL EXPENDITURE	**738.9**	**814.6**	**819.2**	**819.2**	11%	**772.8**	**772.8**	-5%	**869.2**	12%	**850**	-2%	**849.0**	0%	**735.1**	-13%

SPD_table 8. Estimate of Expenditure for the period 2021-2025 in commitment and payment appropriations

2. HUMAN RESOURCES – OUTLOOK FOR 2021 – 2025

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 specialized 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 – appointed by F4E from reserve lists or transferred from other EU institutions. Temporary Agents - 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.

Contract Agents - 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.

2. Short-term employment.

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 10 years.

Pursuant to the temporary reinforcement agreed in 2014 with the Commission (exchange of letters between F4E and Commissioners Mr H. Oettinger (Vice-President of the European Commission and Commissioner for Energy) and Mr J. Dominik (Commissioner for Financial Programming and the Budget) on 23 October 2014)), the budget authority granted 24 CA short-term posts in 2015 and 21 TA short-term posts in 2016.

These posts are filled using non-renewable short-term contracts not exceeding 4 years.

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 organization (although F4E may reimburse the annual emoluments to the seconding organization) 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 31.12.2018	Authorised under 2019 EU budget	Actually filled as of 31.12.2019	Authorised under 2020 EU budget	Requested for 2021	Envisaged in 2022	Envisaged in 2023	Envisaged in 2024	Envisaged in 2025
Subtotal FO/TA	277	283	273	280	280	280	280	272	264
Subtotal CA	168	178	**165**	170	170	170	170	163	157
Subtotal SNE	1	3	2	3	3	3	3	3	3
TOTAL	446	464	440	453	453	453	453	438	424

SPD_table 9. Overview of staff population and its evolution

For a more detailed view on staff see HR_tables 06, 07 and 08 of the annexes to HR REP.

Section IV. Work Programme 2021

This Work Programme 2021 offers an overview of the objectives of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E) for 2021 and also identifies the financial decisions for the actions that are planned to be carried out 2021 with the available budget.
It covers the work on both ITER and Broader Approach (BA) according to the tasks entrusted to the organization.
The WP2021 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 tables below provide a quick overview of the expected results in 2021 in terms of achieved credit, contracts placed and budget (both in commitments and payments) allocated per action.

Action	Baseline to end March 2020 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2021
	543.10280	**482.23694**	**425.83196**	**80.55999**
Magnets	118.19681	118.19281	100.38881	24.16600
Vacuum Vessel	68.84400	48.82700	37.15000	22.09800
In Vessel- Blanket	0.10000	0.07500	0.00000	0.10000
In Vessel- Divertor	3.65500	2.93000	2.19000	0.72500
Remote Handling	2.80000	2.40000	0.80000	1.25974
Cryoplant and Fuel Cycle	27.98470	26.69154	26.55154	4.04066
Antenna and Plasma Engineering	1.00000	0.50000	0.50000	0.37230
Neutral Beam and EC Power Supplies and Sources	35.01600	32.46600	23.62600	3.95400
Diagnostics	2.18945	0.50983	0.38491	0.63748
Site and Buildings and Power Supplies	283.31684	249.64477	234.24070	23.20681

SPD_table 10[18]: Expected 2021 results in terms of discharge of Euratom obligations to ITER (status: end of March 2020)

[18] **Achieved credits** corresponds to milestones completed by F4E. **Release 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 2020”,
Figures in column **Achieved** Credit correspond to “Total achieved credits at the end of March 2020”.
Figures in column **Released** Credit correspond to “Total released credits at the end of March 2020”.
Figures in columns **2021** correspond to the “Credits to be achieved in year 2021”.

Procurement Procedures	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021
P Serv - Contract	7	6	3	6	3	6
P Supply - Contract	7	7	12	5	2	8
Pserv - Specific Contracts	7	10	6	19	3	7
PSupply - Specific Contracts	16	1	5	7	6	1

SPD_table 11: Indicative number, type of contract and timeframe for launching the procurement procedures.

Action	Value (In-Year Euros)	Time of call	Budget line
Remote Handling			
CA10465 - GRT-901 Amendment for DTP2 Additional experiments	150,000	2021 Q2	3.1

SPD_table 12 - List of 2021 Grants/Specific Grants to be signed in 2021

WP2021 Executive summary

The work programme 2021 is mostly focused on the following activities (FP-relevant areas are shown):

- **Magnets** (FP): All major contracts have been signed and manufacturing activities are fully underway. Major deliveries planned for 2021 include four TF Coils, one PF Coil (PFC #02) and some final components of the newly signed IO Task Agreement for the Pre-Compression Rings. The evolution of these activities is highly dependent on the impacts generated by the COVID-19 outbreak. Extensions, modifications or amendments to existing contracts, some of them being triggered by IO (Project Change Requests, Non-Conformities on free issue items, etc.), may be signed. Contracts contingencies, framework contracts and/or task orders may also be signed to support the production (i.e, inspectors, other external resources, workshop materials, tests, etc.).
- **Main Vacuum Vessel** (FP): All major contracts have been signed and manufacturing activities are underway. The first Sector deliveries are currently planned in 2021. Contracts for the transportation to Cadarache of the five sectors will be signed. Extensions, modifications or amendments to existing contracts, some of them being triggered by PCRs, may have to be signed to meet the schedule. Also, Specific Contracts for support activities, like Inspectors, Documentation Support, Engineering and Analysis etc. will continue to be issued depending on the project needs.
- **In-Vessel [Blanket System** and **Divertor]**:

  Blanket System (non-FP): For the Blanket First Wall project, the most important activity in 2021 is the start of the First Wall Panels production lines preparation, including the award of 2 contracts for the procurement of CuCrZr and beryllium raw materials respectively. In parallel, functional testing of full-scale prototypes (e.g. High Heat Flux testing) will be carried out and a contract will be awarded for the performance of Hot Helium Leak testing.
  For the Blanket Cooling Manifold project, negotiations with tenderers will be completed and framework contracts will be awarded to start the first stage of the series production.

  Divertor Systems (non-FP): For the divertor inner vertical target (IVT) project, the main activities will be devoted to the follow-up of the on-going manufacturing of the full-scale prototypes, including the delivery of the first full-scale prototype to IO for assembly trials and the high heat flux testing

of second full-scale prototype. Furthermore, F4E will launch the call for tender for the IVT series production.
For the divertor cassette project, the main activities will be devoted to the follow-up of the on-going manufacturing and the reopening of competition for the signature of Stage 2 of the series fabrication.
For the Divertor Rails project, the Procurement Arrangement will be signed.

Remote Handling (partly FP): The procurement of the Remote Handling Systems (RHS) will focus mainly on the final design activities and some areas of non-first plasma component on the preliminary design. Complementary RH technology-related design activities, prototyping and qualification will be performed together with engineering support related activities and expert contracts to complement the main procurement contracts.

- **Cryoplant and Fuel Cycle**

  Vacuum Pumping (Partly FP): The contract for Helium Leak Localization systems will be signed and design activities for Leak Detection will start. Contracts of Torus and Cryostat Cryopumping System, Front-end Cryopumpt Distribution system, Mitica cryopump will focus on manufacturing and assembly.
  Tritium Plant and REMS (Partly FP): First pre-PA activities will start in support of the Hydrogen Isotope Separation system and Water Detritions System PAs. As for REMS (Radiation and Environmental Monitoring Systems), the contract for 1st plasma activities will be signed and PA activities for the signature of the PA amendment for Tokamak complex will be carried out.
  Cryoplant (FP): End of installation and start of commissioning for LN2 Plant and Auxiliary Systems components will take place. The contract of cryogenic quench line header will be focused on installation and testing. The contract for MITICA Cryoplant will be closed.

- **Antennas and Plasma Engineering** (partly FP): RF Heating & Current-Drive (FP): The tendering phase for the Electron Cyclotron (EC) system (Upper Launchers and ex-vessel waveguide systems) is planned in 2021. The output of a deep-dive, which runs in 2020, will determine the commercial strategy for the Antennas in detail. The tender will include the finalization of the design activities, manufacturing preparation and the manufacturing of the fully qualified Antennas.

- **Neutral Beam Heating and EC Power Supplies and Sources** (non-FP):

  Electron Cyclotron (EC) Gyrotrons, Power Sources and Power Supplies (PS):
  The manufacturing, testing and deliveries of the Main and Body HV Power Supplies will continue, and the installation and commissioning of the first units will start. After signature of the EU Gyrotrons PA, the Call for Tender will be published and evaluation of bids will be in progress.

  NB Test Facility (NBTF) at RFX-Padua:
  For MITICA, the activities in the test bed will continue with commissioning of MITICA power supplies assembling of MITICA auxiliaries (Gas injection and Vacuum system, CODAS, Interlock, and Safety). The contracts for MITICA diagnostics, MITICA Beam Source, MITICA Beam line components will proceed with the manufacturing.

  HNB at ITER-Cadarache:
  We will finalize the detailed and manufacturing design of the Neutral Beam power supplies systems for the ITER units, subject to the negotiations with the industrial suppliers to adapt the contractual schedule to the schedule of ITER buildings construction.

- **Diagnostics** (partly FP): Manufacturing activities for several Diagnostic components and systems will continue, most of them being essential for First Plasma. Design of all remaining Diagnostics systems will progress, as well as the design of ITER port structures and the integration of Diagnostics into the ports. Several Diagnostics systems or sub-systems will complete their design activities, with approval of the final design review. Procurement activities will focus mainly on the placement of contracts (including framework contracts and task orders under framework contracts) for manufacture of remaining First Plasma components and of both contracts (including framework

contracts and task orders under framework contracts) and grants for the completion of the design of less mature Diagnostics systems or sub-systems.

- **Test Blanket Systems** (non-FP, non-in-kind contribution): The activities will mainly focus on the continuation of the preliminary design for TBM Sets and Ancillary Systems and of the related Safety Analysis. In parallel the ANB consultancy activities will continue. In addition, the activities concerning the proof of the TBM-sets fabrication and assembly processes feasibility will commence. If requested and approved by the TBM-PT Steering Committee, cash contribution to IO will be transferred to execute TBM activities common to several ITER Members. The collaboration with EUROfusion and the EFLs will continue. A contract for an Engineering Technical Support Service, currently under evaluation, might be put in place. If negotiations in 2020 are successful, a co-operation with the Korean DA will start in 2020.
- **Site, Buildings and Power Supplies**: The focus of the buildings programme will be on the civil works to complete the Tritium Building (B14) above L2, the construction of Neutral Beam Power Supplies Buildings, Control Building and Fast Discharge Resistor Building and commencement of manufacture of the Cargo Lift. The construction design for the Tokamak Complex services (TB04) will complete with IO approval of all buildings levels. The Cryoplant Coldbox Building services installation will be completed. The design of the Emergency Power Supplies Buildings and equipment, and of the Plant Bridges, will advance.
- **Cash contribution:** In 2021 F4E will pay any remaining cash contribution for 2021 and commit and pay the agreed cash contribution for 2022 in part or fully.
- **Technical Support Activities** including the signature of task orders for experts, Quality control inspectors for manufacturing activities, 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, system engineering, PM tools, planning, risk and cost) are foreseen. F4E also plans renewal of existing Frameworks contracts and signature of new ones.

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.

Concerning the 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 2021 will be based on the Project Plans expected to be agreed by the BA Steering Committee in Spring 2020, following the conclusion of a new Joint Declaration for BA-Phase II. According to present drafts, in 2021 the main activities will be:

- **Satellite Tokamak Programme** (STP, or JT-60SA): Implementation of activities for the Operation/Enhancement phase of the project. 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. Critical contracts for fabrication of the JT-60SA Actively Cooled Divertor and Error Field Correction Coils power supplies will also be launched in 2021. The activities under the responsibility of F4E are carried out through grants, 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.
- **IFMIF/EVEDA**: In 2021 the LIPAc (Linear IFMIF Prototype Accelerator) operation at Rokkasho will focus on attaining firm evidence on the expected performance of the accelerator and on the availability of the subsystems required for subsequent beam operations. Additional contracts will have to be placed for demonstrating the operation and for consolidating the reliability of the beam availability. Preparatory activities for the later operation phases will continue in 2021. 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.

- **IFERC**: 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 will foster collaboration research projects between JA and EU by sharing computer resources and by further jointly developing state-of-the art models.

  REC activities will concentrate on three aspects: collaborative activities with JT-60SA, ITER, and the IFMIF-EVEDA LIPAc accelerator. A collaboration under the ITER BA agreement will start in April 2020 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 DEMO design activities, priority will be given to activities directly 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 will be 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 will be performed in collaboration with EUROfusion.

See details of the Work Programme 2021 in the annexes to Work Programme.

Section V. Other information

1. Barcelona Office Building Policy

#	Building Name and type	Location	SURFACE AREA(in m²)			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	220.000 € *	Long term rent lease agreement until 2042 Short term rent lease agreement until 2022 or 2024, depending on the floors		Y	End of the third year, 6 months' notice to inform the landlord of the non-renewal for the part paid by F4E	Rent paid by Spain for 9000 m2; Rent paid by F4E for 750 m2, directly to the building owner (short term contract)	N/A
TOTAL						220.000 €						

* Total annual rent for 3 modules for F4E short term lease

SPD_table 13 . F4E building

In accordance with the 2007 Host Agreement, Spain (Host State) shall provide 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 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 000m2 of additional space. The offer also included that Spain will cover the costs of the refurbishment works of this additional space. In May 2016, the long-term agreement was signed between Spain, the building owner, and F4E.

The expenditure for the refurbishment of the additional space is foreseen at an estimated cost of EUR 1.5 million that will be financed by Spain and the building owner. An annual expenditure for the operation of the cafeteria and the additional space will be charged on the F4E budget. The possibility of a subsidy is also included to keep a competitive price level for the meals. Following a decision taken by the GB, discussions with the Host State will be held concerning the associated refurbishment costs for all the other floors of the building. The multi-annual planning will then be up-dated accordingly.

F4E had to rent, under the title III, 3 additional office modules for a total of 750 m2 in order to host external experts from services contracts working on F4E site, as the office space made available by Spain free of charge and according to the 2007 Host Agreement, was not sufficient. F4E launched an official request to the Spanish Authorities to cover these new expenses. Discussions with the new government, foreseen in spring 2020, were postponed due to the Covid-crisis. If Spain finally covers the costs, F4E will regularise it.

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 14 . Privileges and Immunities

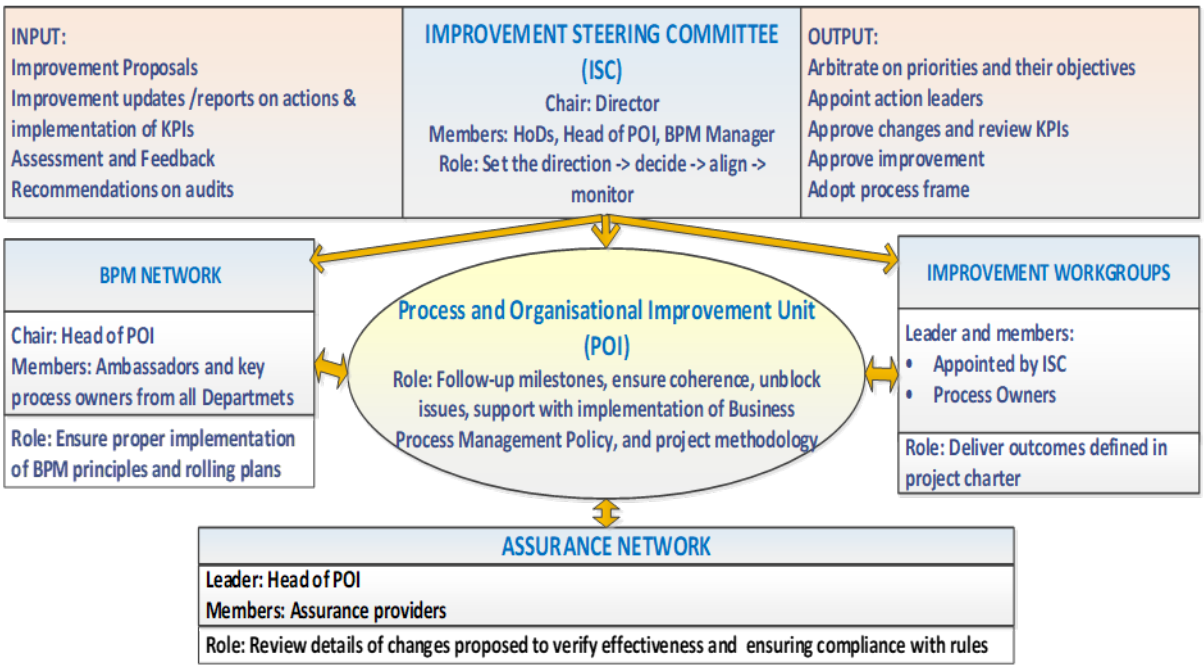
3. Environment management

Fusion for Energy shares the same building with several companies; therefore, the room for manoeuvre to reduce its impact on the environment is limited and EMAS registration very difficult. However, F4E undertook key actions in 2019, which should continue to bear fruit in 2020 and 2021 (awareness campaign on paper consumption and energy savings, suppression of plastic in the entire premises, including in the cafeteria, and staff encouraged to reduce plastic consumption, waste reduction and recycling).

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. 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 **Project Steering Meeting** focuses on activities linked to fulfilling the technical programmes of the ITER Project.

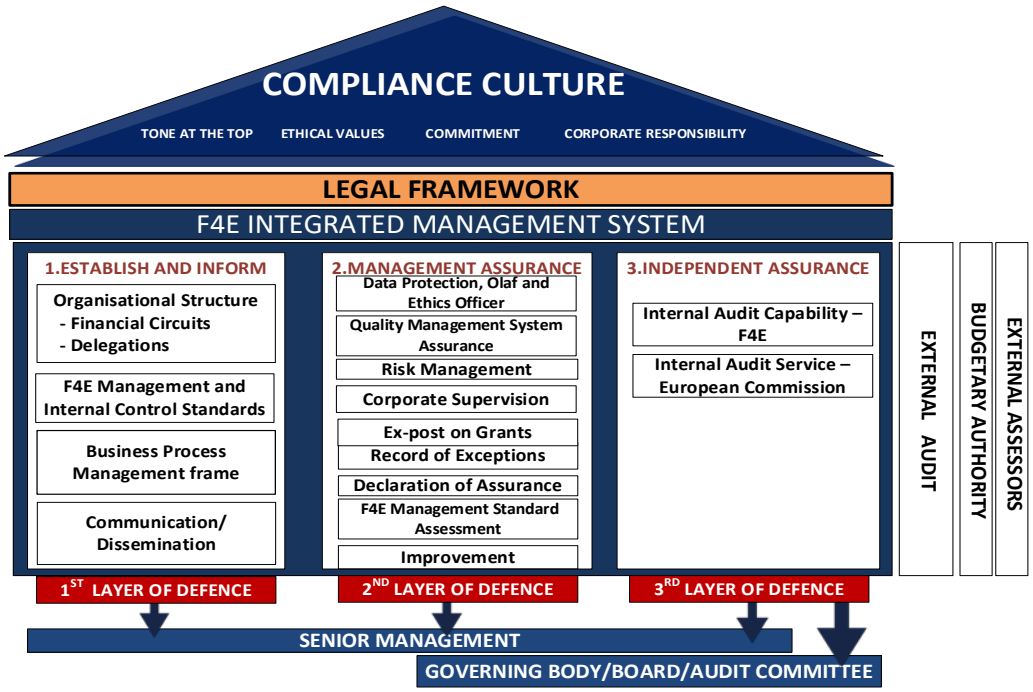


F4E uses the **DMAIC** (Define, Measure, Analyse, Improve, and Control) **approach** which forms part of the Lean Six Sigma methodology (a set of techniques and tools for process improvement). This is used to ensure that processes are more efficient and effective to achieve efficiency gains. Results 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 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 in the internationally recognised COSO framework.

- *1st LAYER (or 1st LINE OF DEFENCE) ESTABLISH AND INFORM*: Internal controls as defined by F4E Management for application by all F4E Staff and providing adequate training and raising awareness.
- *2nd LAYER (or 2nd 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 compliance functions to help build and/or monitor the first line-of-defence controls. These are specialised functions and which provide the information on internal control set out in this report.
- *3rd LAYER (or 3rd LINE OF DEFENCE) INDEPENDENT ASSURANCE* Internal auditors (IAS/IAC) who provide the Governance bodies and Senior Management with comprehensive assurance based on the highest level of independence and objectivity within the organisation. IAC activities (including ex post audit on contracts) are described in the IAC annual audit plan. OLAF carries out independent investigations.



The F4E Internal Control Strategy and the F4E Management and Internal Control Standards provide a frame for implementing the IMS and have been designed so as to provide 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.

5. 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.[19]
While Euratom is formally represented at the ITER Governance level by the EU Commission (DG-ENER), the further implementation of Euratom's contribution to ITER is realised through F4E cooperation with the ITER International Organisation (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[20] is to introduce a framework for the achievement of a "broader approach" in the field of fusion energy designed to facilitate the rapid realisation of fusion energy.
F4E has been formally designated by Euratom as the implementing agency to discharge its obligations for the implementation of the Broader Approach Activities vis-à-vis Japan. In this capacity, F4E cooperates with Japan on the project on the Engineering Validation and Engineering Design Activities for the International Fusion Materials Irradiation Facility (IFMIF/EVEDA; see Section 1.c below), the project on the International Fusion Energy Research Centre (IFERC) and the project on the Satellite Tokamak Programme.

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.

[19] Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project, 21 November 2006.

[20] 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.

d. TBM

F4E's participation in the Test Breeding Modules (TBM) Programme falls under F4E's first statutory objective (see section 1.a above). 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, and the Programme falls under the ITER Agreement as "*any other activities that are necessary to achieve its* [ie, the ITER Organization*] 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 supports the European Commission, in negotiations with the Ministry of Science and ICT of the Republic of South Korea in view of a collaboration on the helium-cooled Test Blanket Module System.

e. Supervision of F4E

The objectives of F4E cooperation with third countries and international organisations are clearly defined in its Statutes as outlined above.[21] 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 binding 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.
The only exception are so-called F4E-ITER IO Procurement Arrangements which spell out the details of the technical implementation of the Euratom contribution to the ITER Project as pre-defined in the ITER International Agreement.
In all other cases, before F4E enters into international obligations, prior F4E Governing Board approval is mandatory.
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.

[21] 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.

2. Switzerland as F4E Member

A further international aspect in the F4E set up results from the fact that, in addition to Euratom and the 27 EU Member States, Switzerland is a full F4E member based on cooperation agreements which Switzerland concluded with Euratom in the field of controlled nuclear fusion[22]. Accordingly, Switzerland has the same rights and obligations as any other F4E member, including full representation and participation in the F4E Governing Board. This co-operation agreement is for renewal end of 2020.

3. Relations with the United Kingdom

Upon the United Kingdom's withdrawal from Euratom with effect from 1 February 2020, F4E relations with the United Kingdom are on a third country basis, subject to the EU-UK Withdrawal Agreement including the provisions regarding the Transitional Period. The United Kingdom's relations with F4E upon the expiry of the Transitional Period remain to be determined in the context of a possible future agreement between Euratom and the United Kingdom.

[22] cf. Commission Decision of 22 November 2007 on the conclusion of Agreements in the form of Exchange of Letters between the European Atomic Energy Community (Euratom) and the Swiss Confederation (Switzerland) on the application of the ITER Agreement, the Agreement on Privileges and Immunities for ITER and the Broader Approach Agreement to the territory of Switzerland and on Switzerland's membership in the European Joint Undertaking for ITER and the Development of Fusion Energy.

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List of Acronyms

ASN	Autorité de Sûreté Nucléaire (French Nuclear Regulator)
BA	Broader Approach
BAUA[23]	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
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
INB	Installation Nucleaire de Base

[23] 1,000 BAUA equal to 678,000 EUR (value 5 May 2005).

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[24]	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
SC	Specific Contract

[24] In 2008, the IUA exchange rate approved by the ITER Council corresponded to 1498.16 Euros.

SR2FP	Straight Road to First Plasma
SS	Steady State
STP	Satellite Tokamak Programme
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

SPD2021_ANNEXES TO PROJECT PLAN

The ITER Procurement Arrangements and their Status

The Procurement Arrangements (PA), signed with IO, 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 (i.e. Build-to-Print, Detailed Design, Functional Specifications). These PAs are the basis for F4E to start the procurement procedures to competitively tender for the work.
Table 1 shows both the current and the signed credit values of the PAs for each area (status end of March 2019). It includes any credit modification (both negative and positive) due to the outcome of the Project Change Requests (PCR) approved by the ITER Council during the evolution of the PA.

Actions	PAs	WBS Name	Original Value[1] (kIUA)	Current Value[2] (kIUA)	Signed date
1 - Magnets	1.1.P1A.EU.01	Toroidal Field Magnet Windings	85.2	89.740	20-Jun-08
	1.1.P2A.EU.01	Pre-Compression Rings	5.14	0.600	12-May-10
	1.1.P3A-B.EU.01	Poloidal Field Coils PF2, PF3, PF4, PF5 & PF6	40.4	40.860	19-Jun-09
	1.1.P6A.EU.01	Toroidal Field Magnet Conductors	43.000	43.390	18-Dec-07
	1.1.P6C.EU.01	Poloidal Field Magnet Conductors	9.6525	11.22881	04-May-09
2 - Vacuum Vessel	1.5.P1A.EU.01	Main Vessel	99.360	87.00393	19-Nov-09
3 - In Vessel Blanket	1.6.P1A.EU.01	Blanket First Wall	26.100	40.330	29-Sep-17
	1.6.P6.EU.01	Blanket Manifold procurement	0	NA	NA
4 - In Vessel – Divertor	1.7.P1.EU.01	Divertor Cassette Body and Assembly	11.200	6.040	08-May-12
	1.7.P2B.EU.01	Divertor Vertical Targets	20.200	19.620	12-Mar-10
	1.7.P2E.EU.01	Divertor Rail	0.000	NA	NA
5 - Remote Handling	2.3.P2.EU.01	In-Vessel Divertor Remote Handling Equipment	12.000	9.620	31-Oct-12
	2.3.P3.EU.01	Cask and Plug Remote Handling System	8.200	17.31337	03-Jun-15
	2.3.P5.EU.01	Ex-Vessel Neutral Beam Remote Handling Equipment	6.000	6.23974	19-Jun-13
	5.7.P1.EU.01	In-vessel viewing system	6.800	6.800	19-Dec-14
6 - Cryoplant	3.1.P1.EU.01	Front End Cryo-Distribution: Warm Regeneration Lines	7.14480	0.200	26-Sep-13

[1] As extracted on 31-March 2020 from the IO PA Database

[2] IC-25/05.3 Proposal for the Update of the Overall Project Cost (OPC) – November 2019

and Fuel Cycle	3.1.P1.EU.02	Front End Cryo-Distribution: Front End Cryopump Distribution	2.71120	0.76518	28-Apr-17
	3.1.P1.EU.03	Cryopumps: Torus & Cryostat Cryopump	0.000	4.822	16-Nov-18
	3.1.P1.EU.04	Cryopumps for ITER Heating and DNB System and MITICA Test Facility	0.000	3.66400	15-Jun-16
	3.1.P3.EU.01	Leak Detection & Localisation System	4.400	4.4	05-Dec -18
	3.2.P3.EU.01	Hydrogen Isotope Separation System	5.456	NA	NA
	3.2.P5.EU.01	Water Detritiation System(WDS) Water Holding Tanks and Emergency Tanks	2.552	3.252	19-Dec-12
	3.2.P5.EU.02	Water Detritiation System Tanks, Water Detritiation System Main System, and Water Detritiation	10.208	NA	NA
	3.4.P1.EU.01	Cryoplant (LN2 and Auxiliary Systems) and Cryoplant	31.500	26.37110	15-Jun-11
	6.3.P1.EU.01	Waste Treatment Storage (Type A Radwaste System)	9.100	NA	NA
	6.4.P1.EU.01	Radiological Protection for design	4.200	4.200	26-Sep-13
7 - Antennas and Plasma Engineering	5.1.P1.EU.01	Ion Cyclotron Antenna	3.96	NA	NA
	5.2.P1B.EU.01	Electron Cyclotron Control System	4.6992	1.400	19-Dec-14
	5.2.P1B.EU.02	Electron Cyclotron Upper Launcher	3.1328	11.2820	15-Mar-19
	No PA	Plasma Engineering	NA	NA	NA
	No PA	Plasma Control System	NA	NA	NA
8 - Neutral Beam and EC Power Supplies and Sources	5.2.P3.EU.01	Electron Cyclotron Gyrotrons	9.96667	NA	NA
	5.2.P4.EU.01	Electron Cyclotron Power Supplies	12.788	11.628	24-May-12
	5.3.P1.EU.01	Neutral Beam	3.800	NA	NA
	5.3.P2.EU.01		4.750	NA	NA
	5.3.P3.EU.01		1.950	NA	NA
	5.3.P4.EU.01		5.950	NA	NA
	5.3.P5.EU.01		6.100	NA	NA
	5.3.P6.EU.01		23.750	31.28571	13-Jul-09
	5.3.P9.EU.01	Neutral Beam Test Facility Components	0.000	25.800	27-Oct-10
	No PA	Neutral Beam Not Credited Activities	NA	NA	NA
9 - Diagnostic	5.5.P1.EU.01	Magnetics Sensor Electronics & Software	1.112	1.112	13-Dec-11
	5.5.P1.EU.02	CER(Continuous External Rogowskis)	0.02768	0.02768	17-May-13

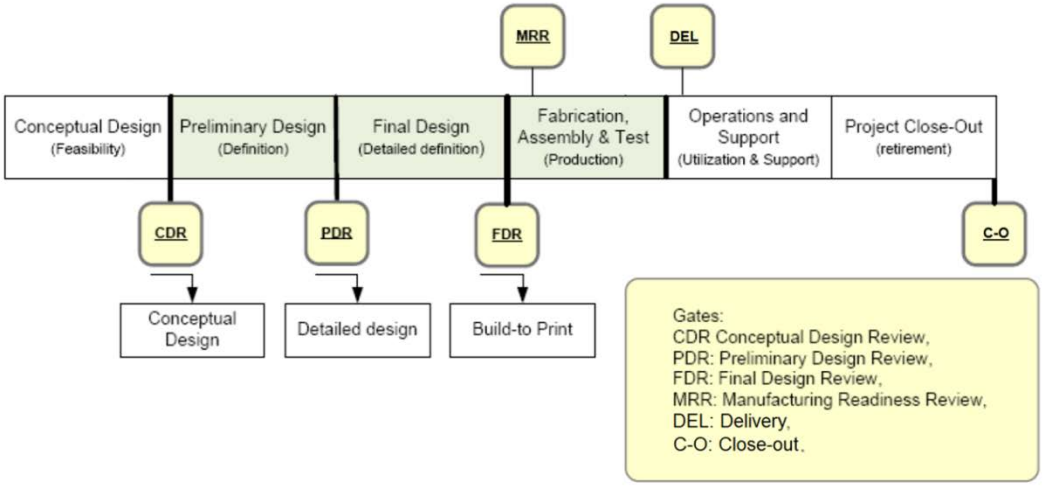
	5.5.P1.EU.16	Outer Coils	0.27714	0.27714	06-Feb-17
	5.5.P1.EU.17	Inner Coils	0.62904	0.62904	09-Mar-18
	5.5.P1.EU.19	Divertor Coils	0.04705	NA	NA
	5.5.P1.EU.03	Bolometry System	2.95007	2.95007	13-Mar-20
	5.5.P1.EU.04	Core-Plasma Charge Exchange Recombination Spectrometer	3.42495	3.42495	20-Dec-19
	5.5.P1.EU.05	Plasma position reflectometry	1.58382	NA	NA
	5.5.P1.EU.06	Equatorial Visible/Infrared Wide-Angle Viewing System	2.93098	2.93098	05-Sep-19
	5.5.P1.EU.07	Pressure Gauges	0.95798	0.95798	21-Sep-19
	5.5.P1.EU.08	Core Thomson Scattering	3.55361	3.55361	20-Dec-19
	5.5.P1.EU.09	Low Field Side Collective Thomson Scattering	1.14786	1.14786	15-Nov-19
	5.5.P1.EU.10	Port Engineering Systems	1.47867	1.47867	20-Jul-17
	5.5.P1.EU.11		2.11573	2.11573	20-Jul-17
	5.5.P1.EU.12		2.11573	2.11573	20-Jul-17
	5.5.P1.EU.13		1.47867	1.47867	20-Jul-17
	5.5.P1.EU.14		1.47867	1.47867	20-Jul-17
	5.5.P1.EU.15	Neutron Profile & Spectroscopy	1.96707	1.96707	20-12-19
	5.5.P1.EU.18	In Vessel Electrical Equipment	2.74824	2.74824	06-Feb-17
	5.5.P1.EU.20	Lower Port Integration	0.02365	NA	NA
10 - Test Blanket Module	No PA	European Test Blanket System Arrangement	NA	NA	NA
	No PA	Test Blanket Systems Research & Development	NA	NA	NA
11 - Site and Buildings and Power Supplies	4.1.P1A-8B.EU.01	Steady-State Electrical Network and Pulsed Power Electrical Network Detailed System Engineering Design	7.000	6.93810	26-Oct-09
	4.1.P1A-8B.EU.02	Steady-State Electrical Network and Pulsed Power Electrical Network Installation	13.300	29.48893	05-Dec-13
	4.1.P8A.EU.01	Emergency Power Supply System	5.700	4.22273	05-Dec-13
	4.1.P8C.EU.01	Steady-State Electrical Network Components	5.000	5.00000	05-Dec-13
	6.2.P2.EU.01	PF Coil fabrication building	392.300	12.80000	19-Nov-08
	6.2.P2.EU.02	Architect Engineering Services		55.7749	04-May-09
	6.2.P2.EU.03	TKM Excavation & Ground Support Structure		31.00000	04-May-09
	6.2.P2.EU.04	Anti-Seismic Bearing		6.20000	04-May-09
	6.2.P2.EU.05	Building Construction		348.60126	14-May-10
	6.2.P2.EU.06	Office Building		13.85000	04-Oct-12
12 - Cash contributions	No PA	Cash Contribution to ITER Organization	NA	NA	NA

	No PA	Cash Contribution to Japan DA	NA	NA	NA
13 – Technical Support Activities	No PA	ITER Programme Management	NA	NA	NA
	No PA	Transportation	NA	NA	NA
	No PA	Engineering Support and Integration	NA	NA	NA
	No PA	Engineering Analysis and Nuclear Data	NA	NA	NA
	No PA	Embedded Control Data Access and Communication	NA	NA	NA
	No PA	Materials and Fabrication Technologies	NA	NA	NA
	No PA	Nuclear Safety	NA	NA	NA
	No PA	CE Marking	NA	NA	NA
	No PA	F4E Programme Management	NA	NA	NA

PP_table 1. Action, WBS name and PA status (as of end March 2020)

Life Cycle of the PAs and main Steps in the Delivery of the ITER EU Contribution

The System Life Cycle establishes a framework for meeting the stakeholder‘s needs in an orderly and efficient manner. It also provides a quick overview of significant dates in the development of the Systems. Essentially, the project defines lifecycle phases with predefined levels of development by using specific dates to determine the readiness to move to the next phase. The different phases are referred to as CDR (Conceptual Design Reviews), PDR (Preliminary Design Reviews), FDR (Final Design Reviews), MRR (Manufacturing Design Reviews), DEL (Delivery) and C-O (Close-Out). A policy for the management of the phase gates across F4E has been approved and is being implemented.
The following figure explain the approach in a schematic way.



PP_figure 1 . Progress in the delivery of the EU contributions

The following definitions provide an explanation of the content of each of the above mentioned phases/gates and their expected output.

Phase	Definition	Typical Expected Output
Conceptual Design	With inputs such as Technical rules to be followed (codes & standards, handbooks, etc.), the allocation of Requirements to the systems (via SRDs) with relevant physical envelopes (CMMs) and interface design specifications (ICDs) and preliminary PBS tree, the CDR Phase aims to consolidate design inputs, to propose at least one feasible design solution describing and identifying its functionalities and main components, to flag any non-achievable requirements. The main phase output is the description of a system design solution that meets the requirements and is achievable at an acceptable risk and cost.	Requirements specifications + Design concept
Preliminary Design	With input the consolidated engineering data of the CDR, the PDR phase aims to refine the Conceptual design in terms of both technical feasibility and schedule robustness, to freeze the interface specifications, to plan future steps (e.g. tests on mock-ups/prototype for design qualification/verification) and to re-assess technical risk of the proposed solution and to propose a mitigation plan before starting the detail design.	Systems architecture + Subsystems requirement specifications
Final Design	The Final Design phase aims to refine the design of the PBS elements to allow the manufacturing, to provide a manufacturing specification clear and agreed with the manufacturer, to provide the BoM, to build the complete set of justifications for component specifications and design, qualification process specifications are frozen and to provide evidence that the manufacturability, transfer, assembly and qualification/start-up of the system are defined and agreed with the stakeholders.	Complete design
Manufacturing Readiness Review	A formal design review meeting conducted to confirm the design baseline after FDR, in terms of processes, documentation, planning, resources, qualification status etc, is mature enough to authorize the start the manufacturing activities.	Manufacturing drawings + resources & facilities for manufacturing ready
Delivery	It marks the time when the procured item is handed over to the user (e.g. ITER Organization) for the next phases (i.e. installation, site acceptance tests, operation).	System delivered
Close-out	It marks the date of the last credit to be achieved for that specific PA. For some specific PAs this date can be earlier than the delivery date, depending on the agreed plan for the release of the credits linked to the procurement.	Final credit released

PP_table 2 . Definition of phases

In the following table the design review phases are shown per Action and per PA (status as end of March 2019). Some of the dates are not within F4E's responsibility.
In a few cases, the PA may foresee the release of the last credit prior to the delivery of the item.
When more than one FDR, MRR or delivery are planned and when the system is composed of several components, the table includes the last design review or delivery date of all components in that system.

F4E Milestone Completed		IO Milestone Completed		F4E Milestone Forecast		IO Milestone Forecast

			1.CDR	2.PDR	3.FDR	4.MRR	5.Delivery	6.Close-out
Magnets	Toroidal Field Coils	BP	-	-	-	21/09/2018	15/06/2022	15/06/2022
	Poloidal Field Coils	BP	-	-	-	12/07/2019	25/10/2023	14/12/2023
	Magnet Conductors	BP	-	-	-	26/06/2015	-	04/11/2016
Vacuum Vessel	Main Vessel	BP	-	-	-	15/05/2013	11/08/2021	11/08/2021
In Vessel-Blanket	Blanket Cooling Manifold	BP	28/09/2011	-	24/06/2016	12/06/2025	25/06/2027	25/06/2027
	Blanket and First Wall Panels	BP	02/02/2010	01/12/2011	11/04/2013	18/01/2023	21/12/2027	21/06/2028
In Vessel-Divertor	Divertor Cassette Body	BP	-	-	-	18/09/2020	04/04/2028	24/04/2028
	Divertor Vertical Target	BP	-	-	-	12/12/2022	20/03/2029	11/04/2029
	Divertor Rails	BP	-	-	22/03/2019	04/07/2023	11/11/2025	11/11/2025
Remote Handling	Divertor Remote Handling System	FS	28/02/2012	17/06/2019	26/08/2022	01/03/2024	20/01/2026	23/07/2026
	Cask & Plug Remote Handling System	FS	30/01/2014	24/03/2022	20/11/2024	22/10/2025	16/09/2027	03/08/2028
	Neutral Beam Remote Handling System	FS	31/10/2012	08/11/2021	03/05/2024	06/03/2025	10/11/2026	30/06/2027
	In Vessel Viewing System	FS	01/08/2014	16/03/2020	14/04/2022	04/07/2022	17/01/2025	23/06/2025

			1.CDR	2.PDR	3.FDR	4.MRR	5.Delivery	6.Close-out
Cryoplant and Fuel Cycle	Cryopumps	BP and DD	-	25/03/2010	02/07/2021	12/01/2024	17/05/2027	17/05/2027
	Hydrogen Isotope Separation System	DD	-	-	09/08/2024	25/08/2026	25/07/2029	25/07/2029
	Water Detritiation System	DD	-	-	16/06/2025	16/12/2026	03/07/2030	16/02/2033
	Liquid Nitrogen Plant and Auxiliary Systems	FS	07/01/2011	15/04/2019	15/04/2019	19/06/2019	10/02/2020	02/03/2022
	Radiological and Environmental Monitoring System	FS and BP	-	29/04/2026	18/05/2027	13/03/2028	04/10/2029	04/10/2029
	Radiological and Conventional Waste Treatment and Storage	FS	24/04/2014	19/10/2022	26/11/2024	16/06/2026	-	19/04/2027
Antenna and Plasma Engineering	Ion Cyclotron Antenna	BP	-	-	-	05/02/2026	02/07/2030	02/07/2030
	Electron Cyclotron Upper Launcher	BP	-	-	-	20/06/2022	20/08/2026	22/09/2026
	Electron Cyclotron Control System	BP	29/01/2014	-	06/03/2026	19/02/2027	-	14/04/2027
Neutral Beam and EC Power Supplies and Sources	Electron Cyclotron Gyrotrons	FS	-	16/03/2017	03/02/2023	02/02/2024	26/01/2027	03/06/2027
	Electron Cyclotron Power Supplies	FS	-	15/10/2014	05/12/2014	31/07/2015	15/10/2021	03/08/2022
	Neutral Beam Source and High Voltage Bushing	BP	-	-	-	22/09/2026	10/08/2029	26/09/2029
	Beamline Components	BP	-	-	-	14/04/2025	31/07/2029	19/09/2029
	Pressure Vessel and Magnetic Shielding	BP	-	-	26/11/2019	30/01/2023	10/08/2027	18/08/2027

			1.CDR	2.PDR	3.FDR	4.MRR	5.Delivery	6.Close-out
Neutral Beam and EC Power Supplies and Sources	Active Correction and Compensation Coils	BP	-	-	14/07/2020	24/05/2023	06/02/2029	06/02/2029
	Neutral Beam Power Supplies	FS	-	26/08/2015	10/01/2022	02/08/2024	05/02/2025	22/01/2027
	Neutral Beam Test Facility	FS	11/02/2013	26/04/2017	07/01/2022	19/08/2021	-	09/07/2024
Diagnostics	Magnetics	FS	-	04/06/2021	12/04/2024	12/04/2024	04/11/2025	04/11/2025
	Bolometers	FS	-	18/07/2023	06/06/2024	17/07/2026	26/01/2028	26/01/2028
	Plasma Position Reflectometry	FS	-	12/06/2023	12/09/2024	07/07/2026	02/01/2029	18/01/2029
	Pressure Gauges	FS	-	03/08/2020	17/12/2021	18/10/2023	09/04/2025	09/04/2025
	Radial Neutron Camera - Gamma Spectrometer	FS	27/12/2017	18/11/2022	06/03/2025	27/11/2026	05/04/2028	29/06/2029
	Core-plasma Thomson Scattering	FS	-	15/11/2023	26/11/2024	16/04/2026	01/02/2029	11/04/2030
	Low Field Side Collective Thomson Scattering	FS	-	01/07/2019	05/06/2020	08/07/2022	03/03/2023	14/05/2024
	Core-Plasma Charge Exchange Recombination Spectrometer	FS	-	13/12/2024	18/12/2025	20/04/2027	21/04/2028	21/04/2028
	Equatorial Visible/Infrared Wide-Angle Viewing System	FS	-	03/12/2025	08/11/2027	24/11/2027	18/08/2028	18/08/2028
	Port Engineering Systems	FS	-	28/09/2020	18/02/2022	07/04/2025	15/11/2032	25/05/2033

The table below shows the key dates for the buildings (status as end of March 2020).

Nr and Name of Building (yellow where construction has started)	RFOC[1] Date		RFIOC/RFE[3] Dates		Completion Date
11 - Tokamak Building	RFOC Pit	Jun - 2019	RFE 1B Stage1	Apr - 2018	Feb - 2023
	Blg 11 - RFOC Crane Hall	May - 2020	RFE 1B Stage2	Mar - 2020	
	N/A	N/A	RFIOC Corner Shafts	Jul - 2020	
			RFIOC Cargo Lift Shaft	Sep - 2020	
	Blg 11 - B2	Dec - 2018	RFIOC B2	Dec - 2018	
			RFIOC DTR	Mar - 2020	
			Early access B2M	Feb - 2020	
			RFIOC B2M	Apr - 2020	
	Blg 11 - B1	Dec - 2019	RFIOC Level B1 (South part)	Dec - 2019	
			RFIOC Level B1 (West part)	Jan - 2020	
			RFIOC Level B1 (East part)	Jan - 2020	
			RFIOC Level B1 (North part)	Mar - 2020	
	Blg 11 - L1	Feb - 2020	RFIOC L1 (Exc. NB Cell)	Jun - 2020	
	Blg 11 - L2	Apr - 2020	RFIOC L2 (Exc. NB Cell)	Apr - 2020	
			RFIOC (NB Cell)	Sep - 2020	
	Blg 11 - L3	May - 2020	RFIOC L3 (Axis T4-T5)	May - 2020	
			RFIOC L3 (Axis T5-T11)	Sep - 2020	
			RFIOC L3M area	Jan - 2021	
	Blg 11 - L4	Nov - 2020	RFIOC L4/L5 (Axis T4-T5)	Nov - 2020	
	Blg 11 - L5	Nov - 2020		Jan - 2021	

			RFIOC L4/L5 (Axis T10-T12)		
	Blg 11 - R1	Sep - 2020	RFIOC R1 (Axis T4-T5 & T10-T12)	Sep - 2020	
13 - Assembly Building	Sep - 2016		RFE 1A stage 1	Jun - 2017	Mar - 2020
			RFE 1A stage 2	Sep - 2017	
14 - Tritium Building	Blg 14	N/A	RFE 19	N/A	Jan - 2026
	Blg 14 - B2	Jul - 2021	RFIOC B2	Jul - 2021	
	Blg 14 - B1	Jul - 2021	RFIOC B1	Jul - 2021	
	Blg 14 - L1	Jul - 2021	RFIOC L1	Jul - 2021	
	Blg 14 - L2	Oct - 2022	RFIOC L2	Oct - 2022	
	Blg 14 - L3	Feb - 2023	RFIOC L3	Feb - 2023	
	Blg 14 - L4	Jul - 2023	RFIOC L4	Jul - 2023	
	Blg 14 - L5	Nov - 2023	RFIOC L5	Nov - 2023	
	Blg 14 - R1	Oct - 2023	RFIOC R1	Oct - 2023	

15 - RF Heating Building	Jun - 2017		1st Early access for PBS52 beams installation	Mar - 2020	May - 2022
			2nd Early access PBS26	Mar - 2020	
			3rd Early access PBS51/52	Feb - 2021	
			4th Early access all PBSs (Elec works)	Aug - 2021	
			intermed. RFE - Levels L1/L2	Oct - 2021	
			RFE	Jan - 2022	
			1st Early access CCWS for PBS 26 spool	Jul - 2020	
			2nd Early access for concrete plinths instal.	Sep - 2020	
			3rd Early access for IO PBS26 spools & equip. instal.	Sep - 2020	
21 - Hot Cell	N/A, no RFOC as Design & Built contract		Nov - 2028		Dec - 2028
23 - Radwaste Building	N/A, no RFOC as Design & Built contract		Feb - 2027		Sep - 2027
24 - Personnel Access Control Building	N/A, no RFOC as Design & Built contract		Mar - 2027		Oct - 2027
32 - Magnets Power Conversion Building	N/A, no RFOC as Design & Built contract		Milestone 1 - IO Early Access B32, 33	Jul - 2017	Mar - 2019
			Milestone 2 - IO Early Access B32, 33	Sep - 2017	
			Milestone 3 - IO Early Access B32, 33, 38	Oct - 2017	
			RFE 7	Dec - 2017	

33 - Magnets Power Conversion Building	N/A, no RFOC as Design & Built contract		RFE 7	Dec - 2017	Mar - 2019
34 - NB Power Supply Building	N/A, no RFOC as Design & Built contract		May - 2023		Nov - 2023
37 - NB High-Voltage Power Supply Building	N/A, no RFOC as Design & Built contract		Jul - 2023		Apr - 2024
51 - Cryoplant Compressor Building	Sep - 2017		RFE 8A	Sep - 2017	Feb - 2021
			RFE 8B	Dec - 2020	
52 - Cryoplant Coldbox Building	Sep - 2017		RFE 8A	Sep - 2017	Feb - 2021
			RFE 8B	Dec - 2020	
53 - Cryoplant Infrastructure Building	Jan - 2018		RFE 8A stage2	Sep - 2017	Feb - 2021
			RFE 8A stage3	Oct - 2017	
			RFE 8A stage4	Dec - 2017	
61 - Site Services Building	Aug - 2016		RFE 17A	Apr - 2017	Jun - 2020
			RFE 17B	Mar - 2018	
71 - Control Building (North: non-PIC)	Sep - 2021		Jun - 2022		Jul - 2023
71 - Control Building (South: PIC)	Apr - 2026		May - 2027		Mar - 2028
74 - Diagnostics Building	Blg 74	N/A	RFIOC South Stair Shafts	May - 2020	May - 2022
			RFIOC Technical Shafts	Apr - 2020	
			RFIOC North Stair Shafts	Jun - 2020	
			RFIOC Lift Shafts	Apr - 2020	
	Blg 74 - B2	Dec - 2018	RFIOC B2	Dec - 2018	
	Blg 74 - B1	Feb - 2019	RFIOC B1	Feb - 2019	
	Blg 74 - L1	Apr - 2019	RFIOC L1	Apr - 2019	

	Blg 74 - L2	Jun - 2019	RFIOC L2	Jun - 2019	
	Blg 74 - L3	Sep - 2019	RFIOC L3	Sep - 2019	
	Blg 74 - L4	Jun - 2020	RFIOC L4	Jun - 2020	
	Blg 74 - L5	Jun - 2020	RFIOC L5	Jun - 2020	
	Blg 74 - R1	Jun - 2020	RFIOC R1	Jun - 2020	
75 - FD & Switching Network Resistor Building	Jul - 2021		Apr - 2022		Mar - 2023

PP_table 3 . Life cycle of the EU procurements (as of end of March 2020)

BA Overall Information

The Satellite Tokamak Programme

The mission of the JT-60SA project is to contribute to the early realization 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:
1. Capable of confining break-even equivalent class high-temperature deuterium plasmas lasting for a duration longer than the timescales characteristic of plasma processes.
2. Pursuing full non-inductive steady-state operation with high plasma beta close to and exceeding no-wall ideal stability limits.
3. Establishing ITER-relevant high density plasma regimes well above the H-mode power threshold.
As of 2020 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[3].

The assembly of the facility has been completed by March 2020.. The period of April 2020 – March 2025 in BA Phase II covers the operation of the facility as well as machine enhancements of the JT-60SA device, starting from the integrated commissioning. After the first plasma in September 2020, 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.

After completion of the integrated commissioning, scheduled up to March 2021, the Experiment Team shall be established, composed of the Experiment Leaders, the Topical Group Leaders and the participating researchers.

The total commitment for the EU corresponding to the STP (JT-60SA) amounts to 236,413 BAUA. At present date (April 2020) the credit awarded to EU is 235,667 BAUA. The remaining credits to be earned amount to 0,746 BAUA (from now until September 2021).
For the period April 2020-March 2025 the total commitment for the EU amounts to 178.5 kBAUA.

The sharing of activities with Japan, which leads to this associated total credited budget, has been agreed in principle by the parties in early 2020 and is currently awaiting formal approval by the BA Steering Committee in the form of the document : ‘Satellite Tokamak Program Project Plan for BA Phase II’ .

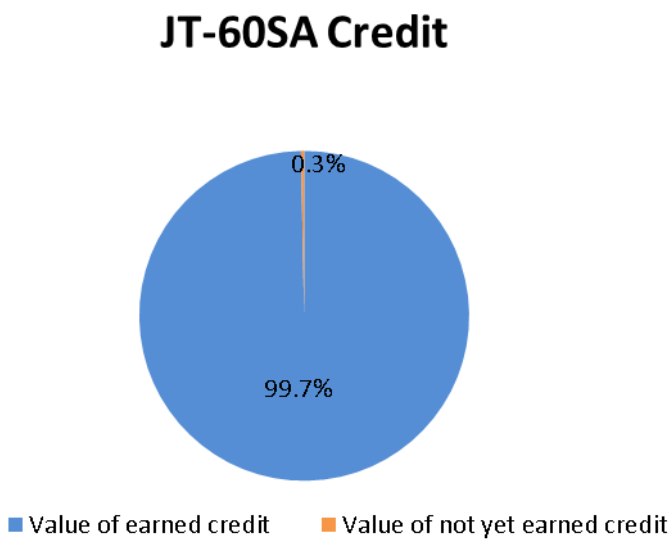
In broad terms the F4E activities for this period will include the following machine enhancements:

- In-vessel Components (Actively Cooled Divertor, cryopumps, MGI).
- Heating & CD Systems (EC RH Power Supplies and Transmission Lines.
- Plasma Diagnostics (Thomson Scattering, FILD, VUV with support of EUROFusion.
- Cryogenic System (Cryoplant Enhancements, Spare parts and Nitrogen Storage).
- Magnet and Power Supply (PS Enhancements, Spare parts, EFCC Power Supplies).
- Control System (Sensors and Tokamak Simulator Development).
- EU Personnel in support of Integrated Commissioning and Operation.

In addition, with respect to Operation/Maintenance and Assembly, F4E will provide:

- Spare parts, industrial support and expertise (in kind)
- Consumables, IT infrastructures and support to EU on-site personnel in support (in cash)

[3] The Project Plans for the BA Phase II (from 2021-2025) for all three projects are to be approved by the Broader Approach Steering Committee in June 2020



PP_figure 2. JT-60SA: percentage of earned/not yet earned credits for BA Phase I (Status April 2020)

The IFMIF/EVEDA

The IFMIF/EVEDA Project (Engineering Validation and Engineering Design Activities for IFMIF) started in June 2007 and has since undergone a re-scoping in 2010 and an extension until March 2021 approved by the BA Steering Committee in October 2019. Its mission is to produce the engineering design of IFMIF (International Fusion Materials Irradiation Facility) and to establish an experimental data base to support such design. The R&D facilities built to that end are:

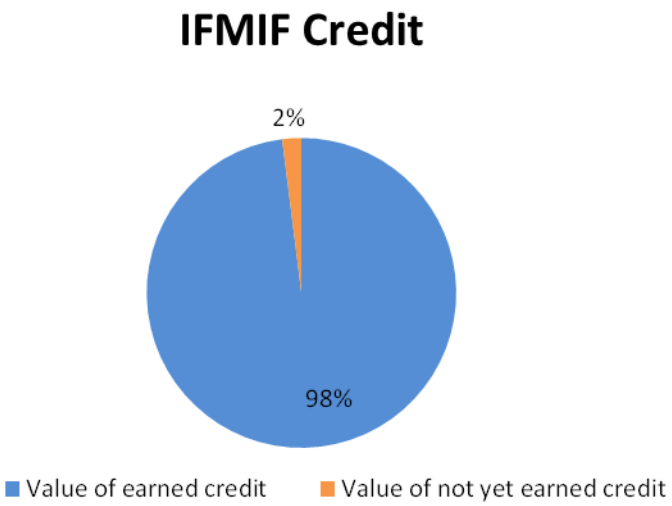
- the Accelerator Facility ("LIPAc"),
- the Lithium Target Facility,
- the Test Facilities.

The schedule foresees a completion of the IFMIF/EVEDA Project by the end of March 2021.
The engineering design of IFMIF as well as all the deliverables associated with the Lithium Target facility and Test Facilities have been achieved. Validation activities of the LIPAc accelerator remain underway.
Considering the activities which will be carried out during the BA Phase II, the project aims at having the completion and experimental validation of the engineering design of the fusion neutron source, in support of the construction of the fusion neutron source. In addition, considering the enhancement of the LIPAc facility, the objective could be to maintain the facility in operation, as a test stand, until the safe and regular operation of the fusion neutron source, to test new equipment and to optimize the beam operation strategies.
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 2021.
The global total commitment for the EU corresponding to the IFMIF/EVEDA for BA Phase I amounts to 148,025 BAUA. At present date (April 2020) the credit awarded to EU is 145,075 BAUA. The remaining credits to be earned amount to 2,950 BAUA (from now till March 2021).
For the period April 2020-March 2025 the total commitment for the EU corresponding amounts to 39.5 kBAUA.

The sharing of activities with Japan, which leads to this associated total credited budget, has been agreed in principle by the parties in early 2020 and is currently awaiting formal approval in June 2020 by the BA Steering Committee in the form of the document : "IFMIF/EVEDA Project Plan for BA Phase II'.

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 3 . IFMIF/EVEDA: percentage of earned/not yet earned credits for BA Phase I (Status April 2020)

The IFERC

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)

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.

In BA phase I, all DEMO Design activities were performed by EUROfusion acting as a Voluntary Contributor. After an initial phase of analysis (common elements for DEMO in EU and JA, 2007-2010), the work moved on to more detailed studies to: a) follow-up work on key design issues and options and narrow down design options; b) define design criteria; c) evaluate ranges of DEMO parameters. The phase I activities concluded in 2020 with a final report.
In BA phase II, the EU contribution DEMO Design work will concentrate in 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.

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 the first years of BA the R&D tasks were conducted in the Voluntary Contributors laboratories and were mostly completed by 2015; afterwards, activities continued under the DEMO Design umbrella, with EUROfusion acting as Voluntary Contributor. In BA phase II, the objective of activities in fusion reactors R&D will be 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.

Regarding the CSC activities, in BA phase I the EU procured and delivered the Helios supercomputer for the Rokkasho CSC. Operation of Helios started on schedule in January 2012, and was carried out until the end of 2016. It was dismantled in the 1st semester of 2017. Joint simulation work continued using domestic supercomputers in JA and EU. In BA phase II, the CSC activities include managing the HPC resources provided by JA as host in order to advance high priority simulation studies for ITER, JT-60SA and fusion reactor in general (e.g. DEMO). In addition, the CSC will study the possibility of providing a joint high performance computer (HPC) suitable for JA and EU scientists.

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 will concentrate on collaborative activities with ITER, the IFMIF/EVEDA LIPAc accelerator, and JT-60SA. Most of the contribution to REC is provided by F4E

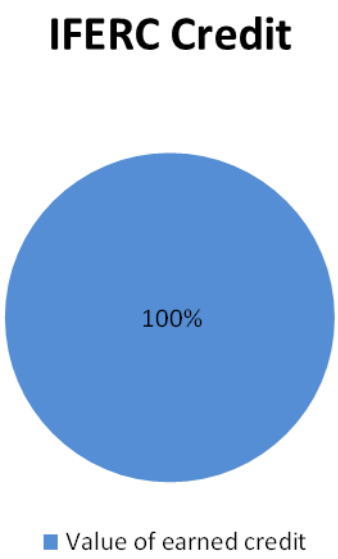
The total commitment for the EU corresponding to the IFERC in phase I amounted to 115,550 BAUA. At present date (April 2020) the credit awarded to EU is 115,550 BAUA, so phase I has been fully completed.

For the period April 2020-March 2025 the total commitment for the EU amounts to 14.4 kBAUA.

The sharing of activities with Japan, which leads to this associated total credited budget, has been agreed in principle by the parties in early 2020 and is currently awaiting formal approval in June 2020 by the BA Steering Committee in the form of the document : “IFERC Project Plan for BA Phase II’.

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

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



PP_figure 4 . IFERC: percentage of earned/not yet credits for BA Phase I (Status April 2020)

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
Schedule Performance Index	SPI above a defined value	SPI>0.95
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.
The PP_table 4 below shows these milestones (the First Plasma ones are in pale yellow).
The table includes all additional milestones selected up to end of March 2019 as well as all modifications of quarters of completions agreed by ITER Council/Governing Board until that date.

IC/GB Reference	Programme	Milestone	Type of Milestone	Agreed Quarter	Forecast Date of Achievement	PA	PA Deliverable
IC02/GB00	11-Buildings Infrastructure and Power Supplies	Start of B1 civil works in Tokamak building	IC	Q1 2016	Achieved	6.2.P2.EU.05	Building Construction
IC04/GB01	11-Buildings Infrastructure and Power Supplies	Erection of Tokamak Main Cranes in Assembly Hall	IC	Q2 2016	Achieved	6.2.P2.EU.05	Building Construction
IC05/GB02	1-Magnets	TF Coil: Completion of first EU TF winding pack	IC	Q2 2016	Achieved	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
IC09/GB03	11-Buildings Infrastructure and Power Supplies	Installation of WDS tanks in Tritium building	IC	Q2 2016	Achieved	6.2.P2.EU.05	Building Construction
IC13/GB04	2- Vacuum Vessel	First Sub Segment Assembly of VV Sector 5 completed	IC	Q4 2016	Achieved	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
IC14/GB05	6-Cryoplant & Fuel Cycle	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	11-Buildings Infrastructure and Power Supplies	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	11-Buildings Infrastructure and Power Supplies	Completion of RFE 1A (Assembly Hall)	IC	Q2 2017	Achieved	6.2.P2.EU.05	Building Construction
IC24/GB08	11-Buildings Infrastructure and Power Supplies	Tokamak Concrete crown civil works achieved	IC	Q3 2018	Achieved	6.2.P2.EU.05	Building Construction
IC25/GB09	11-Buildings Infrastructure and Power Supplies	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	8-Neutral Beam Heating & Current Drive	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	11-Buildings Infrastructure and Power Supplies	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	1-Magnets	PF Coil: EU PF 5 coil ready for cold test	IC	Q1 2020	22/07/2020	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)
IC50/GB13	11-Buildings Infrastructure and Power Supplies	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	1-Magnets	PF Coil: Manufacturing complete for EU PF 6 Coil and delivery to site	IC	Q2 2020	15/09/2020	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)
IC53/GB15	1-Magnets	TF Coil: 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	2- Vacuum Vessel	First EU Vacuum Vessel Sector fabrication complete and delivered to IO site	IC	Q4 2020	29/01/2021	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
IC55/GB17	11-Buildings Infrastructure and Power Supplies	Full crane access between Assembly Hall and Tokamak Building to allow lowering of Vacuum Vessel Sectors into Pit (RFE 1C)	IC	Q2 2020	Removed	6.2.P2.EU.05	Building Construction
IC76/GB18	6-Cryoplant & Fuel Cycle	Commissioning: Cryostat Leak Detection and Localization System delivery to site	IC	Q3 2023	14/02/2023	3.1.P3.EU.01	Leak detection and Localisation System
GB19	11-Buildings Infrastructure and Power Supplies	Cryoplant Compressor Building (51) RFE (RFE #8B)	GB	Q2 2019	22/02/2021	6.2.P2.EU.05	Building Construction
GB20	4-Divertor	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	11-Buildings Infrastructure and Power Supplies	Construction of Cryoplant Coldbox Building (52) Completed	GB	Q3 2019	17/03/2021	6.2.P2.EU.05	Building Construction
GB22	7-RF Heating & Current Drive	Manufacturing of 1st batch of Diamond Disks for EC Upper Launcher 1 finished	GB	Q2 2020	20/07/2020	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	1-Magnets	TF Coil : Delivery of TF04 (EU 07) by EU-DA to ITER Site	GB	Q2 2021	30/09/2021	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings

IC64/GB24	11-Buildings Infrastructure and Power Supplies	Medium Voltage distribution LC1A Ready for Equipment	IC	Q4 2022	16/06/2023	6.2.P2.EU.05 4.1.Pn.EU	Building Construction & Steady-State Electrical Network and Pulsed Power Electrical Network Installation
GB25	2- Vacuum Vessel	Delivery of Sector 9 by EU-DA to ITER Site	GB	Q2 2021	31/01/2022	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
GB26	11-Buildings Infrastructure and Power Supplies	Medium Voltage Distribution Building LC/2B (47) RFE (RFE #10)	GB	Q3 2022	16/06/2023	6.2.P2.EU.05 4.1.Pn.EU	Building Construction
GB27	8-Neutral Beam Heating & Current Drive	Start of Installation of Acceleration Grid Power Supplies - Converter System of Neutral Beam Injector-1 Q2	GB	Q3 2023	01/08/2023	5.3.P6.EU.01	NB Power Supply
GB28	6-Cryoplant & Fuel Cycle	Delivery of Cold Valve Boxes and Cryojumpers 5-8 (4 no.) Batch 2 by EU-DA to Site	GB	Q4 2022	31/10/2022	3.1.P1.EU.02	Front-End Cryopump distribution
GB29	7-RF Heating & Current Drive	Manufacturing of 1st batch of Waveguides for EC Upper Launcher 1 finished	GB	Q4 2023	31/08/2023	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	8-Neutral Beam Heating & Current Drive	Start of Installation of High Voltage Dec 1 of Neutral Beam Injector -1	GB	Q1 2024	03/06/2024	5.3.P6.EU.01	NB Power Supply
GB31	7-RF Heating & Current Drive	Manufacturing of the Ion Cyclotron RF Window Prototype finished	GB	Q2 2022	Removed	5.1.P1.EU.01	Ion Cyclotron Resonance Heating (ICRH) System (Equatorial port plugs incorporating 2 IC antennas)
GB32	5-Remote Handling	Task Order Signed for Manufacturing for Cask and Plug Remote Handling System (CPRHS)	GB	Q3 2022	01/04/2022	2.3.P3.EU.01	15 Cask and Plug RH systems
GB33	6-Cryoplant & Fuel Cycle	Delivery of Torus & Cryostat Cryopumps by EU-DA to ITER Site	GB	Q2 2022	15/06/2022	3.1.P1.EU.03	Cryopumps: 6 Torus and 2 Cryostat Cryopumps
IC90.2/GB34	11-Buildings Infrastructure and Power Supplies	Control Building (71) RFE (RFE #14)	IC	Q2 2022	30/06/2022	6.2.P2.EU.05	Building Construction

GB35	6-Cryoplant & Fuel Cycle	Delivery of Primary (VV)Leak Detection and Localisation by EU-DA to ITER Site	GB	Q4 2023	15/12/2023	3.1.P3.EU.01	Leak detection and Localisation System
GB36	9-Diagnostics	In-V Elec Feedthroughs Delivered to ITER Site	GB	Q4 2022	21/08/2023	5.5.P1.EU	Diagnostics (roughly 25% of all diagnostic systems)
GB37	3-Blanket	Completion of the qualification phase prior to start of Blanket First Wall series production	GB	Q1 2023	04/01/2023	1.6.P1A.EU	Blanket First Wall (215 panels)
GB38	4-Divertor	Completion of Stage I of the series production of Divertor Cassette Bodies.	GB	Q4 2024	12/12/2024	1.7.P1.EU.01	54 Divertor cassette bodies
GB39	9-Diagnostics	Electronics and Software for Magnetics Delivered to ITER Site	GB	Q3 2023	20/01/2023	5.5.P1.EU	Diagnostics (roughly 25% of all diagnostic systems)
GB40	5-Remote Handling	Equatorial Port Plug First Assembly Cask Delivered to ITER Site	GB	Q4 2023	20/07/2023	2.3.P3.EU.01	15 Cask and Plug RH systems
GB41	5-Remote Handling	Upper Port Plug First Assembly Cask Delivered to ITER Site	GB	Q4 2023	02/10/2023	2.3.P3.EU.01	15 Cask and Plug RH systems
GB42	5-Remote Handling	Monorail crane of Neutral Beam Remote Handling System and Delivered to ITER Site	GB	Q1 2024	06/11/2023	2.3.P5.EU.01	1 Neutral Beam RH system.
GB43	7-RF Heating & Current Drive	8th Set of Main High Voltage Power Supplies & Body Power Supplies (MHVPS & BPS) Delivered to ITER Site by EU-DA	GB	Q2 2024	23/02/2023	5.2.P4.EU.01	67% EC High Voltage Power Supplies
GB44	7-RF Heating & Current Drive	EC Upper Launcher Control System ITER Site Acceptance completed	GB	Q3 2024	27/02/2024	5.2.P1B.EU.01	Electron Cyclotron (EC) Control System
GB45	4-Divertor	Completion of Stage I of the series production of Divertor Inner Vertical Target.	GB	Q3 2024	17/09/2024	1.7.P2B.EU.01	Divertor inner vertical targets
GB46	7-RF Heating & Current Drive	Delivery 1st EC Upper Launcher from EU-DA to IO	GB	Q2 2024	14/03/2024	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	5-Remote Handling	In Vessel Viewing System Unit #1 Delivered to ITER Site	GB	Q4 2024	31/07/2024	5.7.P1.EU.01	6 In-Vessel Viewing systems
GB48	7-RF Heating & Current Drive	Delivery of 1st Set (1MW) of Gyrotrons Tubes by EU-DA to ITER Site	GB	Q1 2025	27/02/2025	5.2.P3.EU	25% EC Gyrotron Sources
GB49	4-Divertor	Delivery of the Divertor Rails to the ITER Site.	GB	Q1 2027	10/12/2026	1.7.P2E.EU.01	Divertor rails
GB50	6-Cryoplant & Fuel Cycle	Delivery of Heating Neutral Beam Cryopumps 1 from EU-DA to ITER Site	GB	Q1 2027	03/12/2026	3.1.P1.EU.04	Cryopumps for the Neutral Beam system (ITER and MITICA)
IC43/GB51	11-Buildings Infrastructure and Power Supplies	Assembly building complete	IC	Q4 2018	Achieved	6.2.P2.EU.05	Building Construction
GB53/IC66	11-Buildings Infrastructure and Power Supplies	Tokamak building construction complete	IC	Q3 2022	Removed	6.2.P2.EU.05	Building Construction
IC67/GB54	1-Magnets	TF Coils: Complete FAT for PA work scope for 18 TF Coils	IC	Q4 2021	31/05/2022	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
IC32/GB55	11-Buildings Infrastructure and Power Supplies	Cryostat support bearings full scale prototype delivery to site	IC	Q2 2018	Achieved	6.2.P2.EU.05	Building Construction
GB56	7-RF Heating & Current Drive	1st Set of Main High Voltage Power Supplies & Body Power Supplies (MHVPS & BPS)	GB	Q1 2020	Achieved	5.2.P4.EU.01	67% EC High Voltage Power Supplies
IC90.1/GB57	11-Buildings Infrastructure and Power Supplies	Delivered to ITER Site by EU-DA	IC	Q2 2022	10/06/2022	6.2.P2.EU.05	Building Construction
IC91.1/GB58	11-Buildings Infrastructure and Power Supplies	Cryoline Bridge available for installation of systems	IC	Q4 2022	30/11/2022	6.2.P2.EU.05	Building Construction
IC59.1/GB59	11-Buildings Infrastructure and Power Supplies	Busbar Bridge available for installation of systems	IC	Q2 2020	26/06/2020	6.2.P2.EU.05	Building Construction
IC59.2/GB60	11-Buildings Infrastructure and Power Supplies	Building: Tokamak Building access granted in L3	IC	Q2 2020	31/08/2020	6.2.P2.EU.05	Building Construction

PP_table 4 . Multiannual objectives of the ITER project (IC-GB milestones) (as of 31st March 2020).

Multiannual objectives for the Test Blanket Module (TBM)

The work carried out on the Test Blanket Module (TBM) is not covered by a standard Procurement Arrangement, but by specific TBM Arrangements (TBMA). Through the TBMAs signed by F4E in 2014, EU has committed to deliver two Test Blanket Systems 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).
F4E, in line with the 2017 recommendations of the working group for the realignment of the TBM and DEMO Breeding Blanket programmes, is reorganizing the TBM project as follows:

i) scope change: a Water-cooled Lead-Lithium TBM (WCLL) shall replace the HCLL TBM concept;
ii) collaboration with EUROfusion will continue for the R&D activities and for the design of WCLL TBM system.

A detailed implementation plan, developed in 2018, has been approved by the F4E Governing Board.
The following milestones of the TBM project complete the set of the 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
TBM03	10-Test Blanket Module	WCLL TBS Conceptual Design Review (CDR)	Q3 2020
TBM04	10-Test Blanket Module	WCLL TBS and HCPB TBS Preliminary Design Review (PDR)	Q4 2022
TBM05	10-Test Blanket Module	WCLL TBS and HCPB TBS Final Design Review (FDR)	Q4 2025
TBM06	10-Test Blanket Module	Signature of FD and procurement of WCLL and HCPB ancillary systems	Q2 2026
TBM07	10-Test Blanket Module	Signature of procurement of WCLL TBM and HCPB TBM sets	Q2 2027
TBM08	10-Test Blanket Module	Delivery of WCLL and HCPB ancillary systems to ITER site	Q3 2028
TBM09	10-Test Blanket Module	Delivery of WCLL and HCPB TBM sets to ITER site	Q3 2029

PP_table 5 . Multiannual objectives of the TBM project

Multiannual objectives for the Broader Approach and DEMO

The technical objective for the European part of the BA projects for Phase I, 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. For the period April 2020-March 2025, as no Procurement Arrangements have been signed yet, the technical objectives are defined based on the Project Plans 2020-2025 for all three projects[4].

[4] The Project Plans are to be approved by the BA Steering Committee in May 2020.

Related PA (BA)	Description	Baseline [5] Achievement Date	Credit Allocation (kBAUA)
Integrated Commissioning and Initial Operation	Common activities required to support JT-60SA activities, not covered under specific WBS sub elements of JT-60SA - 2017 Part	Dec-17 Achieved	1.128
EU Contribution to Assembly	Cash contribution in support of assembly	Dec-18 Achieved	1.572
STP-EU-TFC + STP-EU-TFCTF	Transport and Delivery of TF coils and accessories - 2017 part	Dec-17 Achieved	44.302
STP-EU-TFC + STP-EU-TFCTF	Transport and Delivery of TF coils and accessories - 2018 part	Mar-18 Achieved	24.190
STP-EU-TFCSP	1st TF spare coils and Spare TF Coil Winding Pack	Dec-19 Achieved	5.197
STP-EU-TFC	2nd TF spare coils	Dec-18 Achieved	5.197
STP-EU-HTSCL	Transport of the PF/CS HTSCLs - 2017 Part	Dec-17 Achieved	1.280
STP-EU-TFCPRE	Assembly or support of assembly of various components under European responsibility - 2017 Part	Dec-17 Achieved	1.475
STP-EU-TFCPRE	Assembly or support of assembly of various components under European responsibility - 2018 Part	May-18 Achieved	0.738
STP-EU-SNU	Transport and Installation of the SNUs -2017 part	Jun-17 Achieved	1.062
STP-EU-SCMPS	Transport and installation of the SCMPSs -2017 part	Dec-17 Achieved	7.229
STP-EU-SCMPS	Final acceptance on site SCMPS	May-19 Achieved	2.410
STP-EU-RWMPS	Design of RWMPSs	Jan-18 Achieved	0.575
STP-EU-RWMPS	Approval of Report on RWM Factory Test	Mar-20 Achieved	0.345
STP-EU-RWMPS	Transport and delivery on Site of the RWMPSs	Mar-20 Achieved	0.230
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Approval of First Design Report	Jun-17 Achieved	1.119
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Approval of Report on Factory Test	Jun-19 Achieved	1.119
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Delivery on Site	Jul-19 Achieved	0.746
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Acceptance Tests on Site and transfer of ownership	Sep-21	0.746
STP-EU-CR02	Cryostat Vessel Body Cylindrical Section completion of factory test	Nov-17 Achieved	7.824
STP-EU-CR02	Final acceptance of the Cryostat Vessel Body Cylindrical Section	Feb-18 Achieved	2.609
STP-EU-EDICAM	Delivery to Naka of JT-60SA EDICAM complete with port plug	Sep-19	0.010

PP_table 6 . Multiannual objectives JT-60SA for BA Phase I

[5] The baseline achievement date of the technical objectives has been defined in the Project Plan of each project and approved by the BA Steering Committee on 11th April 2019.

Related PA (BA)	Description	Baseline Achievement Date - Year	Credit Allocation (kBAUA)
Pellet injector (PEINJ)	Pellet Injector Construction and Test	2021	7.400
Power Supplies Spare Parts – Part 1 (PSSP01)	Power Supplies Maintenance Support	2021	1.087
Actively Cooled Divertor (DIV1)	Design and Fabrication of actively cooled Divertor Concept Validation	2021	2.028
ECRH Transmission (ECRHWG)	Electro Cyclotron Resonance Heating Waveguides – year 2021	2021	1.800
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils – Year 2021	2021	0.900
Cryopumps (CRPUM)	Cryopumps Construction and Test	2021	1.200
Thomson Scattering (TOSCA)	Fabrication and Tests – Policromators and the follow-up of fabrication and tests	2021	1.600
ECRH PS Spare Parts (ECPSSP01)	Electro Cyclotron Resonance Heating – Part 1	2021	0.500
Pellet injector (PEINJ)	Pellet Injector On-Site Installation & Commissioning Assistance	2022	0.400
Cryopumps (CRPUM)	Cryopumps On-site Installation & Commissioning Assistance	2022	0.300
ECRH Transmission (ECRHWG)	Electro Cyclotron Resonance Heating Waveguides – year 2022	2022	3.600
Actively Cooled Divertor (DIV2)	Design and Fabrication of actively cooled Divertor -Part 1 – Year 2022	2022	4.000
Thomson Scattering (TOSCA)	Fabrication and Tests - Optical Fibers, follow-up of fabrication and tests and On-Site Installation & Commissioning Assistance	2022	2.300
ECRH PS Spare Parts (ECPSSP01)	Electro Cyclotron Resonance Heating – Part 2 and maintenance support	2022	1.250
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils – Year 2022	2022	1.200
Actively Cooled Divertor (DIV2)	Design and Fabrication of actively cooled Divertor -Part 1 Year 2023	2023	4.000
ECRH Transmission (ECRHWG)	Electro Cyclotron Resonance Heating Waveguides – Year 2023	2023	4.400
EF Correction Coils (EFCC PS)	Design and Procurement of the Error Field Correction Coils – Year 2023	2023	1.200
Actively Cooled Divertor (DIV3 and DIV4)	Design and Fabrication of actively cooled Divertor -Part 1 - Year 2024	2024	8.100
ECRH PS (ECPSSP02)	Electro Cyclotron Resonance Heating – Procurement of 2 PS	2024	5.106
Cryoplant CRENH01	Enhancement of Cryoplant Performance	2024	5.778
Actively Cooled Divertor (DIV3-6)	Design and Fabrication of actively cooled Divertor -Part 1 , 3 and 4 -Year 2025	2025	15.300

PP_table 7 . Multiannual objectives JT-60SA for BA Phase II

Related PA (BA)	Description	Baseline Achievement Date	Credit Allocation (kBAUA)
IFMIF-EU-PA-04	Reports for procurement of all cryomodule subcomponents and start of cryomodule assembly at the BA site in Rokkasho	Mar-21	0.920
IFMIF-EU-PA-02-2	Spare Parts of the LIPAc Injector with their Delivery Report at the BA Rokkasho Site	Mar-21	0.500
IFMIF-EU-PA-05	MEBT components with its delivery report at the BA site in Rokkasho	Mar-17 Achieved	1.040
IFMIF-EU-PA-06	RF Power System with its Delivery Report at BA site in Rokkasho	Dec-17 Achieved	17.400
IFMIF-EU-PA-07	HEBT & Beam Dump components with its delivery report at the BA site in Rokkasho	Dec-19 Achieved	1.647
IFMIF-EU-PA-10-A	Phase A: Completion of commissioning @ 100 keV	Dec-17 Achieved	1.410
IFMIF-EU-PA-10-B	Phase B: Completion of commissioning @ 5 MeV	Jul-19 Achieved	3.670
IFMIF-EU-PA-10-B+	Phase B+: Completion of commissioning @ 5 MeV high duty cycle full LIPAc with drift line	Mar-21	1.530
IFMIF-EU-PA-12	Cryoplant Installation and Acceptance Test Report at Rokkasho BA Site	Sep-17 Achieved	1.870

PP_table 8. Multiannual objectives IFMIF/EVEDA for BA Phase I[6]

Related PA (BA)	Description	Baseline Achievement Date - Year	Credit Allocation (kBAUA)
Injector Spare parts (AF2-3)	LIPAc injector spare parts - New LEBT RFQ interface	2021	1.100
RF Power System (AF6-2)	RF Power System – refurbishment of critical subsystems (Spare parts of RF modules -technology based on tubes) – Year 2021	2021	1.000
Control System (AF8-2)	Control System - refurbishment of hardware and software – year 2021	2021	1.000
Injector Spare parts (AF02-3)	LIPAc injector spare parts - Upgraded emittance metre	2022	0.200
RF Power System (AF6-2)	RF Power System – Prototype for the solid state amplifiers and further refurbishment of critical subsystems	2022	4.500
Control System (AF8-2)	Control System - refurbishment of hardware and software – year 2022	2022	0.250
RF Power System (AF6-2)	RF Power System - procurement of spare parts for maintenance	2023	1.100
Control System (AF8-2)	Control System – maintenance of hardware and software – year 2023	2023	1.000
RF Power System (AF6-2)	RF Power System - procurement of spare parts for maintenance and delivery of the solid state amplifiers	2024	1.100
Control System (AF8-2)	Control System – maintenance of hardware and software – year 2024	2024	0.140

PP_table 9. Multiannual objectives IFMIF/EVEDA for BA Phase II

[6] Recent PA amendments are reflected in the table

Related PA (BA)	Description	Baseline Achievement Date	Credit Allocation (kBAUA)
(Supercomputer) CSCPA01 CSCPA02	Successful termination of operation, exploitation, dismantling	Jun-17 Achieved	7.380
(DEMO Design Activities) DPA01-JA-EU	Deliver reports on the agreed design activities	Feb 20 Achieved	0.610
(Remote Exper. Centre) RECPA01-EU	Delivery of software codes and reports on remote participation tests	Feb-20 Achieved	0.225

PP_table 10 . Multiannual objectives IFERC for BA Phase I

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	2021	1.278
CSC-EU	Computer resources and joint simulation projects contribution 2021	2021	0.500
REC-EU	Choice of technologies for ITER REC and collaboration with IFMIF/EVEDA (Establishment of LIPAc control room) year 2021	2021	0.450
DEMO Design Activities	Summary report of activities	2024	4.686
DEMO R&D	Structure material development for in-vessel components	2024	1.874
DEMO R&D	Database for material corrosion	2024	0.469
DEMO R&D	Neutron irradiation experiment of breeding functional materials	2024	1.406
DEMO R&D	Tritium technology for collection and inventory evaluation	2024	0.937
CSC-EU	Computer resources and joint simulation projects contribution 2024; management of procurement and operation of joint HPC if so decided	2024	0.700
REC-EU	Remote tests with IO, IFMIF/EVEDA and JT-60SA – year 2024	2024	0.750

PP_table 11. Multiannual objectives IFERC for BA Phase II

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 12 below provide a list of these objectives.

AREA	Objective	Target
Work Programme objectives	Implement a defined percentage of Work Programme objectives *[including GB milestones and predecessors]* by end of the year	95% implementation of Work Programme Objectives
Credit Allocation Scheme [CAS]	Reach a defined percentage of achieved CAS by end of the year	KPI ≥0.95
Quality	Reduce percentage of long aging NCRs compared to total number of open NCRs.	KPI≤0.22
Annual budget	Implement a defined percentage of Commitment Appropriations by end of the year	96% implementation of Annual budget
Annual payment	Implement a defined percentage of Payment Appropriations by end of the year	96% implementation of payment
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 12 . 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: Schedule Performance Index (SPI)

$$\frac{\textit{Number of milestones which are in the current baseline wih baseline dates later than the beginning of the } 2017 \textit{ and have been achieved}}{\text{Number of milestones which are in current baseline with baseline dates later than the beginning of the 2017 with baseline dates before the end of the current month}}$$

Equation 3: Overall Costs

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

Annual KPI:

Equation 4: Work Programme objectives

$$\frac{\textit{Number of Work Programme objectives met on time}}{\textit{Number of Work Programme objectives planned to be met}}$$

Equation 5: Credit Allocation Scheme (CAS)

$$\frac{\textit{Amount of CAS achieved}}{\textit{Amount of CAS planned to be achieved}}$$

Equation 6: Annual budget

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

Equation 7: Annual payment

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

Equation 8: Quality

$$\frac{\text{F4E NCRs open for more than 12 months}}{\text{Total F4E NCRs open}}$$

Equation 9: Vacancy rate

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

Equation 9: Turnover rate

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

Equation 10: Absenteeism rate[7]

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

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

[7] This formula has been updated compared to the one stated in the previous Programming Document in order to align it with the HR metrics report published at the end of the year.

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

- Schedule Performance Index (SPI)

Green	SPI ≥ 1.0
Amber	1.0 > SPI ≥ 0.80
Red	SPI < 0.80

- Overall costs

Green	KPI ≥ 1.0
Amber	1.0 > KPI ≥ 0.95
Red	KPI < 0.95

- Work Programme objectives

Green	KPI ≥ 0.95
Amber	0.95 > KPI ≥ 0.80
Red	KPI < 0.95

- Credit Allocation Scheme

Green	KPI ≥ 0.95
Amber	0.95 > KPI ≥ 0.80
Red	KPI < 0.95

- Quality (Long aging NCRs)

Green	KPI ≤0.1
Amber	0.25 ≥ KPI > 0.1
Red	KPI >0.25

- Annual Budget (overall at F4E Level)

Green	0.98 ≤ KPI
Amber	0.90 ≤ KPI < 0.98
Red	KPI <0.90

- Annual Payment (overall at F4E Level)

Green	0.95 ≤ KPI
Amber	0.90 ≤ KPI < 0.95
Red	KPI <0.90

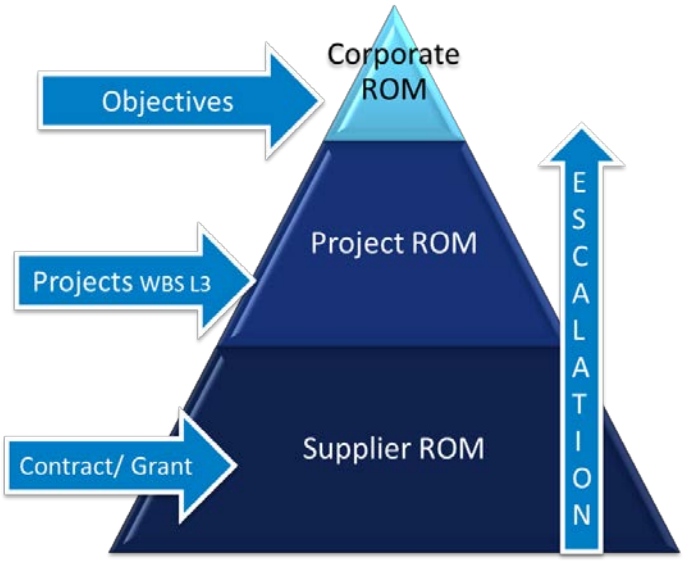
- Vacancy rate

Green	KPI ≤0.04
Amber	0.04<KPI<0.07
Red	KPI ≥ 0.07

Risk and Opportunity 2021-2025

F4E Risk Management Framework

The Risk Management at F4E currently consists of 3 different levels: Corporate (implemented since 2012), Project Level (the bigger part implemented since 2011) and the Supplier Risk Management. All risks and opportunities are evaluated in probability, schedule and cost. The information of the risk exposure is used to calculate the risk provision of the Estimate at Competition.
Suppliers risk registers are provided by the different suppliers once the contract is signed in order to share and inform F4E of the identified risks and the planned mitigation actions.



PP_figure 5 . F4E Risk Management levels

Corporate Risks

The Corporate Risk and Opportunity log is validated at the Senior Management Meeting and the sources of risk identification are the following:

1. Critical Project Risks (local)
2. Project aggregated risks
3. Risk from F4E horizontal activities
4. Risk identified during Audits/Reviews

The summary as April 2020 update is shown in the following PP_table 13. F4E has 10 “High” risks”. The action plans to control those risks are critical for F4E and the score associated to them is the result of the identified cost and schedule impact by the probability of the risk.

Risk Identification		Current Assessment April 2020					End of March 2019	TREND April 2019 April 2020	Comment
Risk ID	Risk Name	Current Probability	Current Schedule	Current Cost	Current Score	Residual Score			
EU.CO-CR-003	Delay in the reception of data/items from the IO or other DA's	High (< 50% <= 80%) (4)	High (6m - 1y) (4)	Very High (>100M€) (5)	100	48	100	=	No changes, long term risk
EU.CO-CR-061	Delay of systems in Critical Path to FP in 2025	High (< 50% <= 80%) (4)	Very High (>1y) (5)	High (20-100M€) (4)	100	100	100	=	No changes, long term risk, COVID impact under evaluation
EU.CO-CR-065	Changes in requirements or additional scope	High (< 50% <= 80%) (4)	High (6m - 1y) (4)	Very High (>100M€) (5)	100	100	100	=	Updated action plan
EU.CO-CR-004	Underperformance of components detected during the ITER integrated commissioning	Medium (<30% - <=50%) (3)	High (6m - 1y) (4)	Very High (>100M€) (5)	75	75	75	=	No changes, long term risk
EU.CO-CR-038	Lack of adequate technical integration along the ITER project lifetime	High (< 50% <= 80%) (4)	Medium (3m - 6m) (3)	High (20-100M€) (4)	64	64	64	=	No changes, long term risk
EU.CO-CR-032	Supplier not able to deliver or to comply with obligations (schedule/cost/scope/QA)	Medium (<30% - <=50%) (3)	High (6m - 1y) (4)	High (20-100M€) (4)	48	48	50	=	Reassessment done for better calculation, no real change
EU.CO-CR-053	Requirements not properly propagated	Low (<10% - <=30%) (2)	Medium (3m - 6m) (3)	Very High (>100M€) (5)	50	50	100	=	No changes
EU.CO-CR-070	Cost increase after 2020 ref. Dec. 2016 Cost Baseline	Low (<10% - <=30%) (2)	Very High (>1y) (5)	Very High (>100M€) (5)	50	32	50	=	No changes
EU.CO-CR-059	Inadequate budget post 2020	Medium (<30% - <=50%) (3)	High (6m - 1y) (4)	High (20-100M€) (4)	48	48	48	=	No changes

EU.CO-CR-072	Discontinuation of the ST positions after 2020	Medium (<30% - <=50%) (3)	Very Low (<1w) (1)	High (20-100M€) (4)	[redacted]	CLOSED	Risk closed managed in December 19

PP_table 13 . Summary of high corporate risks

Risks associated to the Multi Annual Programme

From a multi-annual perspective, a large list of risks exists and they can be associated with each of the procurements depending on the phase of development.
Some of the risks that are considered for each system are the following ones:

Threat	Mitigation Action
Lack of Competition in the industry causing increase of costs.	Reinforce market analysis. Procurement with negotiated procedure. In specific cases, qualify additional suppliers to create competition.
Lack of expertise in industry or laboratories due to the long-lead procurements.	These two risks are considered as directly linked to the previous one and therefore the same mitigation applies.
Lack of continuity in the fusion research causing lack of interest from industry.	
First of a kind R&D project: technical requirements may not be met as expected.	Risk accepted. Testing in place where needed.
Large number of deviations and non-conformities causing delays and over-costs.	Enhancement of follow-up and quality control at factory.
Late input by IO of design or late changes triggering delays and over-costs.	Strict configuration management of all packages by Project Teams. Put on hold procurement of equipment until all systems have reached construction design.
Possible claims from companies causing an increase of costs.	Implement working group in claims management (BIPS)

PP_table 14 . Threats and mitigation action associated to Multi-Annual Programme

As far as the EU in-kind procurements are concerned, the risk analysis has progressed through in-house analysis and feedback from the suppliers (whenever a manufacturing contract was in place).

Risks associated to the Work Programme 2020

As far as Work Programme 2021 is concerned, the following preliminary list of main risks has been derived (not in order of priority). A provision for these risks has been included in the WP when necessary. At the time of this report the effect of COVID-19 is under evaluation, therefore not included in the analyzed risks

Threat	Mitigation Action
Uncertainties in the manufacturing process	Include an appropriate buffer in the planning to clarify possible issues.
Delay in the reception of the free-issued items from other DAs	Plan regular meeting with the DAs and directly involve IO in the topic. Agree delivery dates with both DAs and IO.
Company failed in passing either a qualification step or full-scale prototype acceptance tests	Prepare plans to launch new contracts in parallel for manufacturing the item with different technology.
Lack of competition resulting in overpriced bids	Qualify additional suppliers to create competition (multi-annual activity)

Delays due to lack of agreement with contractors on the consequence of changes received from IO through F4E	Implement working group in claims management.

PP_table 15 . Threats and mitigation action associated to Work Programme 2021

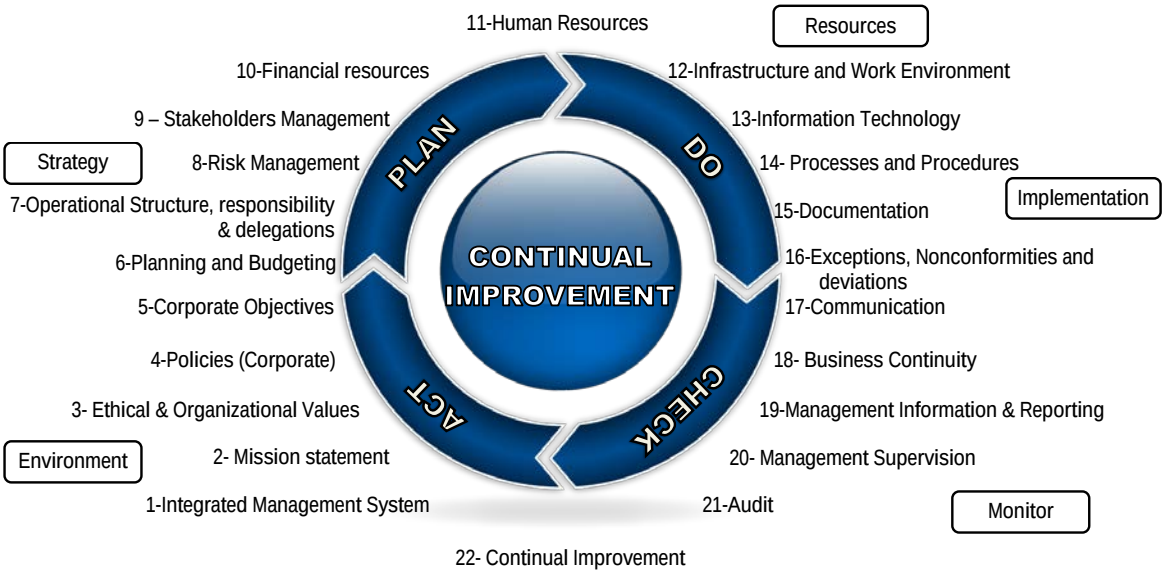
Quality Assurance

Integrated Management System Framework

The Integrated Management System being applied, which includes all quality-related processes, merges the requirements of the two control environments in which F4E operates since the beginning: the (ISO-based) ITER-wide Quality System, which is intended to ensure the performance of ITER and the compliance with the nuclear safety requirements, and the (COSO-based) Internal Control Standards as implemented by the European Commission.

Quality processes are implemented through a Quality Assurance Unit, which provides an effective and efficient method to perform the tasks, a perspective on the organization and its risks. It allows F4E to continually improve the way of working and to reinforce the F4E corporate culture towards the stakeholder's expectations.

The Quality Assurance Unit will continue foster the quality approach and quality system in F4E, as well as to contributing to the process development and improvement in F4E.
As the project continues its evolution into manufacturing, further effort will be put on Product Quality Assurance and Quality Control.



PP_figure 6 . F4E Integrated Management System (IMS)

Quality Related to ITER Procurements

The F4E Integrated Management System, which includes all quality processes, implements, for safety relevant components and activities, the requirements of the INB Order of the 07 February 2012 (replaced from the 01 July 2013 the Quality Order of 10 August 1984), emphasizing putting the application of quality to assure safety.

The overall framework to achieve the quality criteria for items and services provided by F4E to the ITER project is established in the F4E QA Programme for the ITER Project (a specific project QA Programs of the quality system). This QA Programme (for the procurement of the EU in-kind components) is approved by the F4E Director and by IO.
As part of the formalization and approval of the F4E commitments toward the ITER Project, F4E develops a strategy proposal for each project. Based on this strategy, F4E issues a specific Project Management Plan describing and defining the implementing provisions, the interfaces and breakdown of the project.

Suppliers are bound to follow a Quality System for their work. They provide a dedicated Project and Quality Management Plan that describes the quality provisions to be implemented in order to comply with the F4E Supplier Management and Quality Requirements as defined in the call and contractual documentation. Once approved by F4E, it can be used and is physically transferred to F4E at the end of the collaboration in order to ensure traceability of the delivered products over the whole project life.

Quality Related to Broader Approach Procurements

For the BA projects a project-wide Common Quality Management System (CQMS) was introduced.
The CQMS describes general features of common work within each project, allowing the Integrated Project Team to function as a single team with shared procedures and tools. In addition the Home Teams in each project are bound by their respective JA and EU Quality Management Systems, which themselves point to the Quality Management Systems of the actual procuring institutions concerned.
The specific Procurements QA follow the same rules and principles as the ITER Project procurements.

Product Quality Assurance (QA) and the Quality Requirements

Quality Assurance (focused on providing confidence that quality requirements will be fulfilled) encompasses several tasks, including:

1) Support the PTs on QA and QC topics ensuring that the F4E Integrated Management System (IMS) is implemented through the supply chain. Advise the PTMs and the Responsible Officers (ROs) on quality matters;
2) To define, coordinate, develop and implement specific Quality Programmes, the general Supplier Project Management and Quality Requirements, including the annual Supplier Audit Programme and relations with the IO-CT quality representatives for quality issues;
3) Develop and maintain the annual quality surveillance plan defining the planned quality assessment activities;
4) Perform monitoring, audits and assessments of the IMS implementation within the F4E suppliers;
5) Ensure correct functioning of the nonconformity control process. Generate suitable KPIs to show NCR performance and trends;
6) Monitor the QA/QC activities and identify IMS opportunities for improvement and liaise with the POI Unit to propose changes to the IMS;
7) Organize regularly trainings of operational QA.

The standard quality and management requirements are defined in the ‘Supplier Project Management and Quality Requirements’ (F4E-QA-115). For every procurement, the contractual Management Specification refers to that specification, as a base for requirements, defining the applicability of each requirement to the Supplier’s project organization and the dispositions implemented to ensure a proper monitoring of the contract or grant agreement. The Quality Assurance of the contracts/grants is under the responsibility of the Quality Assurance Unit.

Product Quality Control (QC)

Quality Control (focused on fulfilling quality requirements) is applied during the whole project life cycle and includes the following:

1) Monitor the quality of the deliverables and processes is being met and detecting defects by using the established tools, procedures and techniques.
2) Perform supervision visits within the F4E suppliers and coordinating on-site inspection activities
3) Manage the F4E Inspectors contract and any potential third party inspection Framework Contract
4) Analyze possible causes of defects.
5) Determine the preventive actions and deviation requests.
6) Communicate the corrective actions and deviation requests to the appropriate project organization members.

The Quality Control of the contracts/grants implementation is under the responsibility of the Quality Assurance Unit with the technical support and guidance of the Project Teams, ensuring the adequate monitor and supervision of the contract/grant implementation by the Supply chain. This includes regular visits and telecoms, scheduled quality supervision activities and follow-up of the specific work-package control plan.

The supplier monitoring is being supported by a framework contract of inspectors for manufacturing follow-up managed by the Quality Assurance Unit.

Quality Audit

Quality audits are performed to verify the state of the Quality System and Project and Quality Management Plans in accordance with the quality criteria and stakeholder requirements. The methodology regarding the planning, preparation, implementation and recording of internal and external quality audits is defined in a documented process.

The objective of the Quality Audits is to:

- Assure the conformity of the implemented quality system and processes
  - Internal: Relative to defined Internal and/or stakeholder requirements
  - Supplier: Relative to the Supplier's Project and Quality Management Plan
- Verify the effectiveness of the requirements propagation, the implementation of the quality system and its maintenance
- Supply the necessary suggestions to the adequate functioning of the quality system.

Internal audits are performed by the Process and Organizational Improvement Unit. Suppliers' audits are performed by the Quality Assurance Unit. The quality audit results are recorded and analyzed, and may trigger actions (Remedial, corrective and preventive), arising from nonconformities and comments. The reports of quality audits are one of the main inputs of the quality improvement.

Quality Target

The Quality Assurance Unit has defined several activities to improve the performance of the supply chain. To monitor the effectiveness of these actions, an IO requirement has been taken as reference for the acceptance level of long-term open non-conformities (NCR). The maximum acceptable time defined by IO to close an NCR is 12 months. A plan has been agreed with IO to gradually reduce the number of long lasting NCRs.

The objective for 2021 is to reduce the number of NCRs open for longer than 12 months to less than 22% of the total number of open NCRs and to reach the target of 0% set by IO in the following years.

This time reduction in closing NCRs implies an improvement in the management of the actions to fix the defects and problems on ITER parts.

PP_table 16 Credits per PA

This table shows the credit value that F4E should have earned up to end of March 2019 (baseline) against the credit that F4E has actually achieved and the credit that IO has already released to F4E as acknowledgement of the achieved milestones F4E has formally declared as such to ITER IO. It provides all details per PA with the yearly forecast credit up to end 2024 and the cumulative value for the years beyond.
Once a CAS milestone is achieved, before F4E can formally declare its achievement to ITER IO, all necessary data, reports and other information has to be collected from the supplier and then submitted to ITER 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 ITER IO. Then, it will be the turn of ITER 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.

					Forecast (kIUA) Current year includes only part not yet achieved						
Action	**PA**	**Baseline to end March 2020 (kIUA)**	**Achieved Credit (kIUA)**	**Released Credit (kIUA)**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026+**
		543.10280	**482.23694**	**425.83196**	**87.34223**	**80.55999**	**88.87842**	**88.09686**	**27.00276**	**46.29069**	**141.95540**
Magnets	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	47.40800	50.05400	36.30000	14.80800	20.41600	4.46200	0.00000	0.00000	0.00000	0.00000
	PA 1.1.P2A.EU.01 Pre Compression Rings	0.45000	0.30000	0.00000	0.30000	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	15.72000	13.22000	9.47000	11.00000	3.75000	7.24500	5.24500	0.40000	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	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	0.00000
Vacuum Vessel	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	68.84400	48.82700	37.15000	11.73500	22.09800	6.90000	0.00000	0.00000	0.00000	0.00000
In Vessel-Blanket	PA 1.6.P1A.EU.01 Blanket First Wall	0.10000	0.07500	0.00000	0.02500	0.10000	0.50000	0.50000	8.40000	4.80000	25.93000
In Vessel-Divertor	PA 1.7.P1.EU.01 Cassette Body	0.54000	0.54000	0.53000	0.02000	0.00000	0.09000	0.83000	1.14000	0.95000	2.47000
	PA 1.7.P2B.EU.01 Inner Vertical Target	3.11500	2.39000	1.66000	0.00000	0.72500	0.02500	0.02500	0.78000	2.85000	12.82500
Remote Handling	PA 2.3.P2.EU.01 Divertor Remote Handling System	1.20000	1.20000	0.00000	0.00000	0.40000	1.00000	0.00000	0.00000	2.92000	4.10000
	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.30000	0.30000	0.00000	0.50000	0.00000	3.70000	3.00000	0.80000	1.40000	7.61337

	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.10000	0.10000	0.00000	0.36000	0.55974	0.77000	0.92000	0.68000	1.13000	1.72000
	PA 5.7.P1.EU.01 In-Vessel Viewing System	1.20000	0.80000	0.80000	1.68000	0.30000	1.60000	0.70000	1.10000	0.62000	0.00000
Cryoplant and Fuel Cycle	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	0.00000	0.00000	0.00000	0.00000	1.00000	2.50000	1.32200	0.00000	0.00000	0.00000
	PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.18000	0.18000	0.18000	0.00000	0.00000	1.02000	0.00000	0.00000	0.00000	2.46400
	PA 3.1.P1.EU.01 Warm Regeneration Lines	0.20000	0.20000	0.06000	0.00000	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	0.07660	0.07660	0.07660	0.15319	0.00000	0.38220	0.00000	0.00000	0.15319	0.00000
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0.00000	0.00000	0.00000	0.00000	0.70000	0.70000	1.00000	0.00000	0.00000	0.00000
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II - 1st Amendment)	0.00000	0.00000	0.00000	0.00000	0.00000	0.15000	0.15000	0.25000	0.00000	0.00000
	PA 3.1.P3.EU.01 Leak Detection and Localization System Common Activities	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.40000	0.00000	0.00000	0.00000
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (2nd Amendment)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.05000
	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	0.00000
	PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	24.27610	22.98294	22.98294	0.00000	2.34066	1.04750	0.00000	0.00000	0.00000	0.00000
	PA 6.4.P1.EU.01 for Design of REMS	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.60000	0.30000	0.00000	3.30000
Antenna and Plasma Engineering	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.00000	0.00000	0.00000	0.12410	0.37230	0.00000	0.00000	0.00000	0.00000	10.78560
	PA 5.2.P1B.EU.01 Electron Cyclotron Control System	1.00000	0.50000	0.50000	0.50000	0.00000	0.00000	0.00000	0.00000	0.00000	0.40000
Neutral Beam and EC Power Supplies and Sources	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	3.55600	3.55600	3.55600	0.98700	1.97400	3.94800	0.00000	1.16300	0.00000	0.00000
	PA 5.3.P6.EU Neutral Beam Power Supply	14.16000	13.96000	12.76000	1.95000	0.95000	2.80000	4.70000	1.95000	0.95000	4.77571
	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	17.30000	14.95000	7.31000	2.25000	1.03000	0.00000	3.67000	3.90000	0.00000	0.00000
Diagnostics	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics	0.68519	0.50962	0.38491	0.30029	0.23061	0.00000	0.40000	0.10000	0.11200	0.00000
	PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.00000	0.00000	0.00000	0.19160	0.00000	0.19160	0.00000	0.00000	0.27782	0.29696

	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00021	0.00021	0.00000	0.00036	0.00021	0.00057	0.00010	0.00030	0.00058	0.00000
	PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0.00000	0.00000	0.00000	0.17218	0.17218	0.00000	0.17218	0.60836	0.02296	0.00000
	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0.00000	0.00000	0.00000	0.00000	0.00000	0.04110	0.02055	0.02055	0.00000	0.26030
	PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.11724	0.00000	0.00000	0.11724	0.23448	0.52758	0.46895	0.14655	0.70344	0.87929
	PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	1.38681	0.00000	0.00000	1.38681	0.00000	1.38681	0.00000	0.00000	3.38030	2.51355
Site and Buildings and Power Supplies	COMMON	54.83169	52.94865	50.54060	4.85000	5.22500	3.00000	2.43430	0.50000	3.50000	8.52114
	TOKAMAK COMPLEX	56.13327	54.91441	46.70839	19.30274	4.55120	10.38984	39.53449	2.72400	15.15440	0.89798
	AUX BUILDINGS TB03/TB04	70.95364	57.65916	55.08916	6.07844	5.66000	8.20604	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB05	15.00156	14.30000	14.30000	0.70156	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB06	10.72213	6.98000	5.10000	3.28071	0.69213	0.00000	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB07	6.37420	6.37420	6.03420	0.00000	0.03000	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	0.00000	42.46250
	AUX BUILDINGS D&B TB12	0.00000	0.00000	0.00000	0.00000	4.19562	4.02207	10.86829	1.40000	0.00000	0.00000
	AUX BUILDINGS D&B TB13	0.00000	0.00000	0.00000	0.00000	0.00000	1.14000	6.47000	0.00000	0.00000	0.00000
	LOAD CENTERS	11.93200	0.00000	0.00000	3.66800	0.00000	2.08500	3.66600	0.00000	5.26600	0.00000
	INTERCONNECTING ACTIVITIES	0.72835	0.72835	0.72835	0.00000	2.85286	19.04811	0.00000	0.00000	0.00000	0.00000
	AUX BUILDINGS D&B TB17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	9.69000
	COMMON CONTRACTUAL ACTIVITIES	42.79000	41.89000	41.89000	0.90000	0.00000	0.00000	0.00000	0.64000	2.10000	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	0.00000

PP_table 16. Credits per PA

PP_table 17 European Obligation to ITER project[8]

Procurement Package			Package Total (kIUA)	Funding Source	IC-25 Value kIUA	Notes
1.1 Magnets	P1A	Toroidal Field Magnet Windings	89.74000	EU	89.74000	
	P1B	Toroidal Field Magnet Windings	86.65793	EU-JA	7.73620	
				JA	78.92173	
	P2A	Toroidal Field Magnet Structures	46.86000	EU	0.60000	
				EU-JA	46.26000	
	P2B	Toroidal Field Magnet Structures	43.85280	EU-JA	3.10050	
				JA	40.75230	
	P2C	Magnet Supports	22.86000	CN	22.86000	
	P3A	Poloidal Field Coil PF1	6.80000	RF	6.80000	
	P3A-B	Poloidal Field Coil PF2, PF3, PF4, PF5 & PF6	40.86000	EU	40.86000	
	P3C	Correction Coils	5.51000	CN	5.51000	
	P4A-B	Central Solenoid Magnet & Magnet Assembly	53.32698	US	49.84000	
				IO	3.48698	
	P5A	Feeders	31.98556	CN	31.98556	
	P5B	Feeder Sensors	34.08789	IO	34.08789	
	P5C	Magnets and feeders workshop	13.14060	IO	13.14060	
	P6	Magnet Conductor Testing	3.47166	IO	3.47166	
	P6A	Toroidal Field Magnet Conductors	215.01000	CN	16.15000	
				EU	43.39000	
				EU-JA	21.50000	
				JA	32.23000	
				KO	43.39000	
				RF	41.54000	
				US	16.81000	
	P6B	Central Solenoid Magnet Conductors	90.00000	EU-JA	90.00000	

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	P6C	Poloidal Field Magnet Conductors & Feeders/Correction Coils Conductors	83.02744	CN	54.83576	
				EU	11.22881	
				RF	16.96287	
1.5 Vacuum Vessel	P1A	Vacuum Vessel - Main Vessel, Vacuum Vessel - Blanket Manifolds & Hydraulic Connectors, and Vacuum Vessel	118.86042	EU	87.00393	
				KO	25.20000	
				IO	6.65649	
	P1B	In-Wall Shielding (VV-IWS) Block Assemblies - Divertor Pipe Enclosures	40.67923	IN	37.50791	
				IO	3.17132	
	P2A	Equatorial and Lower Ports	55.30949	KO	55.30949	
	P2B	Upper Ports	19.74573	RF	19.74573	
	P3A	ELM and VS Coils	33.35113	IO	33.35113	
	P3B	Power Supplies for IV Coils	47.76387	IO	47.76387	(1)
				KO	0.00000	
	P4	VV In-Service Inspection	13.68535	IO	13.68535	
	P5	Sealing Flange Procurement	0.97431	IO	0.97431	
1.6 Blanket System	P1A	Blanket First Wall	84.52000	CN	10.69000	
				EU	40.33000	
				RF	33.50000	
	P1B	Blanket Shield Blocks	56.34000	CN	28.27000	
				KO	28.07000	
	P1C	Diagnostic First Wall	6.97372	IO	6.97372	
	P2	Port Limiters	0.00000	US	0.00000	
	P3	Blanket Module Connections	9.71000	RF	9.71000	
	P4	Vacuum Vessel Protection System First Plasma	6.31624	IO	6.31624	
	P5	Diagnostic Neutral Beam Liner	2.39268	IO	2.39268	
	P6	Blanket Manifolds	4.42901	EU	4.42901	
1.7 Divertor	P1	Cassette Body and Assembly	6.04000	EU	6.04000	
	P2A	Outer Targets	27.69000	JA	27.69000	
	P2B	Inner Targets	19.62000	EU	19.62000	
	P2C	Dome	14.57000	RF	14.57000	
	P2D	Plasma-Facing Component Testing	8.00000	RF	8.00000	

	P2E	Divertor Rail	2.33061	EU	2.33061	
	P3	Tungsten Divertor	12.64449	IO	12.64449	
	P4	Divertor Integration	17.94895	IO	17.94895	
2.2 Machine Assembly	P1	Assembly Operations	977.26973	IO	977.26973	(3)
	P2A	Machine Assembly Tooling 3-11	18.53300	KO	18.53300	
	P2B	Assembly Tooling 1-2, 12-13	0.01802	IO	0.01802	(3)
	P3	Assembly Steel Platforms	0.00000	IO	0.00000	(3)
2.3 Remote Handling Equipment	P1	In-Vessel Blanket Remote Handling Equipment	42.50000	JA	42.50000	
	P2	In-Vessel Divertor Remote Handling Equipment	9.62000	EU	9.62000	
	P3	Cask and Plug Remote Handling System	17.31337	EU	17.31337	
	P3	Cask and Plug Remote Handling System	0.25391	IO	0.25391	
	P4	In-Vessel Remote Handling Viewing & Metrology	0.00000	EU	0.00000	
	P5	Ex-Vessel Neutral Beam Remote Handling Equipment	6.23974	EU	6.23974	
	P6	Hot Cell Maintenance Equipment	64.49161	IO	64.49161	(1)
	P7	Tokamak Remote Handling Equipment	21.36043	IO	21.36043	
2.4 Cryostat	P1A	Cryostat	76.26075	IN	73.15429	
		Cryostat Rectangular Bellows		IO	3.10646	
	P1B	Vacuum Vessel Pressure Suppression System	2.86311	IN	0.00000	
				IO	2.86311	
	P1C	Cryostat Support Bearings	4.08856	IO	4.08856	
2.6 Cooling Water	P1A-B	Tokamak Cooling Water System: Material & Transportation	64.47842	US	64.47842	
	P1C	Tokamak Cooling Water System: Engineering, On-Site	5.32215	IO	5.32215	(3)
	P2A	Heat Rejection System (HRS) & Comp Cooling Water System	50.59206	IN	50.59206	
	P2B	Heat Rejection & Comp Cooling Water: Engineering, On-Site	0.87186	IO	0.87186	(3)
	P3	Piping inside site buildings beyond 10 m	8.21205	IO	8.21205	
2.7 Thermal Shield	P1	Thermal Shield	26.88300	KO	26.88300	
				IO	0.00000	
3.1 Vacuum Pumping & Fuelling	P1	Torus & Cryostat Cryopumps, Valveboxes and NB Cryopumps and Cryopumps	9.60040	EU	9.45118	
				IO	0.14922	(3)

	P2	Roughing Pumps and Roughing Pumps (VS-RP)	6.56583	US	5.85348	
				IO	0.71235	(3)
	P3	Leak Detection (VS-LD) and Leak Detection	4.97148	EU	4.40000	
				IO	0.57148	(3)
	P4	Standard Components, Vacuum Auxiliary Systems Early Delivery, and Vacuum Auxiliary Systems Late Delivery	7.89215	US	3.19800	
				IO	4.69415	(3)
	P5	Pellet Injector and Pellet Injection System	6.41887	US	3.81993	
				IO	2.59894	
	P6	Gas Injection System & GDC and Gas Injector Valve Boxes & Glow Discharge Cleaning Cond System	6.77985	CN	6.77985	
				IO	0.00000	(3)
	P7	Vacuum Laboratory	7.54578	IO	7.54578	
	P8	Sealing Flange	0.45637	IO	0.45637	
3.2 Tritium Plant	P1	Tokamak Exhaust Processing System	9.94276	US	9.89259	(1)
				IO	0.05017	(3)
	P2	Storage & Delivery and Fuel Storage & Delivery (SDS) System	12.50494	KO	11.78630	
				IO	0.71864	(3)
	P3	Isotope Separation System (ISS) and Hydrogen Isotopes Separation	6.67324	EU	5.19406	(1)
				IO	1.47918	(3)
	P4	Atmosphere Detritiation and Detritiation Core System	85.23026	EU-JA	14.06213	(1)
				IO	71.16813	
	P5	Water Detritiation System Tanks, Water Detritiation System Main System, and Water Detritiation	16.46166	EU	11.52114	(1)
				IO	4.94052	
	P6	Tritium Analysis & Control	20.96148	IO	20.96148	
	P7	Tritium Plant Equipment	19.97177	IO	19.97177	
3.4 Cryoplant & Distribution	P1	Cryoplant (LN2 and Auxiliary Systems) and Cryoplant	85.71759	EU	26.37110	
				IO	59.34649	(1)
	P2	Lower Pipe Chase Cryolines and Later Delivery Cryolines	17.68000	IN	15.29000	
				IO	2.39000	
	P3	Cryodistribution Components	18.45929	IN	18.45929	
4.1 Electrical Power Supply	P1A-8B	SSEN & PPEN Design	6.93810	EU	6.93810	
	P1B	Pulsed Power Electrical Network (PPEN)	21.82914	CN	21.82914	

& Distribution System	P2	AC/DC Convertors and RPC-HF	112.27221	CN	66.69350	
				KO	45.57871	
				IO	0.00000	
	P3	Switching Network, Fast Discharge Units, DC Busbar & Instrumentation	70.85588	RF	59.08426	
				IO	11.77162	
	P8A	Emergency Power System	4.22273	EU	4.22273	
	P8B	SSEN & PPEN Assembly	29.48893	EU	29.48893	
	P8C	SSEN Components	20.00186	EU	5.00000	
				IO	0.00186	
				US	15.00000	
	P9	Cable Procurement	30.34010	IO	30.34010	
4.5 CODAC	P1	Control and Data Access & Communication	70.39886	IO	70.39886	
5.1 IC H&CD	P1	IC Antenna	22.03373	EU	14.73000	(1)
				IO	7.30373	(3)
	P2	IC Transmission Lines	8.32629	US	7.31807	(1)
				IO	1.00822	(3)
	P3	IC RF Power Sources	20.04593	IN	18.00000	
				IO	2.04593	(3)
	P4	IC RF HV Power Supply	12.66791	IO	5.80076	(1)
				IN	6.86715	
5.2 EC H&CD	P1A	EC Equatorial Launcher	6.42250	JA	5.26874	
				IO	1.15376	(3)
	P1B	EC Upper Launcher PTB Window, EC Upper Launcher PTB Main Plug, and EC Upper Launcher	23.57149	EU	12.68200	
				IO	10.88949	(3)
	P2	EC Main Transmission Line	14.25213	US	12.69906	
				IO	1.55307	(3)
	P3	EC RF Gyrotrons	31.74301	EU	7.95511	
				IN	2.44985	
				JA	11.49219	
				RF	9.84586	
	P4	EC HV Power Supply	15.99467	EU	11.62800	
				IN	4.20100	
				IO	0.16567	(3)
5.3 NB H&CD	P1	NB Assembly and Testing	3.80000	EU	3.80000	

	P2	NB Beam Source and HV Bushing, Accelerator	11.50000	EU	3.89300	
				EU-JA	2.07500	
				JA	5.53200	
	P3	NB Beamline Components	3.90000	EU	3.90000	
	P4	NB Pressure Vessel, Magnetic Shielding	12.61913	EU	10.65795	
				EU-JA	0.00000	
				IO	1.96118	
	P5	NB Active Correction and Compensation Coils	4.38821	EU	4.16428	
				IO	0.22393	
	P6	NB Power Supply	92.14579	EU	31.28571	
				EU-JA	42.91800	
				JA	17.94208	
	P7A	Diagnostic Neutral Beam Power Supply	9.67475	IN	9.67475	
	P7B	Diagnostic Neutral Beam Beamline	13.10000	IN	13.10000	
	P8	SF6 Gas System	6.21258	JA	0.00000	
				IO	6.21258	
	P9	Neutral Beam Test Facility Components	26.71000	EU	25.80000	
				IN	0.91000	
				JA	0.00000	
	P10	Heat Protection Panels in VV CD	0.75966	IO	0.75966	
	P11	Temporary Items from Four-Staged Approach	0.88267	IO	0.88267	
	P12	Component Qualification	0.88551	IO	0.88551	
5.5 Diagnostics	P1	Diagnostic Systems	205.66200	CN	3.90042	
				EU	32.04861	(1)
				IN	3.63417	
				JA	19.50047	
				KO	4.11268	
				RF	17.86483	
				US	15.94669	(1)
				IO	108.65413	
5.7 IVVS	P1	In-Vessel Viewing System	6.80000	EU	6.80000	

5.8 Port Plug Test Facility	P1	Port Plug Test Facility	11.71805	RF	8.72983	
				IO	2.98822	
6.2 Buildings	P1/01	Concrete Buildings	504.20274	EU	0.00000	
	P2/01	PF Coil Winding Building		EU	12.80000	
	P2/02	AE Services		EU	55.77490	
	P2/03	Tokamak Excavation & Ground Support Structure		EU	31.00000	
	P2/04	Anti-Seismic Bearings		EU	6.20000	
	P2/05	Buildings Construction		EU	348.60126	
	P2/06	Office Building		EU	13.85000	
	P2	Buildings		IO	35.97658	
6.3 Waste	P1	Waste Treatment Storage (Type A Radwaste System)	37.54249	EU	10.05610	
	P2	Waste Treatment Storage		IO	23.74373	
	P3	Tokamak Assembly Preparation Building		IO	3.74266	
6.4 Radiological	P1	Radiological Protection	4.20000	EU	4.20000	
6.9 Access Control	P1	Access Control and Security Systems	11.64874	IO	11.64874	
				In-Kind PA (a)	**2,876.05847**	
				Transfers from the Reserve Fund to In-Kind (b)	**3.00380**	
				IO Fund (c)	**1,831.79090**	
				Transfers from the Reserve Fund to IO Fund for IO and DAs (d)	**138.79848**	
				TBM (e)	**50.36541**	
				Total Direct Capital Cost (a + b + c + d + e)	**4,900.01705**	

PP_table 17. European Obligations towards IO

Notes:

1) Includes previously deferred items.

2) Represents a new Procurement Package introduced in this report.

3) Costs of Installation and Assembly have been centralized and moved to 2.2.P1.IO. The remaining amount, if any, reflects the cost of minor components.

PAs, cash contributions, secondment agreements for Broader Approach

Title	BA EU Commitment kBAUA	Signed EU PAs (or equivalent) kBAUA	Original EU PA (or equivalent) Signed date
Supply of the Toroidal Field Magnet (EU-TFC)	99.413	99.413	12/07/2010
Supply of One Spare Toroidal Field Coil (EU-STFC)	5.197	5.197	13/03/2014
Toroidal Field Coil Pre-assembly (EU-PAS)	2.950	2.950	06/06/2014
Supply of HTS Current Leads for the TF, CS and EF coils (EU-HTSCL)	3.420	3.420	08/02/2010
Setup of a Cryogenic Test Facility and the Performance of Tests of the TF coils (EU-TFCTF)	18.603	18.603	24/01/2012
Supply of the Quench Protection Circuits for Poloidal and Toroidal Field Coils (EU-QPC)	19.150	19.150	03/12/2009
Supply of Toroidal Field, Poloidal Field, and Fast Plasma Position Control Coils Power Supplies (EU-SCMPS)	20.080	20.080	16/02/2011
Supply of the Switching Network Units for Central Solenoids (EU-SNU)	7.080	7.080	28/12/2010
Supply of the Resistive Wall Mode Control Coil Power Supply system (EU-RWMPS)	1.150	1.150	21/04/2015
Supply of Cryostat Base (EU-CR01)	4.348	4.348	07/12/2009
Supply of Cryostat Vessel Body Cylindrical Section (EU-CR02)	13.042	13.042	25/07/2011
Supply of the Cryogenic System (EU-CRYO)	35.250	35.250	29/11/2012
Supply of the ECRF Power Supply system (EU-ECRFPS)	3.730	3.730	22/07/2015
Integrated commissioning / initial operation, Commissioning (EU)	1.408	1.408	21/04/2015
Supply of the Fast Wide Angle Video Diagnostic System based on the EDICAM intelligent camera (EU-EDICAM)	0.010	0.010	28/06/2018
Supply of the Displacement and Stresses Monitoring System for the JT-60SA TF Coils (EU-TFCDSMS)	0.010	0.010	06/09/2019
EU Contribution to assembly	1.572	1.572	23/03/2018
Satellite Project (Total)	**236.413**	**236.413**	
TF01 Engineering Design of HFTM (EU)	2.065	1.465	13/06/2011
TF01bis Engineering Design of HFTM (EU)		0.600	02/09/2014
TF02 Irradiation Tests in Fission Reactor (EU)	1.850	1.850	30/09/2014
TF04 Other Engineering Validation Tasks (EU)	5.260	4.660	11/11/2011
TF04bis Other Engineering Validation Tasks (EU)		0.600	20/11/2014
LF01 EVEDA Li Test Loop (EU)	0.800	0.800	23/07/2010
LF03 Erosion/Corrosion (EU)	1.220	1.220	23/07/2010
LF04 Purification (EU)	0.490	0.490	23/07/2010

LF05 Remote Handling (EU)	1.710	1.710	22/04/2011
AF01 Tranversal Activities of the Accelerator Prototype (EU)	16.700	16.700	27/01/2014
AF02 Injector (EU)	4.580	4.580	18/12/2009
AF02-2 Injector spare parts (EU)	0.500	0.000	
AF03 Radiofrequency Quadrupole (EU)	25.370	25.370	14/12/2010
AF03.2 Backup Set of RFQ Couplers (EU)	1.000	1.000	07/10/2014
AF04 First Cryomodule of SRF LINAC (EU)	5.810	6.110	26/04/2011
AF05 Medium Energy Beam Transport line MEBT (EU)	3.470	3.470	24/06/2011
AF06 RF Power (EU)	23.200	23.200	18/05/2010
AF07 High Energy Beam Transport line HEBT and Beam Dump (EU)	5.490	5.490	24/06/2011
AF08 Auxiliary Systems (Control Systems and support) (EU)	1.600	1.600	04/10/2010
AF09 Diagnostics (EU)	1.520	1.520	14/11/2012
AF10-WP1 Installation, Checkout, Startup and Commissioning (EU)	4.150	4.150	27/01/2014
AF10-WP2 Installation, Checkout, Startup and Commissioning (EU)	2.540	2.540	20/06/2014
AF10-WP3 Installation, Checkout, Startup and Commissioning (EU)	3.570	3.570	02/09/2014
AF10-WP4 Installation, Checkout, Startup and Commissioning (EU)	1.890	1.590	22/07/2015
AF12 Supply of the Cryoplant of the Prototype Accelerator	2.490	2.490	23/03/2015
ED01 Eng. Design of IFMIF Plant (EU)	2.610	2.610	28/03/2013
ED02 Eng. Design of Accelerator Facility (EU)	6.360	6.360	29/03/2013
ED03 Eng. Design of Lithium Target Facility (EU)	0.800	0.800	18/03/2013
ED04 Eng. Design of Test Facility (EU)	4.270	4.270	27/03/2013
Secondments Professional Staff (EU)	13.120	13.120	15/11/2007
Common Expenses (EU)	1.580	1.580	15/05/2008
Common Fund (EU)	2.010	1.810	15/12/2010
IFMIF/EVEDA (Total)	**148.050**	**148.050**	
IFERC-DPA01-JA.EU (Phase Two DEMO Design Activities (DDA) for the IFERC Project)	6.040	6.040	17/06/2011
IFERC-T2PA01-JA.EU (R&D on Tritium Technology in phase 2-3 part 2 for the DEMO R&D for IFERC)	0.550	0.550	16/07/2014
IFERC-T1PA01-EU.CIEMAT (DEMO R&D Activities on SiC/SiC Composites for the IFERC Project)	2.849	2.849	14/12/2010
IFERC-T1PA01-EU.ENEA (DEMO R&D Activities on SiC/SiC Composites for the IFERC Project)	0.442	0.442	25/01/2011
IFERC-T1PA02-EU.ENEA (DEMO R&D on SiC/SiC Composites for the IFERC Project: erosion/corrosion of SiC and SiC/SiC in liquid metal)	1.032	1.032	31/01/2012

IFERC-T3PA01-EU.CRPP (DEMO R&D Activities in DEMO Blanket for the IFERC Project)	0.425	0.425	14/12/2010
IFERC-T3PA01-EU.SCK.CEN (DEMO R&D Activities in DEMO Blanket for the IFERC Project)	0.825	0.825	14/12/2010
IFERC-T3PA01-EU.KIT (DEMO R&D Activities in DEMO Blanket for the IFERC Project)	2.647	2.647	14/12/2010
IFERC-CSCPA01-EU.CEA (Supply of the supercomputer and peripheral equipment for the IFERC project (CSC activity))	91.500	91.500	28/04/2010
IFERC-CSCPA02-EU.CEA (Enhancement of the Computational Simulation Centre in IFERC)	6.320	6.320	01/11/2013
IFERC-CSCPA01-JA.EU (Supply of Computer Resources)	0.025	0.025	17/01/2019
IFERC-RECPA01-JA.EU (Outline of the Requirements for REC for the IFERC Project)	0.100	0.100	26/08/2013
IFERC-RECPA01-EU (Supply Remote Data Access Software Framework & Integrated Software Platform)	0.775	0.775	28/01/2014
Secondments by EU	1.320	1.320	15/11/2007
Cash Contributions by EU	0.700	0.700	15/12/2010
IFERC (Total)	**115.550**	**115.550**	

PP_table 18 . PAs, cash contributions, secondment agreements for BA Phase I

Title	BA EU Commitment kBAUA
JT-60SA Enhancements in-kind	
In-vessel Components	62.828
Heating & CD Systems	14.906
Plasma Diagnostics	7.548
Cryogenic	5.778
Magnet and Power Supply	4.650
Control System	0.700
Other Tokamak Systems	0.300
EU on-site personnel	6.000
JT-60SA Operation / Maintenance / Assembly	
Consumables	61.066
EU on-site personnel support and Project Team Cost	1.000

Maintenance & Assembly	4.724
Replacement parts	5.300
IT infrastructure	3.000
Others	0.700
JT-60SA (Total)	**178.500**
Fusion Neutron Source	4.000
Lithium Target Facility	4.000
LIPAc-Injector	1.800
LIPAc-RF Power System	7.610
LIPAc-Control System	1.590
Common Expenses (Europe)	1.400
Common Fund (Europe)	8.600
On site personnel (Europe)	10.500
IFMIF/EVEDA (Total)	**39.500**
DEMO Design	5.289
DEMO R&D	5.361
CSC	1.200
REC	1.200
Project Team	1.350
IFERC (Total)	**14.400**

PP_table 19 . Planned PAs, cash contributions, secondment agreements for BA Phase II[9]

[9] As the PAs are not yet signed the PAs have been summed up based on topics, to show the total credit values planned.

Action number	Action name	PMP delivery Target quarter
Action 1	Magnets	Q1 2022
Action 2	Vacuum Vessel	Q1 2021
Action 3 & 4	In Vessel - Blanket and Divertor	Q1 2021
Action 5	Remote Handling	Q1 2021
Action 6	Cryoplant and Fuel Cycle	Q4 2020
Action 7	Antennas and Plasma Engineering	Q4 2021
Action 8	Neutral Beam and EC Power Supplies and Sources	Q1 2021
Action 9	Diagnostics	Q1 2021
Action 10	Test Blanket Module	Q3 2021

PP_table 20 . 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 Annual Forecast 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 2025.
- Estimates of expenditure in payments according to detailed Payment Forecasts for 2020, 2021 and 2022 and estimates based on commitment needs until 2025.

The information below is based on the general assumptions introduced in the Single Programming Document 2021 and on the following specific assumptions:

1. Specific assumptions for the establishment of the F4E Budget

Reference

The European Council set the global amount deemed necessary for all F4E activities during the ITER construction phase to EUR 6.6 billion until 2020, expressed in 2008 value. When converting from current year EUR values to 2008 economic conditions and vice versa the following escalation/de-escalation rates are applied:

Item/Year	≤ 2020	2021 and above
Operational Expenditure (Title III) linked to the delivery of in-kind contributions	2.60%	2%
Cash Contribution (IO, Japan, NBTF, BA etc.)	2%	2%
Administrative expenditure (Title I and II)	2%	2%
ITER Organisation (Reserve Fund and Undistributed budget)	2%	2%

Financial_Table 1. Escalation Rate

The link between the 2008 value and the current economic conditions is given in table 12 for Expenditure in commitment appropriations.

All other tables under this Annex are in current EUR value. The figures provided beyond 2020 are based on the communication[1] received by the European Commission in May 2020 revising its 2018 proposal[2] which foresees a cut of 7.5% in the EURATOM contribution (in commitment) to F4E for the whole period 2021 to 2027.

[1] Communication 2020/442 final, from 27 May 2020, from the Commission to the European Parliament, the European Council , the European Economic and Social Committee and the Committee of the Regions

[2] Legislative financial statement annexed to the Commission Proposal (2018) 445 for a Council Decision amending Decision 2007/198/Euratom, establishing the European Joint Undertaking for ITER and the Development of Fusion Energy.

2. Estimate of Revenue

The F4E revenue is made up of:

2.1. EURATOM contribution
2.2. ITER Host State contribution
2.3. Membership contributions from members other than EURATOM
2.4. Utilisation of unused commitment appropriations
2.5. Revenue from ITER Organization (Reserve Fund and Undistributed Budget) and from recoveries

2.1. EURATOM contribution

The contribution from EURATOM constitutes the main source of revenue for F4E. This revenue is divided in earmarked revenue for operational and administrative expenditure. The latter covers the main part of the F4E administrative costs. The breakdown of the annual EURATOM contribution until 2020 was included in the Legislative Financial Statement[3] accompanying the Council Decision (2013) 791, which has been further adjusted during the annual budgetary procedures.

F4E receives no other contribution from EU than for the ITER project

2.2. ITER Host State Contribution (IHS)

Until 2020, 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 F4E budget minus the domains of exclusion as agreed in the exchange of letter[4] from 2011 and defined as follows:

- Administrative expenditure;
- Broader Approach cost;
- Test Blanket Modules cost;
- The IFMIF construction cost (DONES);
- Transportation cost.

The same assumptions have been taken for the Next MMF subject to final agreement.

The table below represents the expenditure allocated under the Host State contribution, based on commitments and excluding the bank interests gained on this contribution:

[3] 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

4 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).

In Commitment Appropriations Current value (EUR)	<2007 ITER Construction	2007- 2020 ITER Construction	2021- 2025 ITER Construction	*TOTAL*
Total F4E budget	**42 129 070**	**7 625 102 228**	**4 730 773 634**	**12 458 004 932**
Of which Administration		*543 598 742*	*346 927 998*	***890 526 740***
Of which Test Blanquet Modules		*36 555 469*	*34 392 000*	***70 947 469***
Of which Technology for Broader Approach		*77 773 027*	*205 524 242*	***283 297 269***
Of which DONES Expenditure			*88 400 000*	***88 400 000***
Of which Transportation		*48 890 241*	*46 968 487*	***95 858 729***
Of which scope for IHS contribution	**42 129 070**	**6 918 284 749**	**4 008 560 907**	**11 028 974 726**
IHS contribution	**1 484 200**	**1 383 656 950**	**799 800 000**	**2 197 341 150**
Ratio IHS/IHS Scope	3.52%	20.00%	19.95%	**19.92%**

In Commitment Appropriations Constant 2008 value (EUR)*	TOTAL <2007	TOTAL 2007- 2020	*TOTAL*
Total F4E budget	43 912 668	6 544 513 498	**6 588 426 166**
Of which Administration		*473 253 003*	***473 253 003***
Of which Test Blanquet Modules		*31 926 295*	***31 926 295***
Of which Technology for Broader Approach		*65 152 537*	***65 152 537***
Of which Transportation		*38 242 953*	***38 242 953***
Of which scope for IHS contribution	43 912 668	5 935 938 710	**5 979 851 378**
IHS contribution	**1 556 614**	**1 174 509 842**	**1 176 066 456**
Ratio IHS/IHS Scope	3.54%	19.79%	**19.67%**

*calculations in 2008 value applies until 2020 only

Financial_Table 2. IHS Contribution <2007-2020 to ITER construction phase (in current and 2008 value)

The figures shown in the table 2 are indicative, based on F4E estimates and adjusted to the actual cost for the domain of participation of the ITER Host State.

The amount forecasted for 2020 contribution represents the balance between the above calculated total and the budgets executed in the previous years. It shall be noted this amount is provisional and will be recalculated when all underlining figures will be known.

The tables 15 and 16 provide further details on the annual revenue coming from the IHS contribution (in current value).

2.3. 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.

2.4. Utilisation of unused commitment appropriations

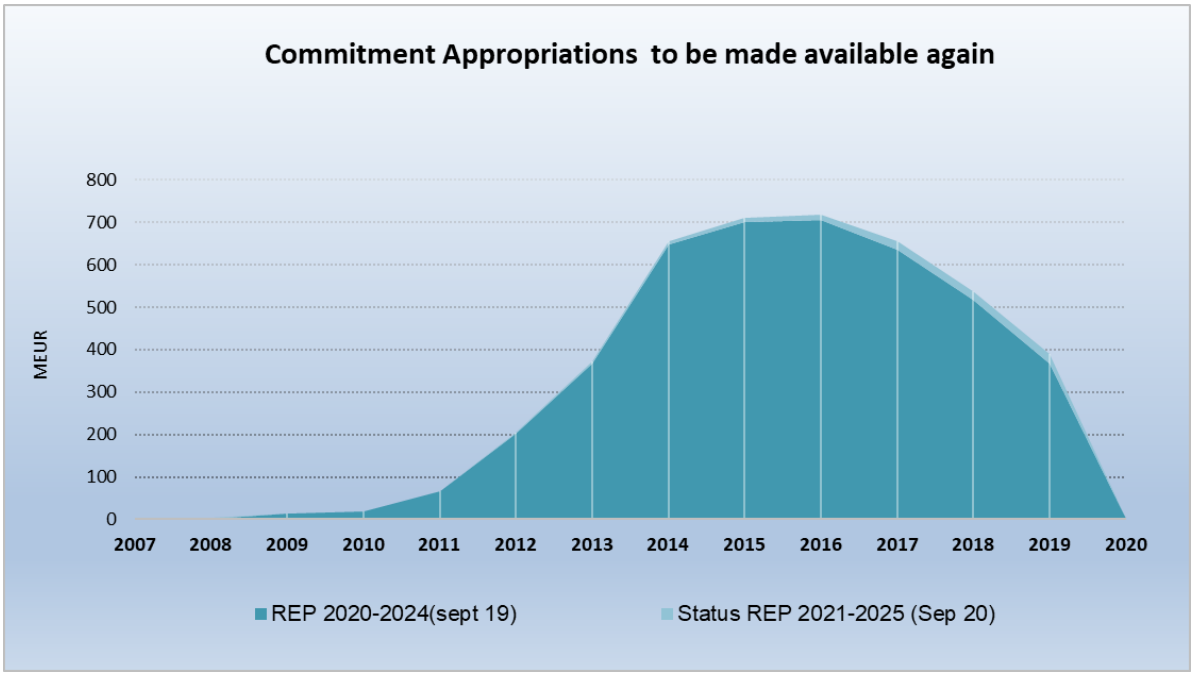
The F4E Financial Regulation foresees the possibility to make the unused appropriations[5] available again as revenue in subsequent budgetary years according to the project needs. This financial mechanism applies to the F4E operational budget excluding the assigned revenue (ITER Host State contribution, and revenue received from IO).

F4E plans to reintroduce all previously cancelled appropriations before the end of 2020 considering the global needs of the project,

The annual amounts cancelled and to be made available again later are detailed in the two tables below (Reference September 2020):

Commitment Appropriation 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 Budget	*TOTAL*
Commitment Appropriation	Cancelled	380.702	285.067	55.515	5.716	33.376	3.860			**765.633**
	Made available again	9.760				96.000	120.007	149.170	390.697	**765.633**
	Total CA still to be made available again	**370.942**	**656.009**	**711.523**	**717.239**	**654.615**	**538.468**	**390.697**	**0.000**	**0.000**

Financial_Table 3. Commitments appropriations made available again (current value)



Financial_Table 4. Estimated evolution of the cancelled appropriations

2.5. Revenue from ITER Organization (Reserve Fund, Undistributed Budget), and from Recoveries

The revenue from the ITER Organization (IO) [6] is covering the tasks implemented by F4E at IO request.

5 According to the annuality principle of the F4E Financial Regulation, unused appropriations at the end of each year are cancelled, as well as the de-commitments (cancellation of budgetary commitments).
6 Art. 6e of F4E Financial Regulation in accordance with art. 4(2) and art. 12 (1e) of the F4E Council Decision and Statutes

- The revenue from IO Reserve Fund is assigned to the implementation of the Project Change Requests originating from IO that have been introduced after 05 March 2015.
- The revenue from the IO Undistributed Budget is assigned to the implementation of actions outside the scope of the IO Reserve Fund.

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

All the revenue under point 2.5 is excluded from the calculation for the monitoring of the ceiling of EUR 6.6 billion (2008 value), as it corresponds to reimbursements or reimbursement-like of revenue already accounted against the EUR 6.6 billion (2008 value).

3. Estimate of Expenditure

The F4E expenditure is divided in:

3.1. Operational expenditure covering the needs of F4E projects
3.2. Administrative expenditure covering the staff and operating costs

3.1. 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[7];

B. EURATOM contribution to the Broader Approach (BA) activities, in accordance with the BA Agreement with Japan[8];

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 project that clusters 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 operational expenditure are dedicated to 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 tasks requested and financed from IO Undistributed Budget.

3.2. Administrative Expenditure

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

[7] Final Report of Negotiations on ITER Implementation, 1 April 2006 (Attachment 2_C)
[8] Broader Approach Agreement F4E_D_22FTK5

4. Estimates of Revenue and Expenditure for the next five years.

Revenue in Commitment Appropriations

REVENUE	2019	2020			2021			2022		2023		2024		2025	
Commitment appropriations (EUR)	Execution Annual Accounts	Estimated Budget available AM2	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
1 REVENUE FROM FEES AND CHARGES															
2. EU CONTRIBUTION	**403 538 332**	**390 085 340**	**390 085 340**	**-3.3%**	**857 567 197**	**857 567 197**	**119.8%**	**702 697 981**	**-18.1%**	**1 012 304 412**	**44.1%**	**798 605 078**	**-21.1%**	**682 298 966**	**-17.0%**
Administrative (Title 1 and 2)	*49 517 000*	*52 781 500*	*52 781 500*	*6.6%*	*62 483 826*	*62 483 826*	*18.4%*	*63 733 503*	*2.0%*	*65 008 173*	*2.0%*	*66 308 336*	*2.0%*	*67 634 503*	*2.0%*
Operational (Title 3)	*353 058 200*	*336 239 356*	*336 239 356*	*-4.8%*	*794 259 197*	*794 259 197*	*136.2%*	*638 964 478*	*-19.6%*	*947 296 239*	*48.3%*	*732 296 742*	*-22.7%*	*614 664 463*	*-19.1%*
Recovery from previous years administrative	*963 132*	*1 064 484*	*1 064 484*	*10.5%*	*824 174*	*824 174*	*-22.6%*								
Recovery from previous years operational															
3 THIRD PARTIES CONTRIBUTION	**135 600 000**	**86 590 850**	**86 590 850**	**-36.1%**	**191 200 000**	**191 200 000**	**120.8%**	**150 500 000**	**-21.3%**	**222 100 000**	**47.6%**	**169 900 000**	**-23.5%**	**141 600 000**	**-20.0%**
ITER Host State contribution	*130 000 000*	*80 490 850*	*80 490 850*	*-38.1%*	*184 700 000*	*184 700 000*	*129.5%*	*143 800 000*	*-22.1%*	*215 100 000*	*49.6%*	*162 700 000*	*-24.4%*	*134 300 000*	*-21.1%*
Membership contribution	*5 600 000*	*6 100 000*	*6 100 000*	*8.9%*	*6 500 000*	*6 500 000*	*6.6%*	*6 700 000*	*3.1%*	*7 000 000*	*4.5%*	*7 200 000*	*2.9%*	*7 300 000*	*1.4%*
4 MISCELLANOUS REVENUE	**1 231 520**	**926 706**	**926 706**	**-24.8%**											
5 ADMINISTRATIVE OPERATIONS															
6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT															
7 CORRECTION OF BUDGETARY IMBALANCES															
8 INTERESTS GENERATED															
9 UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - CARRIED OVER	**14 944 914**	**685 975**	**685 975**	**-95.4%**											
9 BIS UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - MADE AVAILABLE AGAIN	**149 169 582**	**390 696 539**	**390 696 539**	**161.9%**											
TOTAL REVENUE	**704 484 348**	**868 985 410**	**868 985 410**	**23.4%**	**1 048 767 197**	**1 048 767 197**	**20.7%**	**853 197 981**	**-18.6%**	**1 234 404 412**	**44.7%**	**968 505 078**	**-21.5%**	**823 898 966**	**-17.6%**
ADDITIONAL REVENUE	**25 224 097**	**14 436 312**	**14 436 312**	**-42.8%**	**25 000 000**	**25 000 000**	**73.2%**	**17 190 000**	**-31.2%**	**17 530 000**	**2.0%**	**41 850 000**	**138.7%**	**18 240 000**	**-129.4%**
IO Reserve Fund and Undistributed Budget	*12 894 716*	*12 233 035*	*12 233 035*	*-5.1%*	*25 000 000*	*25 000 000*	*104%*	*17 190 000*	*-31.2%*	*17 530 000*	*2.0%*	*41 850 000*	*138.7%*	*18 240 000*	*-129.4%*
IO Reserve Fund and Undistributed Budget carried over	*11 314 654*	*1 604 784*	*1 604 784*	*-86%*											
Recoveries	*372 711*	*398 009*	*398 009*	*7%*											
Recoveries carried over	*642 016*	*200 484*	*200 484*	*-68.8%*											
TOTAL REVENUE AVAILABLE	**729 708 445**	**883 421 722**	**883 421 722**	**21.1%**	**1 073 767 197**	**1 073 767 197**	**21.5%**	**870 387 981**	**-18.9%**	**1 251 934 412**	**43.8%**	**1 010 355 078**	**-19.3%**	**842 138 966**	**-20.0%**

VAR: Variation compared to the previous budget, based on forecast of implementation when it differs from the adopted budget

Financial_Table 5. Revenue in Commitment Appropriations for 2019-2025

Revenue in Payment Appropriations

REVENUE	2019	2020				2021			2022		2023		2024		2025	
Payment appropriations	Execution Annual Accounts	Estimated Budget available AM2	Estimated Budget available AM2 (including admin carry over)	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
1 REVENUE FROM FEES AND CHARGES																
2. EU CONTRIBUTION	**569 253 761**	**633 593 734**	**633 593 734**	**633 593 734**	**11.3%**	**607 211 868**	**607 211 868**	**-4.2%**	**688 680 135**	**13.4%**	**674 379 000**	**-2.1%**	**676 361 314**	**0.3%**	**585 463 105**	**-15.5%**
Administrative (Title 1 and 2)	*49 517 000*	*52 781 500*	*52 781 500*	*52 781 500*	*6.6%*	*62 483 826*	*62 483 826*	*18.4%*	*63 733 503*	*2.0%*	*65 008 173*	*2.0%*	*66 308 336*	*2.0%*	*67 634 503*	*2.0%*
Operational (Title 3)	*502 500 568*	*579 495 500*	*579 495 500*	*579 495 500*	*15.3%*	*543 903 868*	*543 903 868*	*-6.1%*	*624 946 632*	*14.9%*	*609 370 827*	*-2.5%*	*610 052 978*	*0.1%*	*517 828 602*	*-17.8%*
Recovery from previous years administrative	*963 132*	*1 064 484*	*1 064 484*	*1 064 484*	*10.5%*	*824 174*	*824 174*	*-22.6%*								
Recovery from previous years operational	*16 273 060*	*252 251*	*252 251*	*252 251*	*-98.4%*	*0*	*0*	*-100.0%*								
3 THIRD PARTIES CONTRIBUTION	**150 600 000**	**156 100 000**	**156 100 000**	**156 100 000**	**3.7%**	**135 600 000**	**135 600 000**	**-13.1%**	**155 500 000**	**14.7%**	**150 400 000**	**-3.3%**	**148 700 000**	**-1.1%**	**124 600 000**	**-19.3%**
Of which ITER Host State contribution	*145 000 000*	*150 000 000*	*150 000 000*	*150 000 000*	*3.4%*	*129 100 000*	*129 100 000*	*-13.9%*	*148 800 000*	*15.3%*	*143 400 000*	*-3.6%*	*141 500 000*	*-1.3%*	*117 300 000*	*-17.1%*
Of which Membership contribution	*5 600 000*	*6 100 000*	*6 100 000*	*6 100 000*	*8.9%*	*6 500 000*	*6 500 000*	*6.6%*	*6 700 000*	*3.1%*	*7 000 000*	*4.5%*	*7 200 000*	*2.9%*	*7 300 000*	*1.4%*
4 MISCELLANOUS REVENUE	**1 231 520**	**144 414**	**144 414**	**144 414**	**-88.3%**											
5 ADMINISTRATIVE OPERATIONS																
6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT																
7 CORRECTION OF BUDGETARY IMBALANCES																
8 INTERESTS GENERATED																
9 UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - CARRIED OVER	**7 659 944**		**4 541 385**	**4 541 385**	**-40.7%**											
TOTAL REVENUE	**728 745 224**	**789 838 148**	**794 379 533**	**794 379 533**	**9.0%**	**742 811 868**	**742 811 868**	**-6.5%**	**844 180 135**	**13.6%**	**824 779 000**	**-2.3%**	**825 061 314**	**0.0%**	**710 063 105**	**-16.2%**
ADDITIONAL REVENUE	**32 442 475**	**24 806 224**	**24 806 224**	**24 806 224**	**-23.5%**	**30 000 000**	**30 000 000**	**20.9%**	**25 000 000**	**-16.7%**	**25 000 000**	**0.0%**	**23 960 000**	**-4.2%**	**25 000 000**	**4.2%**
IO Reserve Fund and Undistributed Budget	*7 414 845*	*7 575 449*	*7 575 449*	*7 575 449*	*2.2%*	*30 000 000*	*30 000 000*	*296.0%*	*25 000 000*	*-16.7%*	*25 000 000*	*0.0%*	*23 960 000*	*-4.2%*	*25 000 000*	*4.2%*
IO Reserve Fund and Undistributed Budget carried over	*14 311 525*	*16 632 282*	*16 632 282*	*16 632 282*	*16.2%*											
Recoveries	*372 711*	*398 009*	*398 009*	*398 009*	*6.8%*											
Recoveries carried over	*10 343 394*	*200 484*	*200 484*	*200 484*	*-98%*											
TOTAL REVENUE AVAILABLE	**761 187 700**	**814 644 372**	**819 185 757**	**819 185 757**	**7.6%**	**772 811 868**	**772 811 868**	**-5.7%**	**869 180 135**	**12.5%**	**849 779 000**	**-2.2%**	**849 021 314**	**-0.1%**	**735 063 105**	**-15.5%**

VAR: Variation compared to the previous budget, based on forecast of implementation when it differs from the adopted budget

Financial_Table 6. Revenue in Payment Appropriations for 2019-2025

Expenditure in Commitment Appropriations

EXPENDITURE In Commitment Appropriations (EUR)	2019	2020			2021			2022		2023		2024		2025	
	Execution Annual Accounts	Estimated Budget available AM2	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
Total Title 1 & Title 2 Administrative Expenditure	**57 563 841**	**59 980 595**	**59 980 595**	**4.2%**	**63 308 000**	**64 155 500**	**7.0%**	**67 108 998**	**4.6%**	**70 634 000**	**5.3%**	**72 150 000**	**2.1%**	**73 727 000**	**2.2%**
Title 1 Staff Expenditure	**50 069 918**	**52 007 925**	**52 007 925**	**3.9%**	**54 775 000**	**54 863 000**	**5.5%**	**57 721 000**	**5.2%**	**61 057 000**	**5.8%**	**62 382 000**	**2.2%**	**63 764 000**	**2.2%**
Salaries & allowances	45 110 444	46 887 284	46 887 284	3.9%	49 366 000	49 252 000	5.0%	51 386 000	4.3%	54 597 000	6.2%	55 794 000	2.2%	57 045 000	2.2%
Establishment plan posts	*34 305 039*	*35 298 784*	*35 298 784*	2.9%	*37 198 000*	*37 210 000*	*5.4%*	*38 620 000*	*3.8%*	*41 312 000*	*7.0%*	*42 296 000*	*2.4%*	*43 265 000*	*2.3%*
External staff	*10 805 405*	*11 588 500*	*11 588 500*	7.2%	*12 168 000*	*12 042 000*	*3.9%*	*12 766 000*	*6.0%*	*13 285 000*	*4.1%*	*13 498 000*	*1.6%*	*13 780 000*	*2.1%*
Expenditure relating to Staff recruitment	488 024	891 000	891 000	82.6%	685 000	838 000	-5.9%	840 000	0.2%	857 000	2.0%	874 000	2.0%	891 000	1.9%
Mission expenses	890 000	460 000	460 000	-48%	800 000	500 000	8.7%	900 000	80.0%	918 000	2.0%	936 000	2.0%	955 000	2.0%
Socio-medical infrastructure	428 000	343 200	343 200	-19.8%	350 000	477 760	39.2%	357 000	-25.3%	364 000	2.0%	371 000	1.9%	378 000	1.9%
Training	597 398	676 000	676 000	13.2%	689 000	777 000	14.9%	698 000	-10.2%	712 000	2.0%	726 000	2.0%	741 000	2.1%
External Services			0												
Receptions, events and representation	6 000	10 000	10 000	66.7%	10 000	5 000	-50.0%	10 000	100.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%
Social welfare	29 013	46 000	46 000	58.5%	47 000	47 000	2.2%	48 000	2.1%	49 000	2.1%	50 000	2.0%	51 000	2.0%
Other Staff related expenditure	2 521 038	2 694 441	2 694 441	6.9%	2 828 000	2 966 240	10.1%	3 482 000	17.4%	3 550 000	2.0%	3 621 000	2.0%	3 693 000	2.0%
Title 2 Infrastructure and operating expenditure	**7 493 923**	**7 972 670**	**7 972 670**	**6.4%**	**8 533 000**	**9 292 500**	**16.6%**	**9 387 998**	**1.0%**	**9 577 000**	**2.0%**	**9 768 000**	**2.0%**	**9 963 000**	**2.0%**
Rental of buildings and associated costs	1 396 500	1 652 402	1 652 402	18.3%	1 460 000	1 559 000	-5.7%	1 590 000	2.0%	1 622 000	2.0%	1 654 000	2.0%	1 687 000	2.0%
Information, communication technology and data proc.	3 565 429	3 642 200	3 642 200	2.2%	3 960 000	3 975 000	9.1%	4 175 000	5.0%	4 259 000	2.0%	4 345 000	2.0%	4 432 000	2.0%
Movable property and associated costs	158 000	231 000	231 000	46.2%	369 000	391 000	69.3%	397 999	1.8%	405 000	1.8%	413 000	2.0%	421 000	1.9%
Current administrative expenditure	1 249 488	1 410 567	1 410 567	12.9%	1 438 000	1 819 500	29.0%	1 706 999	-6.2%	1 741 000	2.0%	1 775 000	2.0%	1 811 000	2.0%
Postage / Telecommunications	370 600	358 000	358 000	-3.4%	531 000	557 500	55.7%	580 000	4.0%	592 000	2.1%	604 000	2.0%	616 000	2.0%
Meeting expenses	454 198	347 500	347 500	-23.5%	469 000	622 500	79.1%	625 000	0.4%	638 000	2.1%	650 000	1.9%	662 000	1.8%
Running costs in connection with operational activities			0												
Information and publishing	26 000	46 000	46 000	76.9%	40 000	40 000	-13.0%	48 000	20.0%	49 000	2.1%	50 000	2.0%	51 000	2.0%
Studies			0												
Other infrastructure and operating expenditure	273 708	285 000	285 000	4.1%	266 000	328 000	15.1%	265 000	-19.2%	271 000	2.3%	277 000	2.2%	283 000	2.2%
Title 3 Operational expenditure	**670 541 033**	**823 441 127**	**823 441 127**	**22.8%**	**1 010 459 197**	**1 009 611 697**	**22.6%**	**803 278 983**	**-20.4%**	**1 181 300 412**	**47.1%**	**938 205 078**	**-20.6%**	**768 411 966**	**-18.1%**
ITER construction including site preparation	482 595 362	689 112 102	689 112 102	42.8%	742 301 680	741 454 180	7.6%	576 878 983	-22.2%	852 190 412	47.7%	640 980 078	-24.8%	522 084 966	-18.5%
Technology for ITER and DEMO	1 471 437	1 243 862	1 243 862	-15%	10 275 000	10 275 000	726.1%	7 910 000	-23.0%	9 280 000	17%	3 975 000	-57.2%	3 687 000	-7.2%
Technology for Broader Approach	4 268 810	19 491 893	19 491 893	356.6%	30 424 242	30 424 242	56.1%	42 500 000	39.7%	43 300 000	1.9%	44 200 000	2.1%	45 100 000	2.0%
Technology for DONES										28 900 000		29 500 000	-	30 000 000	1.7%
Other Expenditure	14 387 574	18 578 625	18 578 625	29.1%	17 758 276	17 758 276	-4.4%	15 000 000	-15.5%	15 000 000	0.0%	15 000 000	0.0%	15 000 000	0.0%
ITER construction- from ITER host state contribution	144 944 913	81 176 825	81 176 825	-44.0%	184 700 000	184 700 000	127.5%	143 800 000	-22.1%	215 100 000	49.6%	162 700 000	-24.4%	134 300 000	-17.5%
IO Reserve Fund and Undistributed Budget	22 872 936	13 837 819	13 837 819	-39.5%	25 000 000	25 000 000	80.7%	17 190 000	-31.2%	17 530 000	2.0%	41 850 000	138.7%	18 240 000	-56.4%
TOTAL EXPENDITURE	**728 104 873**	**883 421 722**	**883 421 722**	**21.3%**	**1 073 767 197**	**1 073 767 197**	**21.5%**	**870 387 981**	**-18.9%**	**1 251 934 412**	**43.8%**	**1 010 355 078**	**-19.3%**	**842 138 966**	**-16.6%**

VAR: Variation compared to the previous budget, based on forecast of implementation when it differs from the adopted budget

Financial_Table 7. Expenditure in Commitment Appropriations for 2019-2025

Expenditure in Payment Appropriations

EXPENDITURE In Payment Appropriations (EUR)	2019	2020				2021			2022		2023		2024		2025	
	Execution Annual Accounts	Estimated Budget available AM2	Estimated Budget available AM2 (including Admin carry over)	Forecast	VAR 2020/19	Budget	Forecast	VAR 2021/20	Planned needs	VAR 2021/20	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23	Planned needs	VAR 2025/24
Total Title 1 & Title 2 Administrative Expenditure	**57 574 137**	**59 980 595**	**64 521 980**	**64 521 980**	**12.1%**	**63 308 000**	**64 155 500**	**7.0%**	**67 108 998**	**4.6%**	**70 634 000**	**5.3%**	**72 150 000**	**2.1%**	**73 727 000**	**2.2%**
Title 1 Staff Expenditure	**50 379 723**	**52 007 925**	**53 364 013**	**53 364 013**	**5.9%**	**54 775 000**	**54 863 000**	**5.5%**	**57 721 000**	**5.2%**	**61 057 000**	**5.8%**	**62 382 000**	**2.2%**	**63 764 000**	**2.2%**
Salaries & allowances	45 135 651	46 887 284	47 045 119	47 045 119	4.2%	49 366 000	49 252 000	5.0%	51 386 000	4.3%	54 597 000	6.2%	55 794 000	2.2%	57 045 000	2.2%
Establishment plan posts	*34 305 039*	*35 298 784*	*35 298 784*	*35 298 784*	*2.9%*	*37 198 000*	*37 210 000*	*5.4%*	*38 620 000*	*3.8%*	*41 312 000*	*7.0%*	*42 296 000*	*2.4%*	*43 265 000*	2.3%
External staff	*10 830 612*	*11 588 500*	*11 746 336*	*11 746 336*	*8.5%*	*12 168 000*	*12 042 000*	*3.9%*	*12 766 000*	*6.0%*	*13 285 000*	*4.1%*	*13 498 000*	*1.6%*	*13 780 000*	2.1%
Expenditure relating to Staff recruitment	424 347	891 000	961 174	961 174	126.5%	685 000	838 000	-5.9%	840 000	0.2%	857 000	2.0%	874 000	2.0%	891 000	1.9%
Mission expenses	1 435 095	460 000	973 042	973 042	-32%	800 000	500 000	8.7%	900 000	80.0%	918 000	2.0%	936 000	2.0%	955 000	2.0%
Socio-medical infrastructure	428 000	343 200	343 200	343 200	-19.8%	350 000	477 760	39.2%	357 000	-25.3%	364 000	2.0%	371 000	1.9%	378 000	1.9%
Training	469 634	676 000	965 792	965 792	105.6%	689 000	777 000	14.9%	698 000	-10.2%	712 000	2.0%	726 000	2.0%	741 000	2.1%
External Services																
Receptions, events and representation	5 111	10 000	12 028	12 028	135.3%	10 000	5 000	-50.0%	10 000	100.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%
Social welfare	29 013	46 000	46 000	46 000	58.5%	47 000	47 000	2.2%	48 000	2.1%	49 000	2.1%	50 000	2.0%	51 000	2.0%
Other Staff related expenditure	2 452 873	2 694 441	3 017 657	3 017 657	23.0%	2 828 000	2 966 240	10.1%	3 482 000	17.4%	3 550 000	2.0%	3 621 000	2.0%	3 693 000	2.0%
Title 2 Infrastructure and operating expenditure	**7 194 414**	**7 972 670**	**11 157 967**	**11 157 967**	**55.1%**	**8 533 000**	**9 292 500**	**16.6%**	**9 387 998**	**1.0%**	**9 577 000**	**2.0%**	**9 768 000**	**2.0%**	**9 963 000**	**2.0%**
Rental of buildings and associated costs	1 386 310	1 652 402	2 164 392	2 164 392	56.1%	1 460 000	1 559 000	-5.7%	1 590 000	2.0%	1 622 000	2.0%	1 654 000	2.0%	1 687 000	2.0%
Information, communication technology and data proc.	3 564 069	3 642 200	5 352 054	5 352 054	50.2%	3 960 000	3 975 000	9.1%	4 175 000	5.0%	4 259 000	2.0%	4 345 000	2.0%	4 432 000	2.0%
Movable property and associated costs	146 894	231 000	304 746	304 746	107.5%	369 000	391 000	69.3%	397 999	1.8%	405 000	1.8%	413 000	2.0%	421 000	1.9%
Current administrative expenditure	1 159 926	1 410 567	1 774 939	1 774 939	53.0%	1 438 000	1 819 500	29.0%	1 706 999	-6.2%	1 741 000	2.0%	1 775 000	2.0%	1 811 000	2.0%
Postage / Telecommunications	370 078	358 000	503 508	503 508	36.1%	531 000	557 500	55.7%	580 000	4.0%	592 000	2.1%	604 000	2.0%	616 000	2.0%
Meeting expenses	331 117	347 500	609 174	609 174	84.0%	469 000	622 500	79.1%	625 000	0.4%	638 000	2.1%	650 000	1.9%	662 000	1.8%
Running costs in connection with operational activities																
Information and publishing	26 000	46 000	46 000	46 000	76.9%	40 000	40 000	-13.0%	48 000	20.0%	49 000	2.1%	50 000	2.0%	51 000	2.0%
Studies																
Other infrastructure and operating expenditure	210 020	285 000	403 155	403 155	92.0%	266 000	328 000	15.1%	265 000	-19.2%	271 000	2.3%	277 000	2.2%	283 000	2.2%
Title 3 Operational expenditure	**681 329 295**	**754 663 777**	**754 663 777**	**754 663 777**	**10.8%**	**709 503 868**	**708 656 368**	**-6.1%**	**802 071 137**	**13.2%**	**779 145 000**	**-2.9%**	**776 871 314**	**-0.3%**	**661 336 105**	**-14.9%**
ITER construction including site preparation	506 485 473	550 334 650	550 334 650	550 334 650	8.7%	517 045 592	516 198 092	-6.2%	593 271 137	14.9%	564 645 000	-4.8%	556 011 314	-1.5%	449 436 105	-19.2%
Technology for ITER and DEMO	6 842 102	4 921 396	4 921 396	4 921 396	-28.1%	4 100 000	4 100 000	-16.7%	7 000 000	70.7%	8 200 000	17.1%	6 500 000	-20.7%	10 900 000	67.7%
Technology for Broader approach	8 337 082	10 200 000	10 200 000	10 200 000	22.3%	11 500 000	11 500 000	12.7%	13 000 000	13.0%	19 100 000	46.9%	24 900 000	30.4%	30 400 000	22.1%
Technology for DONES											3 800 000		9 000 000	-	13 300 000	47.8%
Other Expenditure	7 372 404	15 000 000	15 000 000	15 000 000	103.5%	17 758 276	17 758 276	18.4%	15 000 000	-15.5%	15 000 000	0.0%	15 000 000	0.0%	15 000 000	0.0%
ITER construction- from ITER host state contribution	147 198 145	150 000 000	150 000 000	150 000 000	1.9%	129 100 000	129 100 000	-13.9%	148 800 000	15.3%	143 400 000	-3.6%	141 500 000	-1.3%	117 300 000	-17.1%
IO Reserve Fund and Undistributed Budget	5 094 088	24 207 731	24 207 731	24 207 731	375.2%	30 000 000	30 000 000	23.9%	25 000 000	-16.7%	25 000 000	0.0%	23 960 000	-4.2%	25 000 000	4.3%
TOTAL EXPENDITURE	**738 903 432**	**814 644 372**	**819 185 757**	**819 185 757**	**10.9%**	**772 811 868**	**772 811 868**	**-5.1%**	**869 180 135**	**12.5%**	**849 779 000**	**-2.2%**	**849 021 314**	**-0.1%**	**735 063 105**	**-13.4%**

VAR: Variation compared to the previous budget, based on forecast of implementation when it differs from the adopted budget

Financial_Table 8. Expenditure in Payment Appropriations for 2019-2025

Budget outturn and Cancellation of appropriations

The outturn is established with Annual Accounts, recovered by EURATOM and reintroduced during the preparation of the following annual draft budget:

Budget outturn	2017	2018	2019
Revenue actually received (+)	860,132,786.99	831,182,146.33	728,796,686.37
Payments made (-)	832,636,609.01	810,953,065.56	734,351,750.46
Carry-over of appropriations (-)	16,437,092.48	32,314,863.41	21,374,150.95
Cancellation of appropriations carried over (+)	943,268.23	1,064,674.13	910,116.73
Adjustment for carry over of assigned revenue appropriations from previous year (+)	5,214,390.36	12,338,033.29	26,853,065.07
Exchange rate differences (+/-)	19,448.54	- 190.61	- 9,792.63
Adjustment for negative balance from previous year (-)			
Total	**17,236,192.63**	**1,316,734.17**	**824,174.13**

Financial_Table 9. Budget Outturns for the years 2017, 2018 and 2019

The budget outturn is calculated as the total revenue actually cashed and it is 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.

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 2.9 million.

5. Content of the Financial Tables

Financial Status

The figures of the table 10 and 11 reflect the series of Annual Accounts for the past year in commitment appropriations and in payment appropriations.

	Current Value MEUR	< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	Total 2014-2019	Total 2007-2019
Commitment Appropriations	ITER Construction	42.129	3 640.669	851.431	398.844	409.033	511.103	615.659	627.540	3 413.610	7 054.280
	Technology		72.847	21.217	19.507	13.122	17.580	12.686	5.740	89.851	162.699
	Technology for ITER		51.250	10.104	7.657	6.754	6.582	9.084	1.471	41.653	92.903
	Technology for Broader Approach		21.597	11.112	11.850	6.367	10.998	3.602	4.269	48.198	69.796
	Technology for DONES		-							-	-
	Other Expenditure		7.816	2.257	2.949	2.031	4.607	6.727	14.388	32.958	40.774
	F4E Administration		203.475	43.587	45.266	48.613	53.431	56.299	57.563	304.760	508.235
	F4E Total Budget	42.129	3 924.807	918.492	466.566	472.799	586.721	691.371	705.231	3 841.180	7 765.987
	IO Reserve Fund and Undistributed Budget		-		1.301	14.248	1.450	3.615	22.873	43.487	43.487
	F4E Total Expenditure	42.129	3 924.807	918.492	467.867	487.047	588.171	694.986	728.104	3 884.667	7 809.475
	F4E Total available budget (In revenue)	42.129	3 934.891	918.513	467.902	487.802	588.916	706.230	729.708	3 899.071	7 833.962
	% of implementation	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%

Financial_Table 10. Annual Expenditure in Commitment Appropriations (According to the successive Annual Accounts)

	Current Value MEUR	< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	Total 2014-2019	Total 2007-2019
Payment Appropriations	ITER Construction	42.129	1 221.090	451.465	467.697	649.149	759.128	730.648	653.684	3 058.087	4 279.177
	Technology		29.005	11.350	11.058	14.437	15.827	16.019	15.179	68.691	97.696
	Technology for ITER		15.231	5.905	5.342	8.576	10.438	7.871	6.842	38.132	53.363
	Technology for Broader Approach		13.774	5.445	5.715	5.862	5.390	8.148	8.337	30.559	44.333
	Technology for DONES		-						-		
	Other Expenditure		4.283	0.912	2.027	2.300	2.896	3.977	7.372	12.111	16.394
	F4E Administration		179.443	43.443	43.085	49.688	52.018	53.872	57.574	242.106	421.549
	F4E Total Budget	42.129	1 433.822	507.169	523.867	715.574	829.869	804.516	733.809	3 380.994	4 814.816
	IO Reserve Fund and Undistributed Budget		-				4.671	9.471	5.094	14.142	14.142
	F4E Total Expenditure	42.129	1 433.822	507.169	523.867	715.574	834.540	813.987	738.903	3 395.137	4 828.958
	F4E Total revenue	42.129	1 786.204	574.385	530.768	730.452	868.544	847.367	761.188	3 551.515	5 337.720
	% of implementation	100%	80%	88%	99%	98%	96%	96%	97%	96%	90%

Financial_Table 11. Annual Expenditure in Payment Appropriations (According to the successive Annual Accounts)

Following the recommendation of the European Commission, starting from the annual accounts 2018, the execution of administrative expenditure in payments contains the execution of the payments of the year plus the execution of payments carried over from the previous year. All figures are definitive (once the final Annual Accounts have been adopted).

Financial Planning

A. Expenditure

The table 12 shows an expenditure of EUR 6.54 billion for the period 2007-2020, nearly in line with the ceiling of EUR 6.6 billion (in 2008 value).

It relies on the data from the table 13 Expenditure in Commitments (in current value).

The figures are detailed for the link to the annual accounts, and are calculated based on the following assumptions:

- De-commitments are withdrawn from the expenditure in commitments according to the year of the original commitment;
- Reimbursements are withdrawn from the expenditure in commitments and in payments according to the year of the original commitment;
- Administrative expenditure reflects the actual annual expenditure based on commitments, provisional at the end of year N and final at the end of N+1.

	Constant Value MEUR(2008)	< 2007 Executed	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Estimated Budget available AM2	Total 2014-2020	Total 2007-2020
Commitment Appropriations	**ITER Construction**	**43.91**	**2 887.60**	**480.13**	**296.08**	**322.13**	**374.27**	**478.26**	**483.75**	**583.55**	**3 018.18**	**5 905.78**
	Technology		**45.39**	**13.76**	**11.92**	**10.73**	**11.75**	**9.83**	**4.32**	**15.56**	**77.86**	**123.25**
	Technology for ITER		25.79	8.19	5.76	5.60	3.72	7.01	1.11	0.92	32.31	58.10
	Technology for Broader Approach		19.59	5.57	6.16	5.13	8.03	2.82	3.21	14.64	45.56	65.15
	Technology for DONES		0.00								0.00	0.00
	Other Expenditure		**4.91**	**1.36**	**2.07**	**1.52**	**3.38**	**4.71**	**10.64**	**13.65**	**37.32**	**42.23**
	F4E Administration		**173.55**	**37.85**	**38.33**	**40.68**	**43.81**	**45.44**	**46.30**	**47.29**	**299.71**	**473.25**
	F4E Total Budget	**43.91**	**3 111.44**	**533.10**	**348.40**	**375.07**	**433.21**	**538.23**	**545.00**	**660.06**	**3 433.07**	**6 544.51**
	IO Reserve Fund and Undistributed Budget		**0.00**		**0.94**	**11.46**	**1.18**	**2.59**	**18.40**	**10.91**	**45.47**	**45.47**
	F4E Total Expenditure	**43.91**	**3 111.44**	**533.10**	**349.34**	**386.53**	**434.39**	**540.82**	**563.39**	**670.98**	**3 478.54**	**6 589.98**

	Constant Value MEUR(2008)	2021 Budget	2022 Planned needs	2023 Planned needs	2024 Planned needs	2025 Planned needs	Total 2021-2025	Total <2007-2025
Commitment Appropriations	**ITER Construction**	**684.27**	**527.61**	**757.17**	**562.23**	**452.49**	**2 983.77**	**8 933.46**
	Technology	**29.32**	**35.61**	**56.43**	**52.74**	**52.44**	**226.54**	**349.79**
	Technology for ITER	7.40	5.59	6.43	2.70	2.45	24.57	82.67
	Technology for Broader Approach	21.92	30.02	29.99	30.01	30.02	141.96	207.11
	Technology for DONES			20.01	20.03	19.97	60.01	60.01
	Other Expenditure	**12.79**	**10.60**	**10.39**	**10.18**	**9.98**	**53.95**	**96.18**
	F4E Administration	**48.94**	**50.86**	**52.48**	**52.56**	**52.65**	**257.49**	**730.74**
	F4E Total Budget	**775.33**	**624.67**	**876.46**	**677.71**	**567.57**	**3 521.74**	**10 110.17**
	IO Reserve Fund and Undistributed Budget	**19.33**	**13.03**	**13.03**	**30.49**	**13.03**	**88.89**	**134.36**
	F4E Total Expenditure	**794.65**	**637.70**	**889.49**	**708.20**	**580.60**	**3 610.63**	**10 244.53**

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 12. Annual Expenditure in Commitment Appropriations (2008 value)

	Current Value MEUR	< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Estimated Budget available AM2	Total 2014-2020	Total 2007-2020
Commitment Appropriations	ITER Construction	42.129	3 126.171	557.735	348.943	383.212	463.894	606.450	626.540	770.289	3 757.063	6 883.234
	Technology		48.092	16.007	14.008	12.901	14.391	12.195	5.689	20.736	95.927	144.018
	Technology for ITER		27.499	9.521	6.740	6.694	4.445	8.630	1.471	1.244	38.746	66.245
	Technology for Broader Approach		20.592	6.486	7.268	6.207	9.946	3.565	4.218	19.492	57.181	77.773
	Technology for DONES		-									-
	Other Expenditure		5.297	1.583	2.477	1.868	4.258	6.084	14.106	18.579	48.954	54.251
	F4E Administration		183.982	42.625	44.028	47.669	52.361	55.388	57.564	59.981	359.617	543.599
	F4E Total Budget	42.129	3 363.541	617.951	409.457	445.649	534.904	680.117	703.900	869.584	4 261.561	7 625.102
	IO Reserve Fund and Undistributed Budget		-	-	1.078	13.422	1.406	3.158	22.873	13.838	55.775	55.775
	F4E Total Expenditure	42.129	3 363.541	617.951	410.534	459.071	536.310	683.275	726.773	883.422	4 317.336	7 680.877

	Current Value MEUR	2021 Budget	2022 Planned needs	2023 Planned needs	2024 Planned needs	2025 Planned needs	Total 2021-2025	Total <2007-2025
Commitment Appropriations	ITER Construction	927.002	720.679	1 067.290	803.680	656.385	4 175.036	11 100.400
	Technology	40.699	50.410	81.480	77.675	78.787	329.051	473.070
	Technology for ITER	10.275	7.910	9.280	3.975	3.687	35.127	101.372
	Technology for Broader Approach	30.424	42.500	43.300	44.200	45.100	205.524	283.297
	Technology for DONES			28.900	29.500	30.000	88.400	88.400
	Other Expenditure	17.758	15.000	15.000	15.000	15.000	77.758	132.009
	F4E Administration	63.308	67.109	70.634	72.150	73.727	346.928	890.527
	F4E Total Budget	1 048.767	853.198	1 234.404	968.505	823.899	4 928.774	12 596.005
	IO Reserve Fund and Undistributed Budget	25.000	17.190	17.530	41.850	18.240	119.810	175.585
	F4E Total Expenditure	1 073.767	870.388	1 251.934	1 010.355	842.139	5 048.584	12 771.189

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 13. Annual Expenditure in Commitment Appropriations (current value)

	Current Value MEUR	< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Estimated Budget available AM2	Total 2014-2020	Total 2007-2020
Payment Appropriations	ITER Construction	42.129	1 196.106	451.206	467.341	648.382	758.891	730.511	653.683	700.335	4 410.349	5 606.454
	Technology		29.002	11.350	11.058	14.437	15.666	16.019	15.179	15.121	98.830	127.832
	Technology for ITER		15.228	5.905	5.342	8.576	10.276	7.871	6.842	4.921	49.734	64.962
	Technology for Broader Approach		13.774	5.445	5.715	5.862	5.390	8.148	8.337	10.200	49.096	62.870
	Technology for DONES		-								-	-
	Other Expenditure		4.266	0.912	2.026	2.300	2.896	3.948	7.372	15.000	34.453	38.720
	F4E Administration		183.982	42.625	44.028	47.669	52.361	55.388	57.564	64.523	364.159	548.141
	F4E Total Budget	42.129	1 413.356	506.093	524.453	712.787	829.814	805.866	733.799	794.979	4 907.791	6 321.146
	IO Reserve Fund and Undistributed Budget		-				4.671	9.471	5.094	24.208	43.444	43.444
	F4E Total Expenditure	42.129	1 413.356	506.093	524.453	712.787	834.485	815.338	738.893	819.186	4 951.235	6 364.591

	Current Value MEUR	2021 Budget	2022 Planned needs	2023 Planned needs	2024 Planned needs	2025 Planned needs	Total 2021-2025	Total <2007-2025
Payment Appropriations	ITER Construction	646.146	742.071	708.045	697.511	566.736	3 360.509	9 009.092
	Technology	15.600	20.000	31.100	40.400	54.600	161.700	289.532
	Technology for ITER	4.100	7.000	8.200	6.500	10.900	36.700	101.662
	Technology for Broader Approach	11.500	13.000	19.100	24.900	30.400	98.900	161.770
	Technology for DONES	-	-	3.800	9.000	13.300	26.100	26.100
	Other Expenditure	17.758	15.000	15.000	15.000	15.000	77.758	116.478
	F4E Administration	63.308	67.109	70.634	72.150	73.727	346.928	895.069
	F4E Total Budget	742.812	844.180	824.779	825.061	710.063	3 946.895	10 310.171
	IO Reserve Fund and Undistributed Budget	30.000	25.000	25.000	23.960	25.000	128.960	172.404
	F4E Total Expenditure	772.812	869.180	849.779	849.021	735.063	4 075.855	10 478.095

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

Financial_Table 14. Annual Expenditure in Payment Appropriations

B. Revenue

The table 15 and 16 represent the annual contributions to the project from EURATOM, France, Members and miscellaneous revenue. They are balanced with the corresponding expenditure.

The EU global envelope of EUR 6.6 billion (2008 value) until the end of year 2020 excludes the revenue from ITER Organization (Reserve fund and Undistributed budget), the recoveries, the recovery of the outturn, the carry overs, and the amounts made available again.

The revenue after 2020 is based on the Legislative financial statement accompanying the Commission proposal (2020) 442 amending the decision on F4E for the Euratom Contribution. The French contribution and the Membership contributions are calculated on the basis of this proposal.

Current Value MEUR		< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Estimated Budget available AM2	Total 2014-2020	Total 2007-2020
Commitment Appropriations	Euratom contribution	40.645	3 272.633	720.918	382.215	323.270	315.184	381.836	402.575	389.021	**2 915.019**	**6 187.651**
	France contribution	1.484	516.202	170.000	64.000	130.000	145.000	142.000	130.000	80.491	**861.491**	**1 377.693**
	F4E Members contribution		21.018	4.400	4.390	4.600	4.860	4.920	5.600	6.100	**34.870**	**55.888**
	Miscellaneous revenue		1.691	0.210	0.207	0.024	0.001	0.001		0.927	**2.602**	**4.293**
	F4E Total Contributions	**42.129**	**3 811.544**	**895.528**	**450.813**	**457.894**	**465.045**	**528.757**	**539.407**	**476.538**	**3 813.982**	**7 625.526**
	IO Reserve Fund and Undistributed Budget		-		1.301	14.984	0.715	13.647	12.895	12.233	**55.775**	**55.775**
	F4E Total Revenue	**42.129**	**3 811.544**	**895.528**	**452.114**	**472.878**	**465.760**	**542.404**	**552.301**	**488.771**	**3 869.757**	**7 681.300**
	Recoveries (Reimbursement)		0.017	0.004	1.996	0.435	0.893	22.949	0.373	0.398	**27.048**	**27.064**
	Carry Over from the previous year		92.759	21.109	10.793	13.461	25.211	19.687	26.902	2.491	**119.654**	**212.413**
	Recovery of the budgetary outturn		20.812	1.873	2.998	1.028	1.053	1.183	0.963	1.064	**10.162**	**30.974**
	Utilisation of unused appropriations		9.760				96.000	120.007	149.170	390.697	**755.873**	**765.633**
	F4E Total available Revenue	**42.129**	**3 934.891**	**918.513**	**467.902**	**487.802**	**588.916**	**706.230**	**729.708**	**883.422**	**4 782.493**	**8 717.384**

Current Value MEUR		2021 Budget	2022 Planned needs	2023 Planned needs	2024 Planned needs	2025 Planned needs	Total 2021-2025	Total <2007-2025
Commitment Appropriations	Euratom contribution	856.743	702.698	1 012.304	798.605	682.299	**4 052.649**	**10 280.946**
	France contribution	184.700	143.800	215.100	162.700	134.300	**840.600**	**2 219.777**
	F4E Members contribution	6.500	6.700	7.000	7.200	7.300	**34.700**	**90.588**
	Miscellaneous revenue							**4.293**
	F4E Total Contributions	**1 047.943**	**853.198**	**1 234.404**	**968.505**	**823.899**	**4 927.949**	**12 595.604**
	IO Reserve Fund and Undistributed Budget	25.000	17.190	17.530	41.850	18.240	**119.810**	**175.585**
	F4E Total Revenue	**1 072.943**	**870.388**	**1 251.934**	**1 010.355**	**842.139**	**5 047.759**	**12 771.189**
	Recoveries (Reimbursement)							**27.064**
	Carry Over from the previous year							**212.413**
	Recovery of the budgetary outturn	0.824					**0.824**	**31.798**
	Utilisation of unused appropriations							**765.633**
	F4E Total available Revenue	**1 073.767**	**870.388**	**1 251.934**	**1 010.355**	**842.139**	**5 048.584**	**13 808.097**

F4E Total Budget : The revenue made of annual contributions without carry over, recoveries, and recovery of outturn, according to the Council Decisions and the reference to the EUR 6.6 billion (2008 value)

F4E Total Revenue : F4E Total Budget plus the revenue made available from the IO Reserve Fund.

F4E Total available Revenue: F4E Total revenue including appropriations carried over, appropriations from the previous outturn and from recoveries.

Financial_Table 15. Annual Revenue in Commitment Appropriations

Current Value MEUR		< 2007 Final Execution	Total 2007-2013	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Executed	2020 Estimated Budget available AM2	Total 2014-2020	Total 2007-2020
Payment Appropriations	Euratom contribution	40.645	1 196.580	421.101	386.171	567.040	716.611	654.029	552.018	632.277	**3 929.247**	**5 125.828**
	France contribution	1.484	261.802	123.000	77.000	120.000	125.000	130.000	145.000	150.000	**870.000**	**1 131.802**
	F4E Members contribution		21.403	4.400	4.390	4.600	4.937	4.920	5.600	6.100	**34.947**	**56.350**
	Miscellaneous revenue		1.691	0.210	0.207	0.024	0.001	0.001	1.232	0.144	**1.820**	**3.511**
	F4E Total Budget	**42.129**	**1 481.477**	**548.711**	**467.768**	**691.664**	**846.549**	**788.951**	**703.849**	**788.521**	**4 836.014**	**6 317.491**
	IO Reserve fund and Undistributed Budget					4.121	11.185	13.149	7.415	7.575	**43.444**	**43.444**
	F4E Total Revenue	**42.129**	**1 481.477**	**548.711**	**467.768**	**695.785**	**857.734**	**802.100**	**711.264**	**796.097**	**4 879.458**	**6 360.935**
	Recoveries (Reimbursement)		0.017	0.004	1.996	0.435	0.893	22.949	0.373	0.398	**27.048**	**27.064**
	Carry over from the previous year		157.645	17.022	33.000	0.025	5.214	12.338	26.853	16.833	**111.285**	**268.930**
	Recovery of the budgetary outturn		107.481	1.881	23.317	28.289	1.073	5.881	17.236	1.317	**78.995**	**186.476**
	Carry over unpaid admin expenditure		39.585	6.768	4.686	5.918	3.629	4.099	5.462	4.542	**35.104**	**74.689**
	F4E Total available Revenue	**42.129**	**1 786.204**	**574.385**	**530.768**	**730.452**	**868.544**	**847.367**	**761.188**	**819.186**	**5 131.890**	**6 918.094**

Current Value MEUR		2021 Budget	2022 Planned needs	2023 Planned needs	2024 Planned needs	2025 Planned needs	Total 2021-2025	Total <2007-2025>
Payment Appropriations	Euratom contribution	606.388	688.680	674.379	676.361	585.463	**3 231.271**	**8 397.744**
	France contribution	129.100	148.800	143.400	141.500	117.300	**680.100**	**1 813.387**
	F4E Members contribution	6.500	6.700	7.000	7.200	7.300	**34.700**	**91.050**
	Miscellaneous revenue							**3.511**
	F4E Total Budget	**741.988**	**844.180**	**824.779**	**825.061**	**710.063**	**3 946.071**	**10 305.691**
	IO Reserve fund and Undistributed Budget	30.000	25.000	25.000	23.960	25.000	**128.960**	**172.404**
	F4E Total Revenue	**771.988**	**869.180**	**849.779**	**849.021**	**735.063**	**4 075.031**	**10 478.095**
	Recoveries (Reimbursement)							**27.064**
	Carry over from the previous year							**268.930**
	Recovery of the budgetary outturn	0.824					**0.824**	**187.300**
	Carry over unpaid admin expenditure							**74.689**
	F4E Total available revenue	**772.812**	**869.180**	**849.779**	**849.021**	**735.063**	**4 075.855**	**11 036.078**

F4E Total Budget : The revenue made of annual contributions without carry over, recoveries, and recovery of outturn, according to the Council Decisions and the reference to the EUR 6.6 billion (2008 value)

F4E Total Revenue : F4E Total Budget plus the revenue made available from the IO Reserve Fund.

F4E Total available Revenue: F4E Total revenue including appropriations carried over, appropriations from the previous outturn and from recoveries.

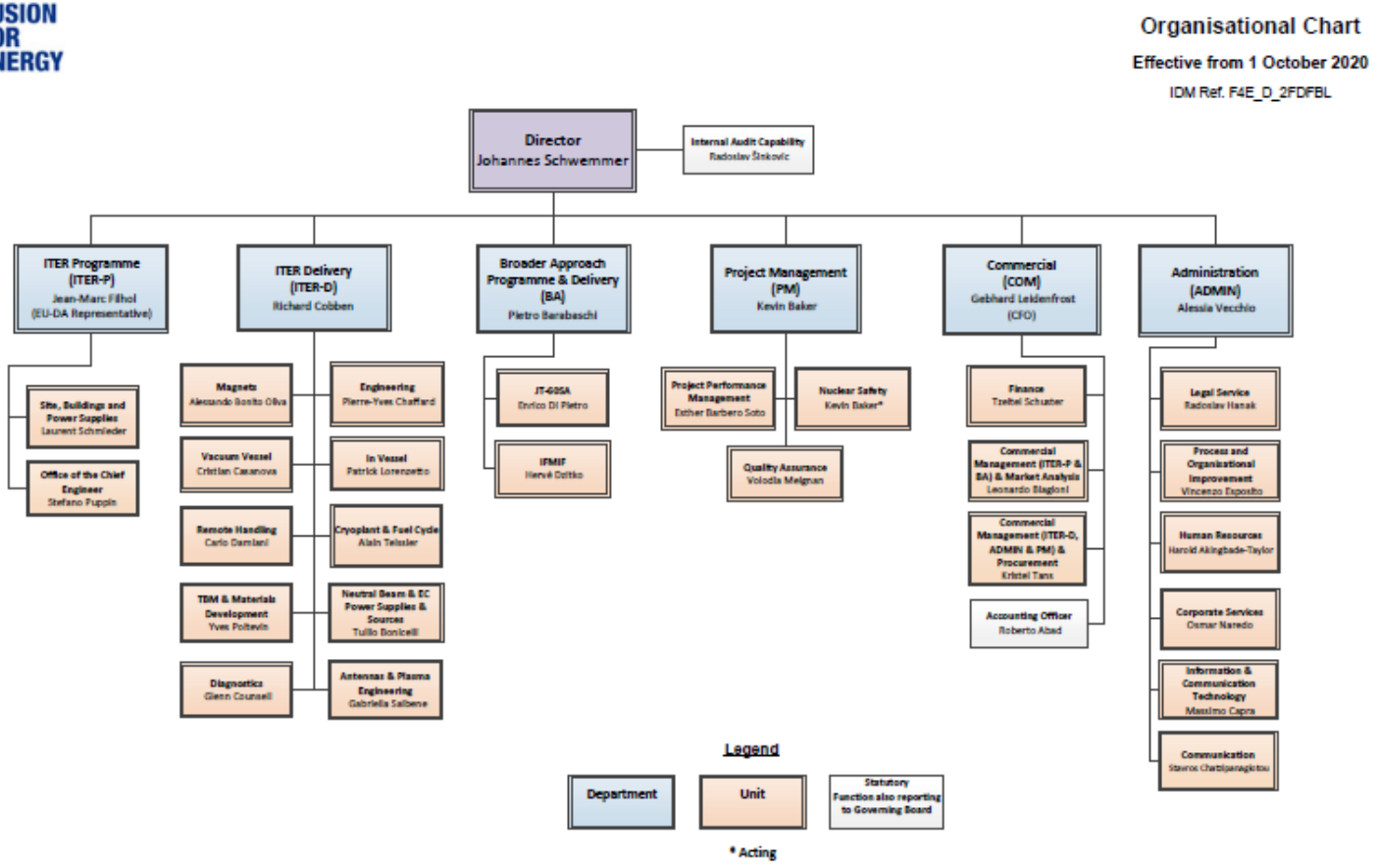
Financial_Table 16. Annual Revenue in Payment Appropriations

List of Tables

SPD2021_ANNEXES TO HR REP

1. Organization chart

FUSION FOR ENERGY



Note: This chart is compliant with the basic organisational structure approved by the Governing Board on 1 October 2016 (IDM Ref.: F4E_D_25W6Y7) and shows management functions in the meaning of the Implementing Rule on Middle Management Staff adopted on by the Administration and Management Committee on 13 June 2018 (IDM Ref. F4E_D_2CB4K5) as well as statutory functions that report to the Governing Board

2. Human Resources per action 2021-2025

It should be noted that the staff costs represent a very small part of the total investment. 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 profiles reported here below may vary depending on change of requirements in each areas, support to IO in testing, commissioning and assembly as well as the need of F4E to retain knowledge in key areas of technology.

The staff reduction in the years 2024 and 2025 reflects the return of 29 posts F4E had obtained as part of a provisional reinforcement of 45 posts agreed by the Commission in 2015. The return of these posts to the Commission must be done by a non-renewal of employment contracts of the staff employed on these positions. In practice, this means that the ramp down for some of these posts will be sooner than the dates suggested in the tables.

Core staff
The distribution of the core staff is based on the needs expressed by the programmes, which have been confirmed by a top-down model based on the open commitment value. These figures do not consider the total staff allocated to the ITER-D Department as the staff members working in the office of the Head of Department have not been included and are reported in the category *Managerial Activities*.

All the staff of the Engineering Unit staff has been allocated to the different programmes with the exception of the staff members working in *Transportation* (for which a new action line has been added in the tables) and the staff assigned in the management cell. In general it is considered that the Engineering Unit supports the ITER-D programmes with 90% of its resources approximately and the rest of the staff supports the ITER-P and BAPD programmes.

Transversal Activities and Managerial Activities
Following the reorganization of ITER-D the action Technical Support Activities is now featured as a staff category named *Transversal Activities* which only includes the staff giving technical support to the programmes in transversal services.

In addition, a new category (*Managerial Activities)* has been inserted in the table to reflect the staff included in the respective offices of the Heads of ITER-P, ITER-D and PM Departments.

Matrixed Staff
The matrix figures represent the staff working in a matrix structure within the programmes. Such a staff is located in the following units: Project Performance Management, Nuclear Safety, Quality Assurance, Commercial Management, Finance and Legal Service.

Direct Staff
This is the result of aggregating the Core staff, the Matrixed staff and the staff assigned to Managerial and Transversal Activities.

Overheads & Management
The "*Management and Overheads*" value takes into account the remaining staff (i.e. Director's Department, HR, ICT, Corporate Services, Communication, Process & Organizational Improvement and other non-matrixed staff in the Administration and Commercial Departments) assigned to the teams on a pro-rata basis.

The following staffing tables HR_table 1 to HR_table 5 represent an optimised distribution of ITER D human resources relying on the planning available at the end of March 2020. The ITER Delivery human resources are only assigned to the ITER Delivery Programmes (excluding ITER assembly and commissioning activities and limiting the involvement in BIPS and Broader Approach programmes to 10 ppy). No resource is allocated yet to activities aiming at maintaining the technical knowledge not directly required by the on-going F4E ITER Programmes activities (e.g. Superconducting Magnets from 2025).

	2021						
	Core Staff[1]	Matrix staff	Managerial activities	Transversal activities	**Direct Staff[2]**	Overhead & Management	**Total F4E**
Magnets	13.10	5.67	1.06	1.22	**21.06**	6.36	**27.43**
Vacuum Vessel	15.10	6.54	1.23	1.41	**24.28**	7.33	**31.61**
In-Vessel	22.80	9.88	1.85	2.13	**36.66**	11.07	**47.73**
Remote Handling	21.10	9.14	1.71	1.97	**33.93**	10.25	**44.17**
Cryoplant & Fuel Cycle	12.20	5.29	0.99	1.14	**19.62**	5.93	**25.54**
Antennas & Plasma Engineering	16.50	7.15	1.34	1.54	**26.53**	8.01	**34.54**
Neutral Beam & EC Power Supplies	23.50	10.18	1.91	2.19	**37.78**	11.41	**49.20**
Diagnostics	22.40	9.70	1.82	2.09	**36.02**	10.88	**46.90**
Test Blanket Modules	7.30	3.16	0.59	0.68	**11.74**	3.55	**15.28**
Transportation	2.00	0.87	0.16	0.19	**3.22**	0.97	**4.19**
Site and Buildings and Power Supplies[3]	27.00	30.77	3.64	2.52	**63.93**	19.31	**83.24**
Broader Approach	29.00	1.55	0.68	1.92	**33.15**	10.01	**43.16**
Total	212.00	99.90	17.00	19.00	**347.90**	105.10	**453.00**

HR_table 01. Human Resources per action 2021

	2022						
	Core Staff	Matrix staff	Managerial activities	Transversal activities	**Direct Staff**	Overhead & Management	**Total F4E**
Magnets	10.90	4.72	0.89	1.02	**17.53**	5.29	**22.82**
Vacuum Vessel	11.60	5.03	0.94	1.08	**18.65**	5.63	**24.29**
In-Vessel	24.90	10.79	2.02	2.32	**40.04**	12.09	**52.13**
Remote Handling	19.90	8.62	1.62	1.86	**32.00**	9.67	**41.66**
Cryoplant & Fuel Cycle	10.80	4.68	0.88	1.01	**17.36**	5.25	**22.61**
Antennas & Plasma Engineering	16.80	7.28	1.37	1.57	**27.01**	8.16	**35.17**
Neutral Beam & EC Power Supplies	26.90	11.65	2.19	2.51	**43.25**	13.07	**56.32**
Diagnostics	21.60	9.36	1.76	2.02	**34.73**	10.49	**45.22**
Test Blanket Modules	10.60	4.59	0.86	0.99	**17.04**	5.15	**22.19**
Transportation	2.00	0.87	0.16	0.19	**3.22**	0.97	**4.19**
Site and Buildings and Power Supplies	27.00	30.77	3.64	2.52	**63.93**	19.31	**83.24**
Broader Approach	29.00	1.55	0.68	1.92	**33.15**	10.01	**43.16**
Total	212.00	99.90	17.00	19.00	**347.90**	105.10	**453.00**

HR_table 02. Human Resources per action 2022

[1] Following the re-organization of the ITER Delivery Department, a revision of the core staff needs has been made. As a result, the new figures differ from the numbers shown in the MAPD 2020-2024.

[2] Following the update of the staff needs in the different programmes as well as the introduction of the *Managerial and Transversal Activities* in the table, the *Direct Staff* column presents different numbers with respect to the MAPD 2020-2024 tables.

[3] Due to an error when processing the data, the matrix number of this action reflected a very low value in the MAPD 2020-2024. It has been already corrected in this table.

	2023						
	Core Staff	Matrix staff	Managerial activities	Transversal activities	**Direct Staff**	Overhead & Management	**Total F4E**
Magnets	6.20	2.69	0.50	0.58	**9.97**	3.01	**12.98**
Vacuum Vessel	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**
In-Vessel	29.00	12.56	2.36	2.71	**46.63**	14.09	**60.71**
Remote Handling	21.80	9.44	1.77	2.04	**35.05**	10.59	**45.64**
Cryoplant & Fuel Cycle	12.20	5.29	0.99	1.14	**19.62**	5.93	**25.54**
Antennas & Plasma Engineering	20.10	8.71	1.63	1.88	**32.32**	9.76	**42.08**
Neutral Beam & EC Power Supplies	27.70	12.00	2.25	2.59	**44.54**	13.45	**57.99**
Diagnostics	24.80	10.74	2.02	2.32	**39.87**	12.05	**51.92**
Test Blanket Modules	12.20	5.29	0.99	1.14	**19.62**	5.93	**25.54**
Transportation	2.00	0.87	0.16	0.19	**3.22**	0.97	**4.19**
Site and Buildings and Power Supplies	27.00	30.77	3.64	2.52	**63.93**	19.31	**83.24**
Broader Approach	29.00	1.55	0.68	1.92	**33.15**	10.01	**43.16**
Total	212.00	99.90	17.00	19.00	**347.90**	105.10	**453.00**

HR_table 03. Human Resources per action 2023

	2024						
	Core Staff	Matrix staff	Managerial activities	Transversal activities	**Direct Staff**	Overhead & Management	**Total F4E**
Magnets	2.00	0.86	0.17	0.19	**3.22**	0.97	**4.19**
Vacuum Vessel	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**
In-Vessel	30.00	12.92	2.54	2.91	**48.36**	14.51	**62.87**
Remote Handling	21.60	9.30	1.83	2.09	**34.82**	10.45	**45.27**
Cryoplant & Fuel Cycle	12.10	5.21	1.02	1.17	**19.50**	5.85	**25.36**
Antennas & Plasma Engineering	19.50	8.40	1.65	1.89	**31.43**	9.43	**40.86**
Neutral Beam & EC Power Supplies	26.70	11.50	2.26	2.59	**43.04**	12.92	**55.95**
Diagnostics	23.50	10.12	1.99	2.28	**37.88**	11.37	**49.25**
Test Blanket Modules	12.60	5.42	1.06	1.22	**20.31**	6.09	**26.41**
Transportation	2.00	0.86	0.17	0.19	**3.22**	0.97	**4.19**
Site and Buildings and Power Supplies	27.00	30.77	3.66	2.62	**64.05**	19.22	**83.27**
Broader Approach	27.00	1.55	0.66	1.85	**31.06**	9.32	**40.39**
Total	204.00	96.90	17.00	19.00	**336.90**	101.10	**438.00**

HR_table 04. Human Resources per action 2024

	2025						
	Core Staff	Matrix staff	Managerial activities	Transversal activities	**Direct Staff**	Overhead & Management	**Total F4E**
Magnets	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**
Vacuum Vessel	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**
In-Vessel	30.60	12.99	2.69	2.91	**49.20**	14.89	**64.09**
Remote Handling	17.40	7.39	1.53	1.66	**27.98**	8.47	**36.44**
Cryoplant & Fuel Cycle	12.00	5.10	1.05	1.14	**19.29**	5.84	**25.13**
Antennas & Plasma Engineering	19.20	8.15	1.69	1.83	**30.87**	9.35	**40.21**
Neutral Beam & EC Power Supplies	24.80	10.53	2.18	2.36	**39.87**	12.07	**51.94**
Diagnostics	22.30	9.47	1.96	2.12	**35.85**	10.85	**46.71**
Test Blanket Modules	15.70	6.67	1.38	1.50	**25.24**	7.64	**32.88**
Transportation	2.00	0.85	0.18	0.19	**3.22**	0.97	**4.19**
Site and Buildings and Power Supplies	27.00	30.77	3.69	2.57	**64.03**	19.38	**83.41**
Broader Approach	26.00	1.55	0.66	1.72	**29.93**	9.06	**38.99**
Total	197.00	93.47	17.00	18.00	**325.47**	98.53	**424.00**

HR_table 05. Human Resources per action 2025

3. HR Quantitative

3.1. Statutory staff, SNE and other staff

Human Resources	Year 2019			Year 2020	Year 2021	Year 2022	Year 2023	Year 2024	Year 2025
ESTABLISHMENT PLAN POSTS	Authorised Budget	Actually filled as of 31/12/2019[1]	Occupancy rate (%)[2]	Authorised staff	Envisaged staff	Envisaged staff	Envisaged staff	Envisaged staff[3]	Envisaged staff[4]
Administrators (AD)	245	230	94%	243	243	243	243	235	227
Assistants (AST)	38	43	113%	37	37	37	37	37	37
Assistants/Secretaries (AST/SC)	-	-	-	-	-	-	-	-	-
TOTAL ESTABLISHMENT PLAN POSTS	**283**	**273**	**96%**	**280**	**280**	**280**	**280**	**272**	**264**
EXTERNAL STAFF	FTE corresponding to the authorised budget	Executed FTE as of 31/12/N-1	Execution Rate %	FTE corresponding to the authorised budget	Envisaged FTE	Envisaged FTE	Envisaged FTE	Envisaged FTE[5]	Envisaged FTE[6]
Contract Agents (CA)	178	165.08	93%	170	170	170	170	163	157
Seconded National Experts (SNE)	3	1.67	56%	3	3	3	3	3	3
TOTAL EXTERNAL STAFF	181	166.75	92%	173	173	173	173	166	160
TOTAL STAFF	**464**	**439.75**	**95%**	**453**	**453**	**453**	**453**	**438**	**424**
Structural service providers		17							
Interim staff		11							

[1] Of which 1 sent (and accepted) Contract Agent offer letter.
[2] 5 AD short term posts were converted into AST. This will be regularized as soon as the phasing out of the 21 TA short term posts granted in 2016 is completed
[3] Return of 8 TA posts in the framework of the phasing out of the 21 TA short term posts granted in 2016
[4] Return of 8 TA posts in the framework of the phasing out of the 21 TA short term posts granted in 2016
[5] Return of 7 CA posts in the framework of the phasing out of the 24 CA short term posts granted in 2015
[6] Return of 6 CA posts in the framework of the phasing out of the 24 CA short term posts granted in 2015

HR_table 06. 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 2019				Year 2020		Year 2021		Year 2022		Year 2023		Year 2024		Year 2025	
	Authorised Budget		Actually filled as of 31/12/19		Authorised budget		Envisaged[1]		Envisaged[2]		Envisaged		Envisaged[3]		Envisaged[4]	
	Permanent posts	Temporary posts	Permanent posts	Temporary 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		1		1		1		1
AD 14	5	2		1	5	3	5	3	3	1	4	2	3	2	2	2
AD 13	14	7	9	6	14	9	13	10	7	5	6	4	6	6	6	9
AD 12	14	21	11	9	15	21	14	21	10	25	11	30	11	34	12	39
AD 11	3	23	5	21	2	27	2	29	3	25	2	29	3	33	4	36
AD 10		28	1	22		31		33	5	42	7	44	6	44	5	44
AD 9		39	9	55		41		42	6	49	5	45	4	45	3	42
AD 8	1	37	1	32	1	33	1	33	1	24	1	24	1	22	2	19
AD 7	1	21	1	20	2	21	2	21	2	20	1	16	1	12		1
AD 6	2	25	1	26	1	16	1	12		14		11		1		
AD 5		1														
AD TOTAL	**40**	**205**	**38**	**192**	**40**	**203**	**38**	**205**	**37**	**206**	**37**	**206**	**35**	**200**	**34**	**193**
AST 11	4		1		5		6		1		1		1		2	
AST 10	2				1				2		3		3		2	
AST 9	4		3		4		4	1	3		1	1	1	2	1	3
AST 8	1	1	2		1	2	1	2		2		2	1	2	2	3
AST 7		3		1		4		5	1	5	1	6	1	7	1	7
AST 6		9	1	5		9		9	2	8	1	8	1	8		8
AST 5		11	2	9		9		8	1	7	2	7	1	7	1	5
AST 4		3	2	8		2		1	1	4	1	2	1	0	1	
AST 3			2	7							1		1	0	1	
AST 2																
AST 1																
AST TOTAL	**11**	**27**	**13**	**30**	**11**	**26**	**11**	**26**	**11**	**26**	**11**	**26**	**11**	**26**	**11**	**26**
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	**51**	**232**	**51**	**222**	**51**	**229**	**49**	**231**	**48**	**232**	**48**	**232**	**46**	**226**	**45**	**219**
GRAND TOTAL	**283**		**273**		**280**		**280**		**280**		**280**		**272**		**264**	

Note: The requested posts for 2021 and the forecasts for 2022,2023,2024 and 2025 are calculated according to the promotions slots rates of Annex I of the Staff Regulations.

[1] Conversion of 1 FO AD13 and 1 FO AD12 posts into TA AD6 and TA AD12 respectively following the departure of two officials in 2020

[2] Conversion of 1 FO AD14 and 1 TA AD12 posts into TA AD9 and TA AD6 respectively following the retirement of two staff members in 2021

[3] Conversion of 2 FO AD14 posts into TA AD9 in view of the retirement of two officials in 2023

In addition, conversion of 1 TA AD14 and 1 TA AD13 into AD12 and AD9 respectively following the retirement of two staff members in 2023

Finally, return of 8 TA AD posts in the framework of the phasing out of the 21 short term posts granted in 2016

[4] Conversion of 1 FO AD14 and 1 TA AD14 posts into TA AD12 and TA AD9 respectively in view of the retirement of two staff members in 2024

In addition, return of 8 TA AD posts in the framework of the phasing out of the 21 short term posts granted in 2016

HR_table 07. Multi-annual staff policy Plan 2021-2025 – Staff in Establishment Plan

B. External personnel

Contract agents	FTE corresponding to the authorised budget 2019	Executed FTE as of 31/12/2019	Headcount as of 31/12/2019[1]	FTE corresponding to the authorised budget 2020	FTE corresponding to the authorised budget 2021	FTE corresponding to the authorised budget 2022[2]	FTE corresponding to the authorised budget 2023	FTE corresponding to the authorised budget 2024[3]	FTE corresponding to the authorised budget 2025[4]
Function Group IV	104	97.13	98	97	97	97	97	90	84
Function Group III	50	53.96	52	50	50	55	55	55	55
Function Group II	24	14.00	14	23	23	18	18	18	18
Function Group I	-	-	-	-	-	-	-	-	-
TOTAL	**178**	**165.1**	**164**	**170**	**170**	**170**	**170**	**163**	**157**

Seconded National Experts	FTE corresponding to the authorised budget 2019	Executed FTE as of 31/12/2019	Headcount as of 31/12/2019	FTE corresponding to the authorised budget 2020	FTE corresponding to the authorised budget 2021	FTE corresponding to the authorised budget 2022	FTE corresponding to the authorised budget 2023	FTE corresponding to the authorised budget 2024	FTE corresponding to the authorised budget 2025
TOTAL	**3**	**1.7**	**2**	**3**	**3**	**3**	**3**	**3**	**3**

[1] Staff in place only. It may differ from the recruited/filled in figure reported in table 2.2. External Staff of the FIFI

[2] 5 CA FGII posts are converted into FGIII

[3] Return of 7 FGIV posts in the framework of the phasing out of the 24 CA short term posts granted in 2015

[4] Return of 6 FGIV posts in the framework of the phasing out of the 24 CA short term posts granted in 2015

HR_table 08. Multi-annual staff policy Plan 2021-2025 – 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	Envisaged staff	Envisaged staff	Envisaged staff	Envisaged staff	Envisaged staff
Contract Agents (CA)	-	-	-	-	-	-
Seconded National Experts (SNE)	-	-	-	-	-	-
TOTAL	0	0	0	0	0	0

HR_table 09. 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 complment. 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[4].
- AD14 for the F4E Director.

[4] 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.

E. Recruitment forecasts 2021 following retirement/mobility

Below are the selections expected for 2021 according to the information available.

Job title in the Agency	Type of contract (Official, TA or CA)		TA/Official Function group/grade of recruitment internal (Brackets)		CA 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 Programme Unit	FO/TA	-	9-12	9	-
Head of Programme Unit	FO/TA	-	9-12	9	-

HR_table 10. Recruitment forecast

4. HR Qualitative

4.1. Implementing Rules on recruitment policy

HR implementing rules foreseen for adoption Year 2021
At this date, Fusion for Energy has not identified any IR yet it would intend to submit.
However, this would also depend on the implementing rules that the European Commission will notify us in the following months and the own Commission calendar in this respect.

HR_table 11. Implementing Rules for 2021

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
Reclassification of TA	Model Decision C(2015)9560	X		
Reclassification of CA	Model Decision C(2015)9561	X		

HR_table 12. Adopted Implementing Rules

C. Reclassification of TA / promotion of officials

Reclassification of temporary staff / promotion of officials in 2018							
	Average seniority in the grade among reclassified staff						
Grades	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019	Actual average over 5 years	Average over 5 years (Annex IB SR)
AD05			**3.72**			**3.72**	2.8
AD06	**2.93**	**2.3**	**2.43**	**5.19**	**2.68**	**3.11**	2.8
AD07	**2.58**	**2.3**	**2.31**	**2.45**	**2.55**	**2.44**	2.8
AD08	**2**	**2.3**	**3**	**2.84**	**3.11**	**2.65**	3
AD09	**4.32**	**3**	**3.09**	**2.80**	**3.99**	**3.44**	4
AD10	**3.34**	**3.7**	**4.38**	**4.96**	**3.86**	**4.05**	4
AD11				**4.91**	**4.31**	**4.61**	4
AD12							6.7
AD13							6.7
AST1		**3.1**				**3.10**	3
AST2	**4**		**4**		**3.00**	**3.67**	3
AST3	**4.42**	**3.5**	**3.27**	**3.07**	**2.47**	**3.35**	3
AST4	**2.5**	**2.3**	**2.75**	**2.50**	**4.00**	**2.81**	3
AST5	**3**	**2.5**	**2**		**3.17**	**2.67**	4
AST6		**3.5**	**3**	**2.00**		**2.83**	4
AST7	**4**				**3.00**	**3.50**	4
AST8					**4.00**	**4.00**	4
AST9							N/A
AST10 (Senior Assistant)					**7.01**	**7.01**	5
AST/SC1							4
AST/SC2							5
AST/SC3							5.9
AST/SC4							6.7
AST/SC5							8.3

HR_table 13. Reclassification of TA / promotion of officials

D. Reclassification of contract agents

Reclassification of contract staff in 2019					
Function Group	Grade	Staff in activity at 01.01.2018	How many staff members were reclassified in 2019	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	**2**	**1**	**4**	Between 6 and 10 years
	16	**17**	**1**	**3**	Between 5 and 7 years
	15	**21**	**5**	**3.5**	Between 4 and 6 years
	14	**48**	**15**	**2.96**	Between 3 and 5 years
	13	**16**	**2**	**2.02**	Between 3 and 5 years
CA III	11	**12**	**1**	**6**	Between 6 and 10 years
	10	**23**	**2**	**4**	Between 5 and 7 years
	9	**18**	**3**	**3.78**	Between 4 and 6 years
	8	**1**	**1**	**4.09**	Between 3 and 5 years
CA II	6	**6**			Between 6 and 10 years
	5	**6**			Between 5 and 7 years
	4				Between 3 and 5 years
CA I	2				Between 6 and 10 years
	1				Between 3 and 5 years
Total		**170**	**31**		

HR_table 14 . 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 try to address the issue and try to increase the representation of female staff. Special efforts will be made for the managerial functions where F4E has only three female staff members.

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

		Official		Temporary		Contract Agents		Grand Total	
		Staff	%	Staff	%	Staff	%	Staff	%
Female	Administrator level	**12**	60%	**42**	81%	0	0%	**54**	34%
	Assistant level (AST & AST/SC)	**8**	40%	**10**	19%	0	0%	**18**	11%
	Total	**20**	100%	**52**	100%	**87**	53%	**159**	36%
Male	Administrator level	**26**	84%	**150**	88%	0	0%	**176**	63%
	Assistant level (AST & AST/SC)	**5**	16%	**20**	12%	0	0%	**25**	9%
	Total	**31**	100%	**170**	100%	**78**	47%	**279**	64%
Grand Total		**51**		**222**		**165**	100%	**438**	100%
Figures are based on filled in posts including staff in place and employment offers									

HR_table 15. Officials, AT and AC on 31/12/2019

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

	2014		2019	
	Number	%	Number	%
Female Managers	**1**	4%	**4**	13%
Male Managers	**26**	96%	**28**	88%
Total	**27**	100%	**32**	100%

HR_table 16. Evolution of Middle and Senior management

4.4. Geographical balance

The table below provides the geographical distribution as at 31.12.2019 based upon the filled in posts on 31.12.2019 (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 + AC FG IV		AST/SC- AST + CA FGI/CA FGII/CA 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
Belgian	**8**	2.4%	**10**	9.2%	**18**	4.1%
British	**14**	4.3%	**4**	3.7%	**18**	4.1%
Bulgarian	**3**	0.9%	**1**	0.9%	**4**	0.9%
Czech	**2**	0.6%	**2**	1.8%	**4**	0.9%
Dutch	**5**	1.5%	**0**	0.0%	**5**	1.1%
Estonian	**1**	0.3%	**0**	0.0%	**1**	0.2%
Finnish	**3**	0.9%	**1**	0.9%	**4**	0.9%
French	**66**	20.1%	**18**	16.5%	**84**	19.2%
German	**10**	3.0%	**6**	5.5%	**16**	3.7%
Greek	**5**	1.5%	**3**	2.8%	**8**	1.8%
Hungarian	**6**	1.8%	**0**	0.0%	**6**	1.4%
Irish	**5**	1.5%	**2**	1.8%	**7**	1.6%
Italian	**68**	20.7%	**20**	18.3%	**88**	20.1%
Lithuanian	**0**	0.0%	**4**	3.7%	**4**	0.9%
Maltese	**1**	0.3%	**0**	0.0%	**1**	0.2%
Polish	**5**	1.5%	**0**	0.0%	**5**	1.1%
Portuguese	**10**	3.0%	**1**	0.9%	**11**	2.5%
Romanian	**8**	2.4%	**1**	0.9%	**9**	2.1%
Slovak	**1**	0.3%	**0**	0.0%	**1**	0.2%
Spanish	**103**	31.3%	**36**	33.0%	**139**	31.7%
Swedish	**4**	1.2%	**0**	0.0%	**4**	0.9%
Croatian	**1**	0.3%	**0**	0.0%	**1**	0.2%
TOTAL	**329**	100%	**109**	100%	**438**	100.0%

HR_table 17. Evolution of Middle and Senior management

B. Evolution over 5 years of the most represented nationality

Most represented nationality	2014		2019	
	Number	%	Number	%
Spanish	**107**	36%	**139**	32%
Italian	**82**	21%	**88**	20%
French	**70**	18%	**84**	19%
British	**25**	6%	**18**	4%
Belgian	**21**	5%	**18**	4%
TOTAL	**388**	87%	**438**	79%

HR_table 18. Evolution of Middle and Senior management

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. Job rotation

A job rotation scheme has been designed to facilitate F4E's already existing internal mobility framework. Job rotation refers to the concept of allowing staff to move to new roles that could suit their background and experience without having to go through an internal selection procedure. This is meant to complement the internal mobility procedure, which is conditional to the filling of vacant posts and is constrained by F4E's low turnover rate and by the contract type and grade provided by the relevant statutory implementing rule adopted by the GB.

C. 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 28 international schools of which 24 in the area of Barcelona and 4 in Cadarache (France).

Agreement in place with the European School(s) of …….				
Contribution agreements signed with the EC on type I European schools	Yes		No	**X**
Contribution agreements signed with the EC on type II European schools	Yes		No	**X**
Number of service contracts in place with international schools:	**27**			
Description of any other solutions or actions in place: **F4E has in place an agreement with a school for children with special needs**				

HR_table 19. Service Level Agreements with International schools

List of Tables

SPD2021_ANNEXES WORK PROGRAMME 2021

1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2021

The 2021 Work Programme takes into account to the extent possible the EU Commission 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 2021, detailed objectives, expected results and target for each WP Action.

Main assumptions

The following assumptions are considered as the basis of the Work Programme 2021:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of March 2020.[1]
- 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 revised Commission proposal for the MFF 2021-2027 No 442 (2020) of 27/05/2020 plus ITER Host State and Membership contributions. Once the budget for MFF 2021-2027 is agreed, the planning data (text describing the financing decision per action, Work Programme objectives, expected results, targets in kIUA, main procurement activities, list of grants with associated value) in the Work Programme will be updated to align with the budgetary data. The budget summary table of Work Programme 2021 (WP_table 1) reflects the current status of the draft budget for the 2021 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 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.

[1] Except for the Work Programme objectives of action 7 Antennas and Plasma Engineering that reflect the situation at the end of September 2020 to reflect the change in procurement strategy.

- 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 is 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.
- Regarding the WP2021 for Broader Approach, the main assumptions are that this is to be coherent with the individual BA Projects' Work Programmes and Project Plans as approved by the Broader Approach Steering Committee.
- 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 the F4E 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 forecast of annual payment due, forecast of progress in the implementation of the contract, or annual budget availability. The instalments proposed for 2021 correspond to the latter case. Instalments may be used under the following actions
  - ✓ Main Vessel (Vacuum Vessel, Blanket, Divertor and TBM)
  - ✓ Site Buildings and Power Supplies.

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 WP2021 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 2021 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 2021. 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 and external legal support, cost of legal proceedings and alternative dispute settlement, including arbitration, as needed[2]. 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.

[2] 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

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

(b) **Annual objectives** defined as the achievement on time of the following milestones:

i. ITER Council/Governing Board (IC/GB) milestones in 2021;

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, when applicable, as the yearly CAS foreseen to be achieved in 2021 and the cumulative CAS foreseen to be achieved by the end of 2021 per PA (PAs associated with each Action are listed in Table 2 of the main text of the SPD).The value is according to the CAS profile implemented in the F4E DWS.

(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 2021. 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 144,000 Euros[3]. 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 WP2021. 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 2021 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 2021 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 12 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.

[3] The threshold has been selected so to be in line with the FR.

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 WP2021 due to changes in the overall planning and priorities.

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 term 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[4]
Work Programme objectives	Implement a minimum percentage of Work Programme objectives *[including GB milestones and predecessors]* by end of the year
Credit Allocation Scheme [CAS]	Reach a minimum percentage of achieved CAS by end of the year
Annual budget	Implement minimum percentage of Commitment Appropriations by 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:

Work Programme objectives

$$\frac{Number\ of\ Work\ Programme\ objectives\ met\ on\ time}{Number\ of\ Work\ Programme\ objectives\ planned\ to\ be\ met}$$

Credit Allocation Scheme (CAS)

$$\frac{Amount\ of\ CAS\ achieved}{Amount\ of\ CAS\ planned\ to\ be\ achieved}$$

Annual budget

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

[4] Action 12 of the MAP Ad Hoc group endorsed by Governing Board 45 stated that "*The targets for these measures will be defined before the start of each year to which the measures apply*".

3. LIST OF WP2021 ACTIONS

Action 1. Magnets

Action 1	Magnets

TF & PF Conductors

Progress of Work

Progress of Work All TF and PF conductor activities are completed, only some storage of strands will be required.

Procurement Activities

Amendments and/or options for existing contracts may be signed (i.e., storage of strands, claims, deviation notices, etc.)

Pre-Compression Rings

Progress of Work

A new IO Task Agreement was signed in 2020 for extra scope: Additional PCR#10, eight 1/5 scale rings, 3 set of samples and additional pultruded length. The scale rings will be completed in 2021. Depending on the impacts of COVID-19, the additional PCR10, the samples and the additional pultruded length might also be completed in 2021.

Procurement Activities

Task orders related to Quality Inspection services might be renewed to follow up the manufacturing of the Pre-Compression Rings. Amendments and/or options for existing contracts may be signed (i.e., claims, deviation notices, etc.).

Toroidal Field Coils

Progress of Work

All 10 TF Winding Packs will be finally shipped to the insertion facility, where the activity will be at full swing to complete the last stage of manufacturing of the TF Coils. During 2021 four TF Coils will be delivered to IO. These delivery dates are highly dependent on the impacts generated by the COVID-19 outbreak and on the dates and quality of the TF Coil Cases delivered by Japan.

Procurement Activities

Amendments and/or options for existing contracts may be signed (i.e., Non-Conformities on free issue items, Project Change Requests, components storage, contract extensions, claims, deviation notices, etc.).

Task orders related to quality inspection services or production support might be signed to reinforce the TF Coil manufacturing activities.

Some task orders might be signed to cover for Engineering, Qualification and Testing activities related to the manufacturing of the coils.

Poloidal Field Coils

Progress of Work

The third PF Coil under F4E responsibility after PF #5 and PF#6 is PF #2, which will be completely finished and handed over to ITER IO for storage prior to assembly. The fourth PF Coil, PF #4, will be well advanced and all 8 Double Pancakes will be completed, stacked and prepared for the Winding Pack ground insulation. The evolution of these activities is highly dependent on the impacts of generated by the COVID-19 outbreak.

Procurement Activities

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 might be signed, if needed, to support the production in the PF Building (i.e., Framework Contracts for materials, services, etc.)

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.1A.11800	IPL > Delivery of TF17 (EU 07) by EU-DA to ITER Site	Q3 2021	GB23	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.28125	HPC- Approval by IO TFWP Acceptance Report (HP 8.4.6) / TFWP14	Q4 2021	Predecessor of GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.3B.01120	IPL > Delivery of PF2 Coil by EU-DA to IO	Q2 2021	WP21 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
EU11.3B.571550	DP2 - PF4.- DP VPI Completed	Q4 2021	WP21 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6

EXPECTED RESULTS

The main expected results for this action are:

1. Completion of the shipment of all TF Winding Packs to the insertion facility.
2. Delivery to IO of 3 to 4 TF Coils.
3. Completion of IO Task Agreement scope: Additional PCR10, eight 1/5 scale rings, 3 set of samples and additional pultruded length.
4. PF Coil #2 completed.
5. All 8 Double Pancakes for PF4 completed.

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):		
	Yearly value	Cumulative value
PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	20.416	85.278
PA 1.1.P2A.EU.01 Pre Compression Rings	0	0.6
PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	3.75000	27.97
PA 1.1.P6A.EU.01 Toroidal Field Conductors	0	43.39
PA 1.1.P6C.EU.01 Poloidal Field Conductors	0	11.22880977

Action 2. Vacuum Vessel

Action 2	**Vacuum Vessel**

Progress of Work

In 2021 the manufacturing of all 5 Vacuum Vessel sectors will continue at full intensity. The first three sectors should be completed during 2021, but this being a First Of A Kind (FOAK) manufacturing activity, the uncertainty will remain until actual completion of the first sector mainly due to potential technically complex non-conformances and impact of Covid 19.

To transport the sectors, so-called Transportation Frame Covers will be manufactured as well.

Procurement Activities

Provisions will be made for the transportation of the sectors to the ITER site stage, resolution of non-conformities (if required), participation in collaboration meetings with the Korean DA for the final assembly and commissioning of the sectors.

Specific Contracts for support activities, like Inspectors, Documentation Support, Engineering and Analysis 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*	Q1 2021	GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.1139800	PS3 VV9 Fabrication Complete	Q3 2021	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel

EU15.1A.1139820	PS4 VV9 Fabrication Complete	Q4 2021	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3081300	START OF FAT - Sector 5	Q2 2021	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3082260	S5 Ready for Lower and Upper Port assembly	Q1 2021	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel

EXPECTED RESULTS

The main expected results for this action are:

1. Delivery of the first European Vacuum Vessel sector to the ITER site
2. Full “D-shape” of the second sector completed
3. All four segments of the third, fourth and fifth sector completed (each sector consists of 4 segments that are joint together to form the D-shape of the sector)
4. Transportation frame and cover ready for the shipment of the sector

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	21.505	82.66

** This milestone is currently reported with negative float as there is a recovery plan under implementation to recover the delay*

Action 3. In Vessel – Blanket

Action 3	**In Vessel - Blanket**

Blanket First Wall project

Progress of Work

In 2021, the start of the activities for the preparation of the production line for the manufacturing of the First Wall (FW) panels is foreseen. The procurement of main raw materials (i.e. Beryllium and CuCrZr) will be implemented by way of task orders. These materials are planned to be provided as free issue items to the Suppliers in charge of FW Panels manufacturing.

In parallel, a series of tests will be performed on the Mock-Ups and Full-Scale Prototypes manufactured under the contracts OPE-443. High Heat Flux Testing of the full-scale prototypes will be performed through a task order under framework contract OPE-319, while a Hot Helium Leak testing of the Alternative Design Mock-ups (ADMUs) will be carried out under contract OMF-1074.

The manufacturers of the full-scale prototypes (OPE-443) will also complete the manufacturing of the ADMU prototypes, and these are planned to be High Heat Flux Tested through task orders under framework contract OMF-1033.

Procurement Activities

In 2021, the main procurement activities foreseen as part of the FW series manufacturing is the signature of task orders for the procurement of Beryllium and CuCrZr materials. A framework contract is planned to be signed to procure He leak test services. In addition, resources needed to support the follow-up of the FW panels manufacturing will be needed, more specifically cost auditors and quality inspectors. A task order for the High Heat Flux test of the ADMUs will also be signed. A task order for thermo-mechanical analyses is also foreseen, in case some detail aspects of the manufacturing design to be developed by the FW panels manufacturers will have to be verified. The call for tender for the procurement of standard parts for the FW series production will be launched.

Blanket Cooling Manifolds project

Progress of Work

In 2021, the main activities will be the start of the qualification phase and of the manufacturing of the first pipe bundles of three 10-degree sectors (Task 1 of OMF-1080).

Procurement Activities

In 2021, the main procurement activity is the completion of the negotiation with tenderers leading to the award of three multiple framework contracts covering all six tasks of the Blanket Cooling Manifolds series production.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU15.2A.12100	Contract Signed for Task 1 - 30 Deg Sector Pipe Bundles	Q3 2021	WP21 objective	PA 1.5.P1A.EU.02 Blanket Manifolds
EU.16.01.208250	Published Call for Tender for Procurement of Standard Parts	Q4 2021	Predecessor of GB37	PA 1.6.P1A.EU.01 Blanket First Wall
EU16.01.61400	Task Order Signed for Auditors 2021-2024	Q2 2021	WP21 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.79780	End of Manufacturing Report (ADMU) - OPE-443-01	Q4 2021	WP21 objective	ITA (C16TD169FE) Supporting Development Fabrication & Testing of First Wall full-scale prototypes

EXPECTED RESULTS

The main expected results for this action are:

1. Start of manufacturing activities of the 30 Deg Sector Pipe Bundles under Blanket Cooling Manifold PA
2. Start of tendering activities procurement of Standard parts for the First wall manufacturing
3. Signed Task Order for Auditors to follow-up the execution of the Cost plus Fee OMF-900 contract
4. Complete the manufacturing of the Alternative Design Mock-Ups

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):		
	Yearly value	Cumulative value
1.6.P1A.EU.01 Blanket First Wall	0.1	0.2

Action 4. In Vessel – Divertor

Action 4	In Vessel – Divertor

Inner Vertical Target project

Progress of Work

In 2021 the first Full Scale Prototype (FSP) of the Inner Vertical Target (IVT) is planned to be completed and shipped to IO (OPE-138-01) for assembly trials.

For the three additional FSPs (OMF-567) the progress is expected to be as follows:

For Lot 1 the fabrication of the Plasma Facing Units (PFUs) and the Steel Support Structure (SSS) will be completed, the Test Assembly (TA) will be shipped to RFDA for High Heat Flux Testing (HHFT).

For Lot 2 the fabrication of the PFUs and the SSS will be completed, the TA will be shipped to RFDA for HHFTing and the FSP integration will be completed.

Finally for Lot 3 the PFUs and SSS fabrication will be completed as well as the HHFTing in RFDA and the FSP Final Acceptance tests.

In regard to the preparation of the call for tender for the Inner vertical target series production, the related technical specifications will be completed.

Procurement Activities

In 2021 the main activity foreseen will be the launch of the call for tender for the series fabrication of the Inner Vertical Target.

In order to cover the remaining HHFT needed to test all FSPs, a task order will be signed from the framework contract OMF-1033.

Additional resources and inspectors will be needed to closely follow up the fabrication of the FSPs as well as the preparation for the IVT series contract. These needs are planned to be insourced through task orders. Provision for metrology equipment will be in place. Moreover, a contract with CEA on lessons learnt on the manufacture of the WEST divertor to support the preparation of the specification for the IVT series production will start.[5]

Cassette Body project

[5] At the time of writing this Work Programme amendment, there is a risk that this activity is postponed from 2020 to 2021. The activity is therefore also included in WP2021 but the budget is only allocated to the year 2020 where the probability of implementation is higher at the time of writing the document.

Progress of Work

In 2021 all the materials for the first-of-a-kind (FOAK) will be received and the manufacturing of the FOAK of the standard cassette body for both contractors will continue (OMF-444 Lots 1 and 3).

Concerning the contract (OPE-1036) related to the fabrication of the transition pieces and remote handling flanges, the qualification will be completed and the manufacturing will start.

Procurement Activities

In 2021 the main activity foreseen will be the signature of Stage 2 for the cassette body series fabrication. An amendment of the OMF-444 Lot 3 is planned to re-work the cassette body FSP in order to upgrade it to a standard cassette body to be installed into the machine. Also, the signature of the contract for Pins, Sleeves and Links is planned for mid-2021. Furthermore additional resources will be needed specifically for Non Destructive Testing and metrology activities. These needs will be insourced through task orders. Provision of tooling for measurement will be in place.

Divertor Rails project

Progress of Work

In 2021 the preparation of the documentation for the signature of the PA for Divertor Rails will be carried out.

Procurement Activities

N/A

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.1050800	HP - Reception of the Conformity of XM19 and 316-LN-IG material for Standard CBs (M_CBST_S14B)	Q3 2021	WP21 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.01.1151220	Prototype/ Qualification of processes TCWS Transition Pieces of CB series Completed	Q2 2021	WP21 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.03.1040	< IPL PA 1.7.P2E.EU.01 APFC Signed	Q2 2021	Predecessor of GB49	PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails
EU17.2B.12590	Release Technical Specification for PFC Series Production	Q1 2021	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.85750	Authorisation of shipment of the Testing Assembly to the HHF Testing Facility - OPE-567-03-01 (II.22)	Q2 2021	WP21 objective	PA 1.7.P2B.EU.01 Inner Vertical Target

EXPECTED RESULTS
The main expected results for this action are: 1. The procurement of materials for the series production of Std. CB will be completed (OMF-444 Lots 1 and 3) 2. Prototype of the TCWS Transition Pieces of CB series will be completed. 3. Completion of the inner vertical target plasma facing units with reference tube transition and alternative tungsten grades (OPE-138 Lot 1) 4. Completion of the manufacturing and qualification of the inner vertical target steel support structure (OMF 567 Lots 1,2,3) 5. Completion of the inner vertical target plasma facing units and twisted tapes (OMF 567 Lots 1,2,3). 6. Specs for the Series production of Inner Targets will be prepared. 7. Signature of Divertor Rails PA 1.7.P2E.EU.01
TARGET
The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 1.7.P1.EU.01 Cassette Body	0.03	0.56
PA 1.7.P2B.EU.01 Inner Vertical Target	0.725	3.115

Action 5. Remote Handling

Action 5	Remote Handling

Divertor Remote Handling System (DRHS)

Progress of Work

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.

Procurement Activities

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. Grant amendment will be supporting the complementary developments at DTP2 site. Grant will be supporting the design of the CMM.

Cask and Plug Remote Handling System (CPRHS)

Progress of Work

Activities are organized in two parallel development lines. One focuses on the first assembly casks that are first plasma components, the other one focuses on the nuclearized cask variants. After the completion of the preliminary design phase, final design development will continue on

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 continue with the preliminary design development.

Procurement Activities

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.

Neutral Beam Remote Handling System (NBRHS)

Progress of Work

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 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.

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.

In-vessel viewing system (IVVS)

Progress of Work

Main focus will be given to the final design development that will continue towards the design review. Final design activities will be accompanied with prototyping and laboratory test 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, camera.

Procurement Activities

Specific contracts will be signed under the new engineering support framework contract of Remote Handling in order to carry out supporting activities for the four main operational procurement and for complementary RH technology related design activities, qualification and prototyping. Grant amendment will be supporting the complementary developments at DTP2 site.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.03.14046592	Task Order Signed for Final Design MA-1 for CPRHS	Q2 2021	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14056380	M7 Preliminary design review meeting held (MA-1 last PDR)	Q2 2021	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.01863	NBRHS Monorail Crane Final Design Completed	Q4 2021	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System
EU57.01.50266	TO for Final Design Phase 1 for IVVS Completed (ADP Approved)	Q2 2021	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

EXPECTED RESULTS

The main expected results for this action are:

1. Signature of task orders for final design complementary scope of DRHS
2. Preparation for the final design review meetings of first plasma CPRHS
3. Preparation for the preliminary design review meetings of non-first plasma NBRHS systems
4. Preparation for the final design review meetings of IVVS

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 2.3.P2.EU.01 Divertor Remote Handling System	0.4	1.6
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	1	1.8
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.55973999	1.01973999
PA 5.7.P1.EU.01 In-Vessel Viewing System	0.3	2.78

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle

Fuel Cycle

Progress of Work

In the frame of the PA for leak detection and localization system, contract for the procurement of the Leak Detection systems will be focus on design activities. Second phase of PA (localization

systems) will focus on tendering process and contract signature of Helium Leak Localization systems and start or design phase.

The type A radwaste treatment and storage system it is expected will be transferred to IO .

In the frame of the PA for REMS (Radiological and Environmental Monitoring Systems), the contract for design and manufacturing of 1st plasma equipment will be signed followed by the start of design activities. 2nd PA amendment will be signed and tendering for the design and procurement of equipment for Tokamak complex will start. An expert contract will be signed to support REMS activities.

The activities in the field of vacuum pumping will keep growing:

• For the Torus and Cryostat Cryopumping System, manufacturing of the 8 cryopumps will start. The TO for the manufacturing of instrument and control systems will be signed and manufacturing will start.

• For MITICA and Neutral beam Cryopumps, the contract execution for MITICA Cryopump manufacturing and assembly (Lot1) will continue focusing on activities for production of the cryopump components and sub-assemblies; and assembly of cryopumps 1 and 2 will start. The supply of the charcoal coating of the cryopanels (Lot 3) will be completed in 2021. The task order for the MITICA Cryopump Installation tool will be manufactured and delivered. Activities for the preparation of PA amendment signature for Neutral Beam cryopumps will start.

• The execution of Front End Cryopump Distribution System will continue : Cryojumpers will go be tested and delivered, Warm Regeneration System will be delivered, Cold Valve Boxes will be assembled and tested and Task order for qualification of instrumentation and control will be closed and the one for manufacturing will signed beginning 2021.

Procurement Activities

• Task Order for Instrumentation and control of Front end Cryosdistribution system and Torus and Cryostat Cryopumps

• Contract signature for final Design and procurement of Beryllium and environmental monitors (First plasma activities)

• Contract signature of Cryostat (Helium) Localization

Cryoplant

Progress of Work

Contract for the Mitica cryoplant in the RFX facilities (Padova, Italy) will be closed in 2021. For the cryogenic quench line header the scope of work will be focused on installation and testing. LN2 Plant and Auxiliary Systems in the Cryoplant building at Cadarache will be focus on installation and start of commissioning activities.

Procurement Activities

Amendments for existing contracts may be signed.

WORK PROGRAMME OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU31.01.11580	IPL > Delivery of Warm Regeneration System by EU-DA to IO	Q2 2021	Predecessor of GB28	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box
EU31.01.305060	Acceptance of 4th batch of Cryopanels for Mitica cryopumps	Q2 2021	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.03.26280	Contract Signed for Helium Leak Localisation System	Q2 2021	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II - 1st Amendment)
EU31.03.26800	Quality plan approved for Primary and Cryostat Leak Detection system	Q1 2021	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

EXPECTED RESULTS

The main expected results for this action are:

1. Manufacturing Readiness Review of Torus and Cryostat cryopumps successfully passed.
2. Cryojumpers of Front end cryodistribution systems delivered.
3. Charcoal coating panels of Mitica Cryopump delivered.
4. Negotiation phase with tenderers for Helium Leak Localization closed.
5. Contract signature of 1st plasma activities for Radiological and environmental monitors systems.
6. End of installation LN2 Plant and Auxiliary Systems in building 51.

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	1	1
PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0	0.18
PA 3.1.P1.EU.01 Warm Regeneration Lines	0	0.2
PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0	0.22979
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0.7	0.7
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II– 1st Amendment)	0	0
PA 3.1.P3.EU.01 Leak Detection and Localization System Common Activities	0	0

PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System (2nd Amendment)	0	0
PA 3.2.P5.EU.01 Water Detritiation System - Tanks	0	3.252
PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	2.34066003	25.32359985
PA 6.4.P1.EU.01 for Design of REMS	0	0

Action 7. Antenna & Plasma Engineering

Action 7	Antennas and Plasma Engineering

Ion Cyclotron Antenna

No activities of design foreseen in 2021.

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

Progress of work

In 2021 PA procurement activities based on the staged PA signed in March 2019 will proceed in parallel to final design work and procurement contracts for prototypes (under ITA).
For PA based activities, the main action is the signature of the integrator contract that covers the overall scope for design finalization, fabrication, assembling and testing of the EC Upper Launchers and the ex-wessel waveguide systems. The main challenges are the timely placement of these contracts and the close technical follow-up required to guarantee quality, schedule and cost control. On the design front, main on-going activities are related to design, prototype fabrication and testing as well as qualification and requirements identification & verification for the ex-vessel systems, towards Intermediate Design Review (pre-FDR) in 2021. Management of changes (requirements, and interfaces) as well as technical complexity and diversity of launcher components remain one of the main challenges.

The FALCON facility will support the project in 2021 by testing components and prototypes as needed. This will include testing of the ex-vessel waveguides cooling and of the GCC waveguides pre-series. Maintenance of the facility is foreseen in 2021 with a refurbishment of the RF dummy loads and a possible revision of the High Voltage Power Supplies.

Procurement activities

PA activities: in addition to the follow-up activities related to the series fabrication of the diamond disks, the integrator framework and the first task order of this framework will be signed. The first task order of the integrator framework contract includes the design finalization of the components pending FDR and fabrication, assembling and testing of the EC Upper Launchers. Another framework contract is planned to be signed for the isolation valves prototyping and series production. Other contracts are foreseen in support of these main activities, most of them specific contracts on exiting frameworks. In addition, contracts are foreseen for the testing of diamond disks

and for other mm-wave components (also implemented mainly with Task Orders on existing frameworks).

ITA activities: Support for Final and Build-to-print design will be ongoing during 2021, mainly performed through specific contracts as part of existing frameworks, related to CHIT resolution of the FDR held in 2019, and further design of the items not covered by the FDR (e.g. in-vessel waveguides, mirrors 3 and 4, and the ex-vessel waveguides system). Specific contracts under the existing framework contract for setup and operation of the EC components test facility (FALCON) are also envisaged in 2021, and the signature of contracts for other prototypes (e.g. windows) are also foreseen.

Engineering support activities are also foreseen in 2021, to both PA and ITA activities. Most will be implemented with existing framework contracts via new specific contracts.

Additional resources and inspectors will be needed to closely follow up the activities, these are planned to be insourced through task orders.

Electron Cyclotron Control System

Progress of Work

The Electron Cyclotron Control System development follows a staged approach. The delivery and installation of ECPC Stage 2 (the Gyrotron Commissioning Components (GCC) plant control system) already postponed to 2020 is further pushed by PCR 1134 which now foresees the RFE date of building 15 in February 2021. To partially recuperate this delay and to mitigate any further delays on the availability of the EC building B15, it will be installed in a temporary location allowing a partial but significant commissioning of the system. In parallel to the ECPC stage 2 testing, the design activities of ECPC Stage 3 and of the Subsystem Control Unit of the Upper Launcher (EC-UL-SCU) for first plasma will both continue.

Procurement Activities

The main activities for 2021 will regard the commissioning of the ECPC Stage 2 in the temporary location provided by ITER-IO and the integration with the available SCUs and GCC subsystems.

Plasma Engineering

Procurement Activities

A relevant part of the PE activity responds to (often urgent) requests and hence it is difficult to plan in advance. PE group in 2021 is going to focus on transversal activities in support to F4E procurements.
As for 2020, Plasma Engineering Studies and Engineering Support for PE and Antennas will mainly be not credited through PAs.

WORK PROGRAMME OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**ITA/PA**
EU52.01.2000910	Contract Signed for Supply of the	Q3 2021	Predecessor of GB46	PA 5.2.P1B.EU.02

	EC ULs and Ex-Vessel Waveguides of ITER			Electron Cyclotron Upper Launcher
EU52.01.3000000	Task Order 01 Signed for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q3 2021	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.520160	Contract Signed for Manufacturing of Isolation Valve Prototypes and Series Production	Q2 2021	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.05.500120	Task Order Signed for Support to Design of EC Plant Control System (Stage 3)	Q4 2021	WP21 objective	PA 5.2.P1B.EU.01 Electron Cyclotron Control System

EXPECTED RESULTS

The main expected results for this action are:

1. Completion and signature of the PA amendment for the remaining scope of the Electron Cyclotron (EC) Upper Launcher and ex-vessel waveguides (Upper and equatorial launcher)
2. Completion of the pre-FDR for the remaining items to be designed (in-vessel waveguides, mirrors 3 and 4, and the ex-vessel waveguides system)
3. Signature of the technical integrator framework contract for the design finalization, fabrication, assembly and testing of the EC Upper Launchers and ex-vessel waveguide systems.
4. ECPC Stage 2 (GCC control system) commissioned at IO temporary location.
5. Testing of ex-vessel transmission lines prototypes and partial valve component mock ups.

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.37230	0.49640
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0	1

Action 8. Neutral Beam and EC Power Supplies and Sources

Action 8	Neutral Beam and EC Power Supplies and Sources

Electron Cyclotron (EC) Gyrotrons, Power Sources and Power Supplies (PS)

Progress of Work

Completion of the Manufacturing and Factory Acceptance Tests of the UNITS 3-4 of the European EC Power Supply

Start of installation and commissioning of the EU EC Power Supply system

Commissioning and site acceptance tests completed of the European Power Supply of UNIT 1

Technical Follow-up of the EC Power Supplies will continue

The performance of the improved 1MW Continuous Wave Gyrotron prototype will be verified with the long pulse, high power tests

The preparation of the offers to the Call for Tender of the EU Gyrotrons will be completed.

The evaluation of offers from the Gyrotrons manufacturers and the corresponding negotiations will be in progress.

Procurement Activities

Electron Cyclotron (EC) Gyrotrons:

The 5.2.P3.EU.01 Gyrotrons PA consists in the procurement of 6 units of 1MW Gyrotrons at 170 GHz for the Electron Cyclotron Heating and Current Drive system of ITER. The work scope includes the design, manufacturing, assembly, factory testing, delivery, on-site installation and commissioning of the Gyrotrons. Each gyrotron unit is composed of a gyrotron tube, a superconducting magnet, a filament power supply, a control system, a cooling manifold system and auxiliaries and supporting structures. After PA signature, the main activities will be Call for tender and evaluation of the offers.

Electron Cyclotron Power Supplies:

Options will be released for the main contract for the procurement of the EC Power Supplies and specific contracts signed for the supervision, auxiliaries and Interfacing systems.

Neutral Beam

Progress of Work

MITICA Beam Source – completion of the manufacturing for the majority of the sub-assemblies and starting of factory assembly

MITICA Beam Line Components – manufacturing of sub-assemblies will proceed as planned

NBTF transfer to IO of MITICA gas and vacuum system

NBTF progressing in MITICA instrumentation, control, diagnostic and assembly contracts

NB Vessels, Drift-Duct and Absolute Valve:

- PA signature foreseen in March 2021

Passive Magnetic Shield (PMS) and Active Correction Compensation Coils (ACCC):

- PA signature foreseen in October 2021

General Assembly – Tooling:

- PA signature (Tooling only) foreseen in January 2021 pending preparation of PA documentation by IO

Power Supplies:

- Completion of detailed design activities for all power supplies

Procurement Activities

Specific contracts will be signed for technical follow-up.

HNB Assembly, Pressure Vessel and Magnetic Shielding and Active Correction and Compensating Coils

The components of the HNB1 and 2 NB Injectors are under PA-53-4. The whole scope of supply will be arranged in four to seven parts depending also of the availability of the technical build-to-print documentation from IO. The PA 53-5 ACCC-Coils and PMS part of PA 53-4 are foreseen to be signed in October 2021. As well, the Tooling first of the three parts of the PA 53-1- General Assembly will be signed in January 2021.

Both PA signature dates will depend on timely readiness of PA documentation to be prepared by IO, in particular technical specifications

Neutral Beam Test Facility (NBTF)

Specific contracts will be signed for the NBTF, namely for NBTF Control, Interlock and Safety, PRIMA Assembly, specific contracts for site supervision and support. Specific contracts for technical support in the area of Neutral Beam components and quality inspectors will be signed.

Neutral Beam Power Supplies

No major procurement activities foreseen as all procurement contracts are already in execution. Some options releases, mainly for spares, are foreseen.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.02.18380125	Dispatch Invitation to submit updated proposal for European Gyrotrons Procurement	Q1 2021	WP21 objective	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons
EU52.04.12635	3rd set of the Gyrotrons high voltage power supply completed at Supplier Site	Q1 2021	WP21 objective	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply

EU53.05.00100	PA 5.3.P5.EU.01 Heating Neutral Beam Active Correction Coils Signed	Q3 2021	WP21 objective	PA 5.3.P5.EU.01 Heating Neutral Beam Active Correction Coils
EU53.06.07280	Start of Manufacture of Acceleration Grids Power Supply - Conversion System of Iter Heating Neutral Beam – 1	Q4 2021	Predecessor of GB27	PA 5.3.P6.EU Neutral Beam Power Supply
EU53.06.07680	Final Design Report of Acceleration Grids Power Supply - Conversion System of Iter Heating Neutral Beam – 1 accepted by IO	Q1 2021	WP21 objective	PA 5.3.P6.EU Neutral Beam Power Supply

EXPECTED RESULTS

The main expected results for this action are:

1. Procurement Arrangements signatures for Absolute Valve, Beamline Vessel & Drift Duct, ACC, PMS
2. Procurement Arrangement signature for Tooling
3. Launch of procurement procedure for the European Gyrotrons Procurement
4. EU Gyrotrons improved prototype: first test campaign on the long pulses test completed
5. Start of factory assembly of MITICA beam source
6. Completion of design activities for power supplies of ITER units

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	1.974	6.517
PA 5.3.P6.EU Neutral Beam Power Supply	0.95	16.11
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	1.98	19.18

Action 9. Diagnostics

Action 9	**Diagnostics**

Progress of Work

The Diagnostics Programme will continue during 2021 with the manufacture of several components or systems for delivery to ITER, mostly for First Plasma. These include various types of in-vessel magnetic sensors, the mineral insulated cabling, cable supports and junction boxes that will connect to all in-vessel diagnostic sensors and fission chambers for the radial neutron camera diagnostic.

The design of all remaining Diagnostics systems will also progress, both under the on-going Framework Partnership Agreements and under industrial design contracts, as will the design of ITER Port structures and the integration of Diagnostics into the Ports.

Several Diagnostics systems and subsystems will complete their design activities with approval of the final design review, including the Tokamak electrical feedthroughs, the collective

Thomson scattering system and the first plasma port components for the wide angle viewing system.

Procurement Activities (contracts and grants)

Procurement activities will focus mainly on two areas: placement of manufacturing contracts or task orders for the production of components for delivery to ITER and procedures for the completion of the design of less mature Diagnostics systems. 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. In-sourcing of personnel is foreseen to support the Programme during 2021, as is the use of Inspectors for manufacturing contracts and Experts in specialist areas, including in support of design reviews. Amendment to on-going grants or specific grants may be required.

Manufacturing contracts

The Diagnostics Programme will launch and/or sign procurement procedures for manufacturing of several Diagnostics subsystems needed for First Plasma, either as individual contracts or as task orders under a framework contract to be signed during 2021.

One of these subsystems comprises opto-mechanical components of the Wide-Angle Viewing System (WAVS) in Equatorial Port Plug 12. These components will allow collection of images of the ITER plasma and wall, in both visible and infrared light, for transmission to cameras located in the port cell and must withstand harsh thermal and nuclear loads while maintaining exceptional optical performance.

Other subsystems include Vacuum Vessel electrical feedthroughs, platforms that will support bolometer cameras mounted in the Vacuum Vessel and bespoke instrumentation hardware for the huge array of magnetics sensors on ITER, among others.

A contract for the finalization of the design and the manufacturing of the In-Divertor electrical services and for the manufacturing of electrical auxiliary services (including clips, clamps, bosses and critical junction boxes will also be signed.

Design contracts

A grant will be signed in 2021 to complete the design of the WAVS in 4 Equatorial Ports, including Equatorial Port 12.

The Diagnostics Programme will also launch procurement procedures, mainly in the form of task orders under a design framework contract to be signed in 2021 to complement or to finalize the design work for several Diagnostics, including the Core-plasma Thomson Scattering System, the Charge Exchange Recombination Spectrometer and the Bolometer Diagnostic.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.0102290	Manufacturing Design for Bespoke Instrumentation Hardware Available	Q3 2021	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.01.0103640	Manufacturing Readiness Review meeting for Plant Controller	Q2 2021	WP21 objective	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.01.203290	Task Order signed for Bespoke Instrumentation Hardware for Magnetics	Q2 2021	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.06.681270	HPC - IO Approval of FDR for Feedthroughs	Q3 2021	WP21 objective	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.06.682400	Approval of BTP documentation	Q3 2021	WP21 objective	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services

EXPECTED RESULTS

The main expected results for this action are:

1. Delivery of first batch for inner vessel magnetic sensors
2. Delivery of in-vessel cables for vacuum vessel sector 6
3. Completion of final design for Tokamak electrical feedthroughs
4. Completion of final design for WAVS port plug components for EQ12

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics	0.23061	1.04052
PA 5.5.P1.EU.03 Diagnostics - Bolometers	0.118	0.118
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.00000	0.19160001
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00038612	0.00095362
PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0	0.13769
PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0	0
PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0.17217999	0.34435998
PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0	0

PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.38103	0.498270
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	0	1.38680998

Action 10. Test Blanket Module

Action 10	Test Blanket Module

Progress of Work

It is foreseen to continue the Preliminary Design activities and Safety Analysis for TBM Sets and Ancillary Systems.

The consultancy of an Agreed Notified Body, mainly for the qualification of the TBM Box, will continue as well as the handling and storage of EUROFER and other steel products.

In addition it is planned to complete the Post Irradiation Examination of EUROFER specimen, needed for EUROFER qualification and the preliminary Welding Procedure Specifications needed for the manufacturing of the TBM box.

The activities for the development of TBM Industrial Feasibility and Fabrication Technologies will commence.

The collaboration with EUROfusion and EFLs will continue.

Three new Framework Contracts will be signed:
- WCLL TBM Set Preliminary and Final Design Activities;
- WCLL-TBS Safety Analyses and Studies;
- Definition and codification of EUROFER97 design limits in RCC-MRx design and construction code.

Procurement Activities

It is planned to sign Task Orders for the start or the continuation of the following activities:

- Preliminary Design of TBM Sets, of Ancillary Systems and of the related Safety Analyses and studies;
- Consultancy of an Agreed Notified Body;
- Proof of the TBM-sets fabrication and assembly processes feasibility;
- Codification of EUROFER design limits.

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 procurement plan is not in response to PA or ITA but to the TBM Arrangements (TBMAs). All activities are not credited.

WORK PROGRAMME OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU56.01.10180	TO 01 Signed for Preliminary Design of WCLL AS	Q1 2021	WP21 objective	NA
EU56.01.1227200	Task Order F4E-OFC-0950-01-02 Signed for Preliminary Design of HCPB TBM set	Q1 2021	WP21 objective	NA
EU56.01.1232060	TO 02 Signed for Safety Analyses for TBS PD	Q3 2021	WP21 objective	NA
EU56.01.80210	Task Order F4E-OFC-1070-01 Signed for Proof of the TBM-Sets fabrication and assembly processes feasibility	Q2 2021	WP21 objective	NA

EXPECTED RESULTS

The main expected results for this action are:

1. The completion of Post Irradiation Examination of EUROFER specimen.
2. The completion of the first on-going activities for the preliminary Welding Procedure Specifications needed for the manufacturing of the TBM box.
3. TBS WCLL Conceptual Design Review approved by the Review Panel

Target credit NA

Action 11. Site and Buildings and Power Supplies

Action 11	**Site and Buildings and Power Supplies**

Progress of Work

Construction works will progress for the Tritium Building (B14) civil works (TB18), and for the Neutral beam Power Supplies Buildings, Control Building and Fast Discharge Resistor Building (TB12).

Design activities for Emergency Power Supplies Buildings and equipment (TB13) and for the Plant Bridges (TB12) will progress, allowing a start of first construction activities planned for the Emergency Power Supplies buildings.

Progress on the remaining Auxiliary Buildings will be achieved with the Cryoplant Coldbox Building B52 (TB04 scope) completed. TB04 design activities will progress to completion for the Tokamak Complex services with IO approval of the construction design for all levels, and qualification and procurement of equipment will continue. Painting and finishing works will continue in the Tokamak Complex (TB11, TB19).

The manufacture of the cargo lift will start (TB02).

Design activities for the Hot Cell Complex will restart.

Specific contracts will be signed under ongoing framework support services and works contracts. Changes and exercise of options to the ongoing services and construction contracts in relation with Project Changes Requests (PCRs), input data delays, and re-allocation of scope between contracts will be implemented through amendments to the ongoing contracts.

Procurement Activities

Contracts to be signed by the end of 2021 include:

TB20: Doors Installation Tritium Building

TB21: Site Completion Works

AE Hot Cell: Architect Engineer for the Hot Cell Complex

SO II: Support to Owner for all activities including the Hot Cell Complex

Specific contracts will be signed under ongoing framework support services and works contracts. This includes, for example, 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), Claim manager, and consultancy for advice on interpretation of French Regulatory Law 2012.

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU62.02.72206	HPC - IO approval of Contractor Final & Construction Design (Structure) for Bldg 46	Q4 2021	Predecessor of GB24	AUX BUILDINGS D&B TB13
EU62.02.72486	HPC - IO approval of Contractor Final & Construction Design (Structure) for Bldg 47	Q4 2021	Predecessor of GB26	AUX BUILDINGS D&B TB13
EU62.050206	IPL > Tokamak Building (11) RFIOC L3M area	Q1 2021	Predecessor of GB53	MAIN MILESTONES
EU62.05.29019	NPC - Notice to Commence construction of Control Bldg 71 Non PIC	Q1 2021	Predecessor of GB34	AUX BUILDINGS D&B TB12
EU62.05.460	IPL > Construction of Cryoplant Coldbox Building (52) Completed	Q1 2021	GB21	MAIN MILESTONES
EU62.05.680	IPL > Tokamak Building (11) RFIOC Levels L4/L5 (Axis T10-T12) (Previously RFE milestone)	Q1 2021	Predecessor of GB53	MAIN MILESTONES

EXPECTED RESULTS

The main expected results for this action are:

1. Tokamak Complex buildings services design complete
2. Tokamak Building last level Ready For IO Contractors
3. Emergency Power Supplies Building construction start
4. Cargo lift manufacturing activity start
5. Construction of Cryoplant Buildings (B51/52) completed

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
COMMON	5.225	63.02365009
TOKAMAK COMPLEX	4.55119995	78.76835282
AUX BUILDINGS TB03/TB04	5.66	69.39759906
AUX BUILDINGS D&B TB05	0	15.00155998
AUX BUILDINGS D&B TB06	2.97284004	10.95284004
AUX BUILDINGS D&B TB07	0.03	6.4042002
AUX BUILDINGS TB09/TB10	0	0
AUX BUILDINGS D&B TB12	4.19562012	4.19562012
AUX BUILDINGS D&B TB13	0	0
LOAD CENTERS	0	3.668
INTERCONNECTING ACTIVITIES	2.85285992	3.5812099
AUX BUILDINGS D&B TB17	0	0
COMMON CONTRACTUAL ACTIVITIES	0.9	42.79
PA 6.2.P2.EU.06 Headquarters Building	0	13.85

Action 12. Cash Contributions

Action 12	Cash Contributions

Cash Contribution to IO

In accordance with the ITER Agreement, the financing of the ITER Organization is ensured through contributions made to IO in the form of cash (10%) or in kind (90%) from Members. Cash contributions from ITER Members to IO are determined annually, based on estimates of the IO budget for the following year. The final figure is approved or modified by the ITER Council.

Cash Contribution to Japan[6]

According to the ITER Agreement, there is a transfer of 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. An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year.

WORK PROGRAMME OBJECTIVES

Milestone	Scope Description	Forecast achievement date	Type of milestone	PA
Cash to IO	Yearly Commitment [7]	Q4 2021	WP21 objective	NA
Cash to Japan	NB Power Supplies for Cadarache	Q4 2021	WP21 objective	PA 5.3.P6.JA.02

EXPECTED RESULTS

The expected result for this Action is to pay to IO the 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. As far as the cash to IO is concerned, the target for 2021 is to commit the cash contribution for 2022 according to the decisions due to be taken by the ITER Council in November 2021. As far as the cash to Japan is concerned, the target for 2021 is to commit the amount agreed in the Annexes C to the Japanese PA 5.3.P6.JA.02 due to be signed during the year and the contribution to reinforce the commitment for the escalation revision PA 1.1.P1B.JA.01.

Target credit NA

Action 13. Technical Support Activities

Action 13	Technical Support Activities

The procurement of the supporting activities is mainly performed through Framework contracts and specific contracts.

Technical Support to In-Kind Procurement

Engineering Support activities

[6] At the time of writing the Work Programme, there is a risk that the activity corresponding to PA 3.2.P4.JA.01 is postponed from 2020 to 2021. The budget is nevertheless allocated to year 2020 where the probability of implementation is higher at the time of writing the document.

[7] The cash contribution required by IO for the year N is committed by F4E at the end of the year (N-1). E.g. the commitment shown here in WP 2021 is the cash contribution to IO for 2022.

Engineering Unit during 2021 will continue supporting the ITER Departments project Teams (and to a limited extend the BA department) by providing them technical expertise and technical resources in the key domains of engineering and fusion technologies.
The unit will provide technical expertise and resources in the following areas:
Design office activities, System Design and Mechanical engineering, Analysis: Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism, Nuclear Analyses; Design Codes and Standards; Instrumentation and Control; Metrology.
Beyond the preparation of task orders, the procurement activities in TSS will be mainly focused on renewing Framework Contract providers, for adapting the level of support to the needs of the project teams.

Material and Fabrication
For 2021 the Materials of the Engineering Unit has the aim to support the ITER Department's Project Teams (and to a limited extent the BA department) by providing technical expertise in the domains of Materials Science, Materials Technologies and Manufacturing Processes.
The group supervises development and qualification of material and joints. The group also supports material procurement and fabrication follow-up.
The focus for 2021 will be to support the critical components design and fabrication mainly in the areas off Magnets, Vacuum Vessel, EC Antenna, Neutral Beam and In-Vessel.

Assembly Integration and Validation (AIV)

Support to F4E management on review and assessment of proposed AIV IO policies and plan. Support to Configuration Management in potential future transversal PCRs/Deviation related to AIV scope of work; support to F4E teams in relation to AIV responsibilities on site (e.g. logistics, deliveries portal)

Nuclear Safety

Progress of Work

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-inforce the nuclear safety awareness within F4E.

Procurement Activities

A framework contract will be signed for the continuation of the supply of Services for Nuclear Safety Compliance and another one for the continuation of the Nuclear Safety support on inspections. All other activities will be implemented through Task Orders under existing frameworks.

Task Orders under existing framework contracts and the new one to reinforce the supply of Services for Nuclear Safety Compliance will be issued for the Nuclear Safety activities.

F4E will be supported by experts on on-site inspections services and on Nuclear Safety code standards, funded by F4E through expert contracts.

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.

Procurement Activities

Task Orders under existing framework contracts will be issued 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

A framework contract will be signed for the continuation of support services in the area of CE marking and Task Orders under the new framework contract 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, Configuration Management, Design and Manufacturing Readiness Reviews, Interface Management, and other Systems Engineering topics.

Procurement Activities

A framework contract will be signed for the continuation of the supply of Services for Systems Engineering. Task Orders under existing framework contracts and the new one will be issued 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 to continue to complement the in-house Configuration Management 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.01.8140	Published Call for Tender for Engineering Support Contract	Q3 2021	WP21 objective	All
EU.ES.02.5860	Contract Signed for Mechanichal analysis of ITER Components LOT 1	Q4 2021	WP21 objective	All
EU.ES.03.60700	Contract Signed for Provision of System and Instrumentation Engineering Support for Nuclear Safety I&C	Q2 2021	WP21 objective	All
EU.PM.3035350	Task Order under FwC F4E-OMF-0937-01 signed for Quality Assurance Support to BIPS Project Team (cont.TO 03.1)	Q3 2021	WP21 objective	All
EU.PM.3051990	FWC F4E-OMF-TBD1 signed for System Engineering Support Services (2021-2024)	Q3 2021	WP21 objective	All
EU.NS.01.23220	FwC F4E-TBD-NSS.1 signed for Eng. Supp. Serv. in the Area of Compliance with ITER Nuclear Safety Requirements 2021-2025	Q1 2021	WP21 objective	All
EU.PM.51380	Task Order under OMF-0783-01 signed for Support to Technical Integration (cont. TO 05 OMF-783-01-02)	Q2 2021	WP21 objective	All

EXPECTED RESULTS

The main expected results for this action are:

1. Implementation of the framework contract F4E-OMF-xxxx which will provide Fusion for Energy with specific contracts in the field of Mechanical Analysis,
2. Provision of System and Instrumentation Engineering Support for Nuclear Safety I&C and Proc.
3. Support for Conventional I&C Systems.

Signature of new framework contracts to continue to provide support services in the area of Nuclear Safety compliance and inspection.

Signature of a new framework contract to continue to provide support services in the area of CE marking.

Signature of a new framework contract to continue to provide support services in the area of Systems Engineering.

The expected result for the activities in Nuclear Safety, Quality Assurance & Quality Control, CE Marking and System Engineering is to provide the requested support to all Project Teams on these matters.

In general, the target for 2021 is to contribute in achieving the cumulative credit forecasted for each action in this WP2021 thanks to the support granted to the work under each specific action.

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 2021 is to keep safeguarding the EURATOM's investment in ITER while achieving the cumulative credit forecasted for each action in this WP2021 thanks to the support granted to the work under each specific action.

Transportation

Transportation

During 2021, Engineering /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 2021, 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.
In 2021 focus will be again put on the optimization of the number of HELs and the related number of convoys, this jointly with IO, all DA's and Daher.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3027530	Task Order Signed for TO 14 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2021	WP21 objective	All
EU.PM.4021975	Task Order Signed for TO 15 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2021	WP21 objective	All

EXPECTED RESULTS

1. Transportation of Highly Exceptional Loads amongst others, EU & JA-DA TF coils and EU & KO-DA VV-sectors between Maritime Port of Marseille and ITER site.
2. Gendarmerie Task Orders to escort the HEL convoys and
3. Task Orders for Management fees and for component transportation with contractor Daher will be signed

Target Credit NA

Other Technical Support Activities

Programme Management

Progress of Work

The main focus of Programme Management is on performance monitoring and reporting, scheduling support, 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

A framework contract will be signed for the continuation of the supply of Project Management Systems Support Services.

Task Orders under existing framework contracts will be issued to continue to support the F4E Project Teams at Barcelona and Cadarache or at suppliers' premises.

Other Expenditures

Progress of Work

A general provision is foreseen for consultancy services (e.g. participation to specific committees, support/advice to F4E Management, technical support, procurement and commercial support, management retreat, support on processes definition and documentation management, etc.) as well as provision for interim management services, operational missions, policy insurance and audit.

This part also includes the provision of ICT support (hardware, software and services) for the specific benefit of the operational activities.

Logistic and legal support to operational activities is also included.

Procurement Activities

The above scope will be implemented mainly by issuing Task Orders under existing framework contracts and under a new framework contract that will be signed for external operational support on procurement and commercial activities.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA

EU.PM.3081920	Task Order #05 under FwC F4E-OMF-0895 LOT 2 signed for Risk Management Senior Support (cont. TO 03)	Q2 2021	WP21 objective	All
EU.PM.3072460	Task Order under FwC F4E-OMF-0895 LOT 1 signed for PPM Support VV (cont. TO 08)	Q2 2021	WP21 objective	All
EU.PM.3081580	Option 5 for extension of Task Order #02 under FwC F4E-OMF-895LOT 3 in Support on Planning & Scheduling BIPS	Q2 2021	WP21 objective	All
EU.PM.3076400	FWC F4E-OMF-(TBD) signed for Project Management Systems Support Services (2021-2025)	Q3 2021	WP21 objective	All

EXPECTED RESULTS

Signature of a new framework contract to continue to provide support services in the area of Project Management Systems Support.

The expected result for this Action is to provide the requested support to all Project Teams on matters concerning Programme management.

The target for 2021 is to contribute in achieving the cumulative credit forecasted for each action in this WP2021 thanks to the support granted to the work under each action.

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, etc.).

Action 14. Broader Approach

Action 14	**Broader Approach**

JT-60SA

Progress of Work

The activities defined in the STP WP2020, as recommended by the STP Project Committee will be implemented. These 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.

Procurement Activities

Critical contracts for development and/or fabrication of the JT-60SA Actively Cooled Divertor, Error Field Correction Coils power supplies, Electron Cyclotron Resonance Heating power supplies and transmission lines, enhancements of Cryoplant and Power Supplies performance will be launched in 2021. The activities under the responsibility of F4E are carried out through grants, 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. Cash contributions on specific QST Call for Funds, covering EU Contribution to operation, maintenance and assembly will also be made.

IFMIF/EVEDA

Progress of Work

In 2021 the LIPAc (Linear IFMIF Prototype Accelerator) operation at Rokkasho will focus on attaining firm evidence on the expected performance of the accelerator up to 5 MeV and on the availability of the subsystems required for subsequent beam operations.

Procurement Activities

Additional contracts will have to be placed for demonstrating the operation and for consolidating the reliability and the beam availability. Preparatory activities for the forthcoming operation phases (commissioning of the accelerator at the nominal energy of 9 MeV and deuteron beam intensity of 125 mA in pulsed mode and continuous waves) will continue in 2021. F4E will be supported by experts, and on-site health and safety services to ensure safe operations as well as a dedicated transportation services to support maintenance and refurbishment activities, funded respectively by F4E through expert contracts and specific contracts. 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 will foster collaboration research projects between JA and EU by sharing computer resources and by further jointly developing state-of-the art models. REC activities will concentrate in three aspects: collaborative activities with JT-60SA, ITER, and the IFMIF-EVEDA LIPAc accelerator. A collaboration under the ITER BA agreement will start in April 2020 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 DEMO design activities, priority will be given to activities also directly 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 will be 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 will be performed in collaboration with EUROfusion.

Procurement Activities

There are contracts to be placed for preparation of remote participation rooms for tests with ITER and testing activities as well as related to CSC for code adaptation for possible procurement process. 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.01.13520	LIPAC Injector Spare parts completed	Q2 2021	WP21 objective	LIPAc Activities
EU.BA.01.18580	Contract signed for ECRH Waveguides	Q4 2021	WP21 objective	ECRH Transmission
EU.BA.01.19740	Remote participation tests REC-IO and REC-IFMIF completed	Q4 2021	WP21 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator
EU.BA.01.21040	Industrial Support to JT-60SA Integrated Commissioning and First Operation Completed	Q2 2021	WP21 objective	CON Cryoplant spare/replacement parts
EU.BA.01.6460	Delivery of Cryomodule assembly (IFMIF)	Q4 2021	WP21 objective	LIPAc Activities

EXPECTED RESULTS

The main expected results for this action are:

JT-60SA:

1. Contract placement for Error Field correction Coils
2. Contract Electron Cyclotron Resonance Heating Power Supplies placed
3. Massive Gas Injection System delivered to site
4. Power Supplies industrial Support to JT-60SA Integrated Commissioning and First Operation Completed
5. Cryoplant industrial Support to JT-60SA Integrated Commissioning and First Operation Completed
6. Actively Cooled Divertor Prototypes and Tests: Completion of Phase I
7. Contract placement for the fabrication of Actively Cooled Divertor Plasma Facing Units (PFU) places

IFMIF/EVEDA

1. Procurement of injector spare parts to ensure availability of the LIPAc accelerator completed
2. Qualification of the complete LIPAc accelerator at 5 MeV 125 mA deuteron beam intensity in pulsed and continuous waves

IFERC

1. Detailed R&D plan for IFERC Phase II

Equipment for tests of remote experiment with ITER and support of remote experiments

TARGET

The target of 2021 is the achievement of a cumulative value expressed in kBAUA (CAS):

Supply of the ECRF Power Supply system (EU-ECRFPS)	0.746	3.730
Cash contribution JT-60SA 2021 (CASH02)*	3.840	3.840
Pellet injector (PEINJ)*	5.400	5.400
Power Supplies Spare Parts – Part 1 (PSSP01)*	1.087	3.974

Actively Cooled Divertor (DIV1)*	2.028	2.028
ECRH Transmission (ECRHWG)*	1.800	1.800
EF Correction Coils (EFCC PS)*	0.900	0.900
Development of JT-60SA Simulator (TKSIM01)*	0.200	0.300
Cryopumps (CRPUM)*	1.000	1.000
Massive Gas Injection System (MGI)*	0.100	0.100
Thomson Scattering (TOSCA)*	1.000	1.000
F4E personnel and Secondees travel and subsistance costs (EUSUP01)*	0.200	0.400
ECRH PS Spare Parts – Part 1 (ECPSSP01)*	0.500	0.500
Cryoplant Maintenance Support (CRSP01)*	0.120	1.800
Contract for on-site conventional and nuclear safety (EU personnel and companies) (NSAF1)*	0.050	0.150
Manufacturing and test of Irradiation Modules (LF01-2)*	0.200	1.400
AF02-2 Spare Parts of the LIPAc Injector (EU)	0.500	0.500
AF04 First Cryomodule of SRF LINAC (EU)	0.920	5.810
Injector Spare parts (AF02-3)*	0.500	1.600
RF Power System (AF6-2)*	1.000	2.000
Control System (AF8-2)*	0.200	1.200
Installation, Check-out, Start-up and Commissioning (AF10-2)*	2.100	4.200
Design feedback for Neutron Source (ED01-2)*	0.200	1.200
Common Expenses*	0.250	0.550
Common Fund*	1.680	3.040
On-site Personnel*	2.100	4.200
Demo design activities*	1.172	1.811
Structure material development for in-vessel components*	0.469	0.724
Database for material corrosion*	0.117	0.181
Neutron irradiation experiment of breeding functional materials*	0.351	0.543
Tritium technology for collection and inventory evaluation*	0.234	0.362
CSC-EU*	0.400	0.500
REC-EU*	0.400	0.600
Project Team - EU staff*	0.220	0.440

Project Team - EU Common Expenses*	0.050	0.100

*Procurement Arrangements not yet signed are marked with an **

WP_TABLE 1 WORK PROGRAMME 2021 BUDGET SUMMARY

Budget Summary of the 2021 Work Programme

Chapter 2021 new nomenclature	Chapter Link with 2020 nomenclature	Budget Chapter Description	2021 Work Programme Commitment appropriations (EUR)
31	3 1	ITER construction including site preparation	742,301,679.51
32	3 2	Technology for ITER	10,275,000.00
33	3 3	Technology for Broader Approach & DEMO	30,424,241.52
36	3 4	Other expenditure	17,758,275.97
35		External Support Activities	
4 1	3 5	Appropriations from the ITER Host State contribution	184,700,000.00
		Total Title III and Title IV (new) of the Budget	**985,459,197.00**
31 to 36	3 1 to 3 4	Additional non-budgeted revenue	0.00
4 1	3 5	Host State contribution carried over from previous year	0.00
4 2	3 6	Additional revenue from the Reserve Fund Allocation scheme with ITER Organization	25,000,000.00
4 3	not existing	Othe earmarked Expenditure	
		Total Available Operational Expenditure	**1,010,459,197.00**

Chapter 2021 new nomenclature	Chapter Link with 2020 nomenclature	Work Programme	2021 Work Programme Commitment appropriations (EUR) Grants	Procurement	Cash
3 1 + 4 1 + 4 2 + 4 3	3 1 + 3 5 + 3 6	Expenditure in support of ITER Construction	6,751,166.00	635,780,407.31	309,470,106.20
				952,001,679.51	
3 2	3 2	Design and R&D in support of ITER, not credited	0.00	10,125,000.00	150,000.00
		Sub total technology for ITER		**10,275,000.00**	
3 3	3 3	Expenditure in support of Broader Approach	0.00	23,792,241.52	6,632,000.00
		Sub total Technology for Broader Approach and DEMO		**30,424,241.52**	
3 6	3 4	Other Expenditure (EU.PM.PM)		17,758,275.97	0.00
		Sub total Other Expenditure		**17,758,275.97**	
3 5		**External Support Activities**			
		Totals Operational Expenditure	***6,751,166.00***	***687,455,924.80***	***316,252,106.20***
				1,010,459,197.00	

WP_Table 1 . Work Programme Budget Summary

WP_TABLE 2 INDICATIVE VALUE OF FINANCIAL RESOURCES FOR THE ACTIONS IN WP2021

Action #	Action	Budget WP2021
1	Magnets	10,179,277
2,3,4,10*	Main Vessel	167,984,720
5	Remote Handling	30,840,485
6	Cryoplant & Fuel Cycle	11,110,183
7	Antennas and Plasma Engineering	38,773,146
8	Neutral Beam and EC Power Supplies and Sources	4,733,417
9	Diagnostics	45,565,240
11	Site and Buildings and Power Supplies	341,994,310
12	Cash Contributions	301,143,374
13	Technical Support Activities	27,233,306
14	Broader Approach	30,901,742
	Total	**1,010,459,197**

*The 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 - 2021 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

Action	Signature	Type of contract
Magnets		
CA09025 - TO XY under OMF-0937 for Inspection Services for PF Coils 2-5 Mfr. (cont.OMF-937-01-01-05)	Q3	SC-PServ
CA09027 - TO XY under OMF-0937 for Inspection Services for PF Coils 6 Mfr. (cont. 3rd Inspector)	Q4	SC-PServ
CA10475 - Task Order Signed for TO XX Mechanical Engineering Support for the Magnets PT	Q1	SC-Pserv
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Vacuum Vessel		
CA05909 - Commitment 2021 for VV Inspectors	Q1	SC-PServ
CA06293 - Commitment and Task Order Signed - F4E-OMF-789-MG-B21 for 1 VV Resident Inspectors	Q4	SC-PServ
CA08395 - Commitment and Task Order Signed - F4E-OMF-789-WT-A21 for 1 VV Resident Inspectors	Q4	SC-PServ
CA08398 - Commitment and Task Order Signed - F4E-OMF-789-MG-A21 for 1 VV Resident Inspectors	Q2	SC-PServ
CA08400 - Commitment and Task Order Signed - F4E-OMF-789-EN-B21 for 1 VV Resident Inspectors (ENSA)	Q1	SC-PServ
CA08402 - Commitment and Task Order Signed - F4E-OMF-789-BL-A21 for 1 VV Resident Inspectors	Q2	SC-PServ
CA08832 - Commitment and Task Order Signed - F4E-OMF-789-WT-B21 for 1 VV Resident Inspectors	Q4	SC-PSupply
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
In Vessel- Blanket		
CA05646 - Contract for TASK 1 - 30 Deg Sector Pipe Bundles	Q2	PSupply
CA07809 - High Heat Flux Test Facility (OPE-319) Flat Rate Commitment for 2021	Q3	PSupply
CA07880 - Task Order for Inspectors BFW - 2021-2022	Q3	SC-PServ
CA08354 - TO 02 Procurement of Beryllium (Series)	Q4	SC-PSupply
CA08356 - TO 01 Procurement of CuCrZr (Series)	Q1	SC-PSupply
CA09867 - Task Order for Auditors 2021-2024	Q1	SC-PServ
CA10478 - TO 02 for HHF (High Heat Flux) testing of In Vessel components (OMF-1033)	Q2	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
In Vessel- Divertor		
CA05618 - Task Order for HHF Tests for Stage 2 Prototypes	Q4	SC-PServ

CA06407 - Task Order Signed for Resources 2021 - IVT	Q2	SC-PServ
CA06532 - STAGE 2 Cassette Body Series Production	Q4	PSupply
CA07955 - Task Order 01 for Resident Inspector 2021 - IVT	Q3	SC-PServ
CA08813 - Contract for Pins Sleeves and Links of CB series	Q4	PSupply
CA09562 - TO Signed for Supporting Activities on measurement of multilinks lateral panels	Q1	SC-PSupply
CA10364 - Task Order Signed for Metrology 2021 for CB Series Stage 1	Q2	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Remote Handling		
CA05358 - Task Order Signed for Final Design Phase 2 (CTM) for DRHS	Q1	SC-PSupply
CA06538 - Task Order Signed for Final Design Phase 2 (CMM) for DRHS	Q3	SC-PSupply
CA07449 - Task Order Signed for Final Design Phase 2 for IVVS	Q1	SC-PSupply
CA07452 - Task Order (TO#09) signed for Final Design of VOS	Q1	SC-PSupply
CA08384 - Task Order for Final Design CDS + CES	Q2	SC-PSupply
CA09114 - TO for Engineering Insourcing Contract #08	Q1	SC-PServ
CA09115 - TO for Engineering Insourcing Contract #09	Q2	SC-PServ
CA09116 - TO for Engineering Insourcing Contract #10	Q4	SC-PServ
CA09715 - Task Order (577-02-03) signed for Preliminary Design MA-2 of CPRHS	Q1	SC-PServ
CA10455 - Task Order Signed for Manufacturing and testing of Rad Hard drivers for Actuators	Q2	SC-PSupply
CA10457 - Task Order Signed for 2021 GTD-1 DRHS CS Prototypes	Q2	SC-PSupply
CA10458 - Task Order Signed for 2021 GTD-2 IVVS CS Development	Q4	SC-PServ
CA10459 - Task Order Signed for 2021 OMF-1034 - TELBOT Developments	Q2	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Cryoplant and Fuel Cycle		
CA08896 - Front End Cryodistribution Systems – Instrumentation and control T03 Manufacturing	Q1	SC-PSupply
CA09047 - contract signed for FD&Procurement of Berillium and environmental monitors (First plasma activities)	Q1	PSupply
CA09499 - OPTION 1: Perform seismic analysis for all the Leak Detection Systems for ITER	Q1	Option/Stage
CA09500 - OPTION 2: Design, Procurement and Integration of the glove box/es for the remote Leak detection systems and Gas Analysis	Q1	Option/Stage
CA10384 - Contract Cryostat (Helium) Localization	Q2	PSupply
CA10387 - Option 1 Cryostat (Helium) Localization	Q3	Option/Stage
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Antenna and Plasma Engineering		
CA01421 – Task Order signed for Manufacturing of Isolation Valve prototypes and FDR documentation	Q2	SC-PSupply

CA01589 - Contract signed for Diagnostics Development (Volometers)	Q3	PSupply
CA03742 - Task Order Signed for Support to Design of EC Plant Control System (Stage 3)	Q3	SC-PSupply
CA05761 - Contract Signed for Support to IO for EC Plant Control System (Stage 2)	Q4	PServ
CA08930 - Contract signed for Manufacturing of EC Window prototypes	Q1	SC-PSupply
CA09579 - Contract Signed for GCC RF Load	Q1	PSupply
CA10163 - Option 1 signed for In-Sourcing Thermo-mechanical FEA Analyst	Q1	Option/Stage
CA10638 - TO signed for Mechanical Testing of Window and Valve prototypes	Q3	SC-PServ
CA10639 - TO signed for mm-wave testing of Window and Valve prototypes	Q3	SC-PServ
CA10965 - Task Order 01 Signed for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q3	SC-PSupply
CA11052 - Task Orders for In-sourcing UL&EW 2021	Q3	SC-PServ
CA11077 - Task Order 01 signed for Support to Owner	Q2	SC-PServ
CA11139 - Contract Signed for Scenarios and Simulations	Q3	PServ
CA11140 - Contract Signed for Support to F4E procurement	Q4	PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Neutral Beam and EC Power Supplies and Sources		
CA01674 - Commitment for Specific Contract - TO#05 MITICA CODAS, Interlock and Safety	Q1	SC-PSupply
CA04443 - Task Order Signed for PRIMA#4 Assembly	Q4	SC-PSupply
CA04447 - Contract Signed for Fabrication Follow-up of Components Outside NBTF	Q4	PServ
CA05353 - Task Order Signed TO#6 for Procurement of NBTF MITICA CODAS 2, Safety	Q4	SC-PSupply
CA05455 - Release of Option 12 of Contract for Procurement of AGPS-CS of NBI-1 & NBI-2	Q4	Option/Stage
CA06567 - Contract Signed for NBI-1&2 Vessels	Q4	PSupply
CA06569 - Contract Signed for NBI-1&2 Drift Duct	Q4	PSupply
CA06578 - Contract Signed for NBI-1 & NBI-2 Tooling	Q4	PServ
CA07651 - Commitment for Technical Support of Neutral Beam Components for 2022	Q4	SC-PServ
CA09429 - TO for I&C interfaces with the EC Power Supplies	Q1	SC-PServ
CA10299 - ECPS on-site supervision and documentation management	Q1	PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Diagnostics		
CA05665 - Task Order Signed for Development of Mfg Specs for RNC port-plug components (EPP01)	Q1	SC-PServ
CA05672 Task Order Signed for Development of Mfg Specs for Port Plug Components	Q1	SC-PServ

CA05705 Task Order signed for Bespoke Instrumentation Hardware	Q2	SC-PSupply
CA05711 Task Order Signed for Port Plug design, testing and diagnostic integration TO6 - Final Design	Q1	SC-PServ
CA06111 TO for PFPO1 Design for CPTS -> Specific Contract 01 Signed for Preliminary Design CPTS	Q1	SC-PServ
CA06143 Contract signed for Final Design and Manufacturing of IDES and Manufacturing of In-Vessel Supports	Q1	PServ
CA08511 - Contract Signed for Procurement and In-Cryo Feedthroughs	Q4	PSupply
CA08512 - Contract Signed for Procurement and Delivery for UP&LP Connectors, UP&LP Marshalling Clamps and LP Clamps	Q3	PSupply
CA09101 Contract Signed for Irradiation testing of prototypes/materials	Q1	PServ
CA09323 - Task Order Signed for TO17Bis for In-source personnel under OMF-0871	Q2	SC-PServ
CA10076 - Contract Signed for Irradiation Testing for Bolometer Sensor Prototype & Electrical Connections	Q1	PServ
CA10548 Task Order Signed for PFPO1 Design for CXRS	Q3	SC-PServ
CA10813 Task Order signed for manufacturing of Feedthroughs	Q4	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Test Blanket Module		
CA06586 - TO 02 Signed for Preliminary Design of HCPB TBM sets	Q1	SC-PServ
CA06815 - TO 03 Signed for HCPB Ancillary Systems PD	Q4	SC-PServ
CA06816 - TO 02 Signed for Safety Analysis for TBS Preliminary Design	Q3	SC-PServ
CA06870 - TO 02 signed for ANB Consultancy - TBM Qualification	Q2	SC-PServ
CA06882 - TO 03 signed for FWC ANB Consultancy (AS + TBM Set)	Q2	SC-PServ
CA08656 - TO 01 signed for Ancillary Systems WCLL PD	Q1	SC-PServ
CA09802 - TO 01 for Proof of the TBM-sets fabrication and assembly processes feasibility	Q2	SC-PServ
CA09803 - TO 02 for Proof of the TBM-sets fabrication and assembly processes feasibility	Q4	SC-PServ
CA09812 - Engineering Technical Support Service	Q3	PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Site and Buildings and Power Supplies		
CA05655 - TB21 - Commitment for Completion and Final Fittings Works - TO#02 - 2021	Q2	SC-PSupply
CA05726 - TB09 - Commitment for AE Design for Bldgs 21, 23, 24	Q4	PServ
CA06817 - TOs for AMF-0796 Eng & contract management consultancy services with special respect to cost and schedule assessm. 2021	Q4	SC-PServ
CA07135 - TB04 - Commitments for Options 2021	Q3	Option/Stage
CA07181 - SO II – Engineering support services Jan 2022 – Dec 2025. 1st Commitment	Q2	PServ

CA07217 - Site Security and Reception Services for the ITER Site 2022 signed (from 12/21 to 12/22)	Q4	SC-PServ
CA07267 - Iter Site Cooperation Agreement for 2021	Q3	PServ
CA07596 - TB19 - Commitment for Option 1: Tritium above L2	Q2	Option/Stage
CA08336 - Iter Site Cooperation Agreement for 2021 for PFC	Q3	PServ
CA08417 - TO#02 for FWC-OFC-1006 for Eng, Contract & Claim Management consultancy services	Q1	SC-PServ
CA09311 - TB20 - Commitment for Contract for B14 Doors Manufacturing / Installation	Q2	Psupply
CA09386 - TO#02 for FWC for the H&S Joint Procurement for 2021-2022	Q1	SC-PServ
CA09558 - TB21 - Commitment for Completion and Final Fittings Works - TO#01 - 2020	Q1	SC-PSupply
CA10174 - TB11 - Commitment for Completion works Contract - TO#07 – 2021	Q1	SC-PSupply
CA10254 - TO for FWC AMF-0796 Eng & contract management consultancy services	Q4	SC-PServ
CA10255 - TO for FWC AMF-0796 Eng & contract management consultancy services	Q4	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Supporting Activities		
CA06033 - TO for Embedded Control Data Access and Communication 2021	Q4	SC-PServ
CA06081 - TO for Engineering Analysis (except Nuclear Data & Non Credited activities) - 2021	Q4	SC-PServ
CA06442 - TO 2021 - Global transportation of HEL NON-EU ITER components	Q4	SC-PServ
CA06445 - TO for EU-share of 2022 Management fees for Logistics Service Provider	Q4	SC-PServ
CA06446 - TO 2021 - Global transportation of CEL-CL ITER components	Q4	SC-PServ
CA07538 - Task Order Signed for TO 14 for Convention 4 for Real Convoys	Q2	SC-PServ
CA07539 - Task Order Signed for TO 15 for Convention 4 for Real Convoys	Q4	SC-PServ
CA06753 - Task Order under FwC F4E-OMF-0937-01 for QA Support to IV Project Team (cont. TO 06)	Q2	SC-PServ
CA10585 - Task Order under FwC F4E-OMF-0871-01 for Support in QA and NCR Management to First Wall (IV) Project Team	Q1	SC-PServ
CA09738 - Task Order under FwC F4E-OFC-0735-01 for Nuclear Safety support at F4E Cadarache (cont. TO 05)	Q1	SC-PServ
CA09740 - Task Order under FwC F4E-OFC-0735-01 Second Nuclear Safety support at F4E Barcelona (cont. TO 04)	Q1	SC-PServ
CA10495 - Task Order under FwC F4E-TBD-NSS.1 for Nuclear Safety additional support 1	Q1	SC-PServ
CA10499 - Task Order under FwC F4E-TBD-NSS.1 for Nuclear Safety additional support 2	Q1	SC-PServ
CA09637 - Task Order #05 under FwC F4E-OMF-0895 LOT 2 for Risk Management Senior Support (cont. TO 03)	Q2	SC-PServ
CA07394 - Task Order #04 under FwC F4E-OMF-0895 LOT 2 for Risk Management Junior Support (cont. TO 02)	Q1	SC-PServ
CA07405 - Task Order under FwC F4E-OMF-0895 LOT 1 for PPM Support to NB Project Team 2021/22 (cont. TO 03)	Q2	SC-PServ

CA07413 - Task Order under FwC F4E-OMF-0895 LOT 1 for PPM Transversal Support to Project teams 2021/22 (cont. TO 10)	Q3	SC-PServ
CA08664 - Task Order under FwC F4E-OMF-0895 LOT 1 for Cost Control Support to Project Teams 2021/22 (cont. TO 02)	Q1	SC-PServ
CA08671 - Task Order under FwC F4E-OMF-0895 LOT 1 for PPM Support to APE Project Team 2021/22 (cont. TO 07)	Q2	SC-PServ
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Broader Approach		
CA09642 - Contract for error field correction coil PS	Q2	PSupply
CA10365 - Additional N2 Storage	Q2	PSupply
CA10366 - Hardware for enhancements	Q2	PSupply
CA10367 - ECRH Power Supplies procurement of 2PS	Q2	PSupply
CA10368 - ECRH Waveguides	Q2	PSupply
CA10369 - Design and Fabrication of actively cooled Divertor Concept Validation	Q2	PServ
CA10370 - Design and Fabrication of actively cooled Divertor - Part 1 (PFUs) - 50%	Q2	PSupply
CA10371 - Design and Fabrication of actively cooled Divertor -Part 1 (PFUs) -25%	Q2	PSupply
CA10379 - ECRH Maintenance Support	Q2	PServ
CA10380 - ECRH PS Spare Parts - Part 1	Q2	PSupply
CA10381 - ECRH PS Spare Parts - Part 2	Q2	PSupply
CA10429 - Maintenance of hardware, software and upgrade of solid components	Q1	PServ
CA10433 - Development of solid state amplifiers	Q4	PSupply
CA10434 - Upgraded accelerator column	Q2	PSupply
CA10435 - Spare parts of RF modules (tubes)	Q1	PSupply
Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A

Table 3 . Main Procurement Activities per action

WP_TABLE 4 - LIST OF 2021 GRANTS PER ACTION

Action	Value (In-Year Euros)	Time of call	Budget line
Remote Handling			
CA10427 - Grant for Final Design of CMM Hydraulics	500,000	2021 Q2	3.1
CA10465 - GRT-901 Amendment for DTP2 Additional experiments	200,000	2021 Q2	3.1
Diagnostics			
CA10401 - Grant signed for GRT-1103 Completion of the design of Equatorial Wide Angle Viewing System (EP-WAVS) and Support	5,475,174	2021 Q1	3.1
CA10428 - Amendment of SG05 for additional prototyping	575,992	2021 Q1	3.1

WP_Table 4 . Grants per action

NB: For the specific grants, as they do not have call for tender, the table refers to their signature date.

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 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021
P Serv - Contract	7	6	3	6	3	6
P Supply - Contract	7	10	6	19	3	7
Pserv - Specific Contracts	21	30	23	18	8	23
PSupply - Specific Contracts	4	4	8	4	1	6

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 WP2021.
- 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 1st 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%

List of Tables