FUSION FOR ENERGY

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

The Governing Board

DRAFT DECISION OF THE GOVERNING BOARD ADOPTING THE ANNUAL AND MULTI-ANNUAL PROGRAMME (2020-2024) 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 6(3)(e) 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 2 December 2015 (hereinafter "the Financial Regulation"), and in particular Title III thereof;

HAVING REGARD to the Implementing Rules of the Financial Regulation[5] adopted by the Governing Board on 2 December 2015 (hereinafter "the Implementing Rules"), and in particular Title III thereof;

HAVING REGARD to Commission Delegated Regulation (EU) No 1271/2013 for the bodies referred to in Article 208 of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 30 September 2013,[6] and in particular Title III thereof;

HAVING REGARD to the comments and recommendations of the Joint Undertaking's Administration and Management Committee and of the Technical Advisory Panel on the present Annual and Multi Annual Programme (2020-2024);

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 Annual and Multi Annual Programme.

(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 Annual and Multi Annual Programme 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 Annual and Multi Annual Programme;

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(15)-GB34-12.9 adopted 02.12.2015.

5 F4E(15)-GB34-12.9 adopted 02.12.2015.

6 O.J. L 328, 7.12.2013.

(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 Annual and Multi Annual Programme;

HAS ADOPTED THIS DECISION:

Article 1

The Annual and Multi-Annual Programme (2020-2024) of Fusion for Energy annexed to this Decision is hereby adopted.

Article 2

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

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

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

In addition, any related changes to the scope of the annual Work Programme do 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 2019.

For the Governing Board

Joaquin Sanchez
Chair of the Governing Board

For the Secretariat

Romina Bemelmans
Secretary of the Governing Board

Annex: F4E Annual and Multiannual Programme (2020-2024) F4E_D_2GUK27 v2.1

Annual and Multiannual Programme

Years 2020-2024

F4E_D_2GUK27

THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY

Josep Pla nº 2 · Torres Diagonal Litoral · Edificio B3· 08019 Barcelona · Tel. +34 93 320 18 00 · Fax +34 93 320 18 51

www.fusionforenergy.europa.eu

Fusion for Energy

The European Joint Undertaking for ITER
and the Development of Fusion Energy
C/ Josep Pla 2,
Torres Diagonal Litoral
Edificio B3
08019 Barcelona
Spain

Tel: +34 933 201 800
Fax: +34 933 201 851
E-mail: info@f4e.europa.eu

fusionforenergy.europa.eu

Section I. General Context

1. Introduction

1.1 Purpose of the Annual and Multi-Annual Programming document

According to Article 32 (Annual and Multi-Annual Programming) of the F4E Financial Regulation (F4E(15)-GB34-12.9 Adopted on 02/12/2015), the F4E Annual and Multi-Annual Programme integrates three other documents requested by the F4E rules:

1. The Project Plan (PP);
2. The Resource Estimate Plan (REP);
3. The Work Programme (WP).

The PP, REP and the WP are documents that, according to the F4E Statutes and Financial Regulation, the Director shall prepare and submit to the Governing Board (GB) for adoption. The first step of the adoption process requests the preparation of a draft Annual and Multiannual programme for the year N – N+5 to be sent in January of the year N-1 to Commission, GB Chair, EU Parliament and Council.

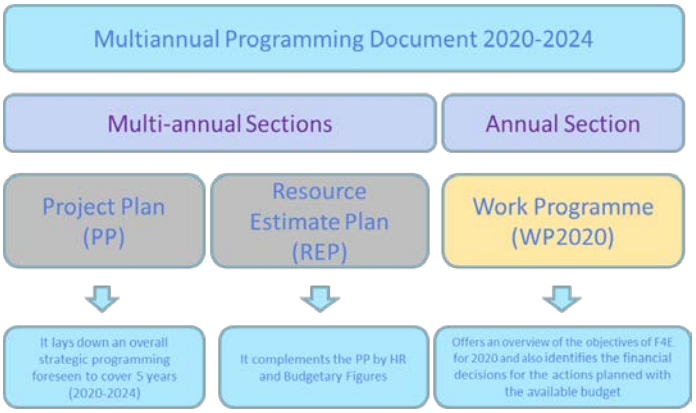

Figure 1 . Structure of the MAP document

The information inside this document is structured as follows.

- A general context section in which F4E mission and values are presented as well as the definition of the EU contribution to ITER and to Broader Approach (BA).
- The Multiannual section is composed of the PP and the REP:
  - The PP is providing a multi-annual view of the F4E objectives for ITER, BA and DEMO projects. Furthermore, it also defines the strategy to achieve them and KPIs used to measure F4E performances.
  - The REP provides the multi-annual information concerning both financial and human resources.
- The Annual section, the Work Programme, offers an exhaustive view of the F4E activities with the necessary information to be considered a financial decision, including annual objectives, targets and resources.

The reference date for all figures in the present document is end of March 2019.
Exceptions are specifically mentioned.
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.
Since its creation in 2007, Fusion for Energy is responsible to provide Europe’s contribution to the work on ITER, the Broader Approach (BA) and the Demonstration Fusion Power Reactor (DEMO) projects according to the tasks entrusted to the organization.

1.3 F4E Projects

ITER[1]

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

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.

BROADER APPROACH (BA)

The Broader Approach agreement, concluded between Euratom and Japan, includes activities which complement the ITER project and accelerate the realization of fusion energy by carrying out Research and Development (R&D) and developing some advanced technologies for future demonstration reactors. Both parties contribute equally financially. The Euratom resources for the implementation of the BA are largely provided voluntarily by several participating European states (Belgium, France, Germany, Italy, Spain and, in the past, Switzerland) as well as EUROfusion.

DEMO

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

1.4 Key Performance Indicators

F4E has identified specific Key Performance Indicators (KPI) in order to measure how effectively the organization achieves the target set in different areas (i.e. schedule, cost, risk, budget consumption, etc.). F4E monitors these KPIs and reports internally to the Project Steering Meeting (PSM) to discuss any possible event or risk that could threaten their achievement.

1.5 Reporting

Fusion for Energy reports to the Governing Board on progress and performance against the Project Plan and the Work Programme. Fusion for Energy produces monthly a dashboard which reports on the Key Performance Indicators.

2. General background

2.1 ITER

ITER has the aim to produce a significant amount of fusion power to allow scientists to study “burning” plasma (i.e. heated by fusion reactions) and also to advance many of the key technologies needed for future fusion reactors. Euratom (represented by the European Commission) is part of this large project involving a total of seven parties that represent half the world’s population – Euratom, the Russian Federation, Japan, China, India, South Korea and the United States.

In 2006 the seven Parties signed the ITER International Agreement. Each of them has a Domestic Agency (DA) that has the obligation to provide components in-kind to build the machine and provides funds to finance the ITER International Organization (IO). The in-kind contribution consists of the delivery of components to be manufactured by each DA according to an agreed share.

The task of F4E, as the Euratom Domestic Agency for ITER, is to discharge Euratom obligations to deliver its share of in-kind components (see Table 1) and cash contributions to the ITER project. The

EU share consists of 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 peculiarity of the project is that about 90% of the ITER 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 components are built under strict quality and safety control. The coordination is 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 operational activities commence at First Plasma and continue until 2037. There will then be a deactivation and decommissioning phase through 2042 and beyond.

ITER Construction Phase	Overall cost IC-23 (kIUA)	EU share (kIUA)	EU share already released (kIUA)
In-kind	2898.6	1363.8329	384.44
In-cash	4847.62	2157.5987	561.72*
Total	**7746.22**	**3521.43**	**946.16**

* Estimations are not 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

Table 1. Summary table of EU contribution to ITER

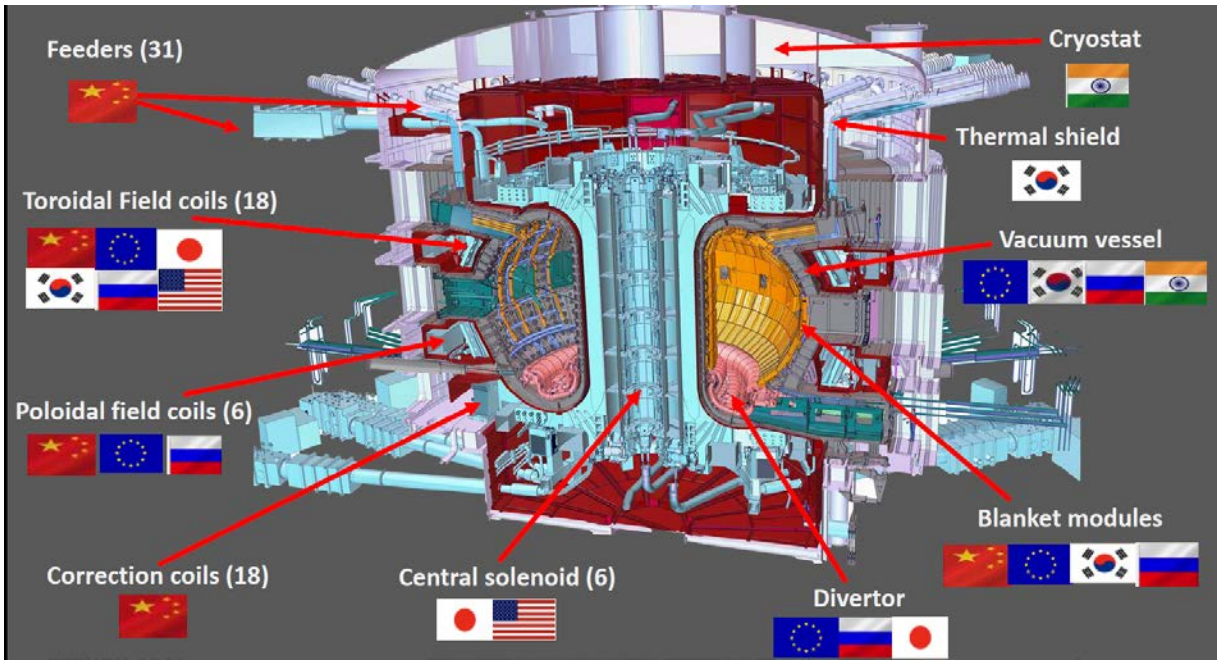

Figure 2 . Main DAs obligation toward ITER IO

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[2] (kIUA)	Released Credits in kIUA
Magnets	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings	89.74	19.40
	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	6.22
	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
Vacuum Vessel	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors	89.56	37.15
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	0.02
	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

[2] IC-23/05.2 Proposal for the Update of the Overall Project Cost (OPC) – November 2018

	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	3.112
	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 Heating & Current Drive	5.3.P1.EU.01	Neutral Beam (NB) Assembly and testing	3.80	0.00
	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	10.91
	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	0.02491
Buildings	6.2.P2.EU.01	PF Coil Fabrication Building	12.80	
	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	349.06661	
	6.2.P2.EU.06	IO Office building	13.85	

& Electrical Power Supply & Distribution System	4.1.P1A-8B.EU.01	Steady-State Electrical Network and Pulsed Power Electrical Network Detailed System Engineering Design	6.93810	215.39373
	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	0.60	0.00
	6.4.P1.EU.02	Radiological protection for Procurement	3.60	0.00

Table 2. List of EU Deliverables

For more details see list of PAs in table 14 of Annexes to Project Plan.

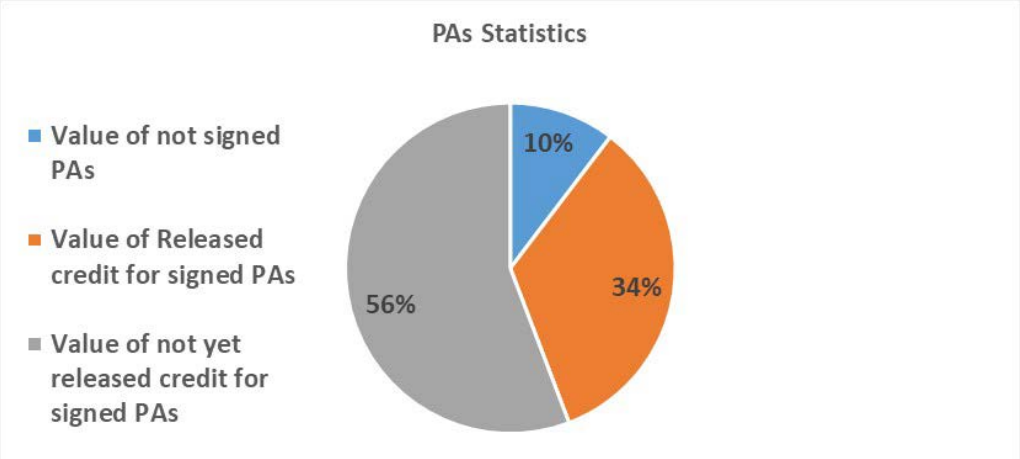

Figure 3 . PA Credits of in-kind contribution in percentage: value of PA Signed & credit released / PA Signed & credit to be released / not Signed EU PA (status end of end March 2019)

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.

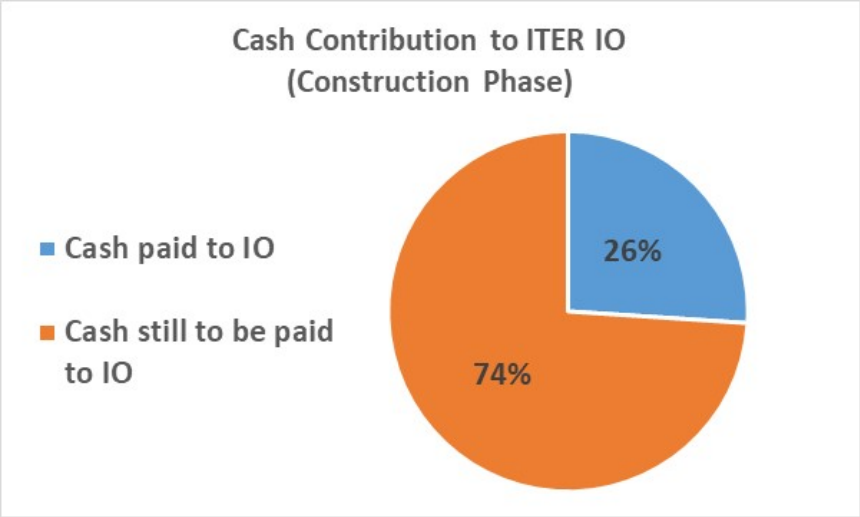

Figure 4. Cash paid to IO / cash still to be paid to IO (Construction Phase)

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.

F4E provides a yearly payment based on the documented achievement of progress. The full payments of five PAs have already been completed. Commitments of two new PAs are foreseen in 2020 at the earliest. In addition, F4E will pay a specific contribution to Japan in 2022 to fulfill a settlement agreement between EU and Japan agreed in 2014.

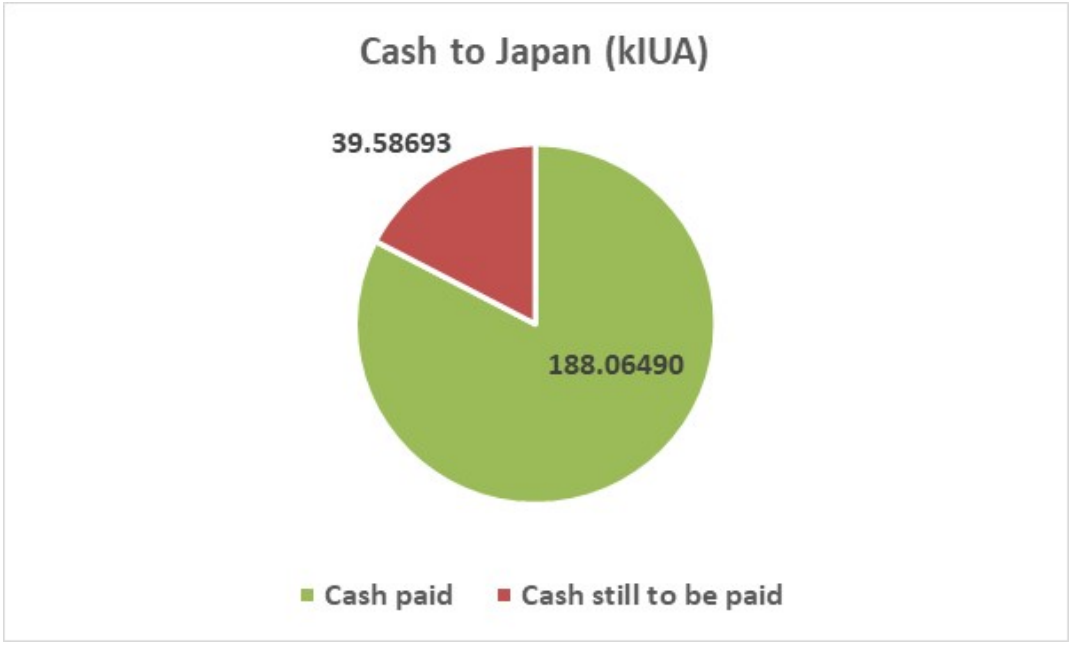

Figure 5. Cash paid to Japan / cash still to be paid to Japan
(excluding settlement agreement)

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

The updated Project Baseline (Baseline 2016) is based on the Staged Approach (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 following main significant points should be mentioned:

- 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 impact on the ITER Council (IC) and Governing Board (GB) milestones that were moved accordingly;
- As of the end of March 2019, the EU has achieved a total of 14 IC/GB milestones, while 12 show some delays, in some cases due to be recovered when the new RAD dates will be implemented into the baseline. Nine milestones are at risk of experiencing delays with respect to the agreed quarter of achievement. While the remaining 21 are on track;
- As for the main components critical for First Plasma achievement:

  Magnets

  EU's first Toroidal Field coil winding pack was inserted into the case provided by the Japanese Domestic Agency. Activities, initially slowed down due to the resolution of non-conformities (NCR) on the coil cases, resumed and welding is in progress.
  The manufacturing of Poloidal Field (PF) Coil #5 is in progress and the impregnation curing of the seventh Double Pancake has been completed. Some rearrangement of the manufacturing responsibilities are in progress in order to minimize the probability of possible delays. As for PF Coil #6, manufacturing (in China) is well advanced and ground insulation wrapping has been completed.
  The manufacturing of the pre-compression rings is in progress following an alternative approach. The test of a full-scale slice was successful and it paved the way towards the start of manufacturing.

  Vacuum Vessel

  Manufacturing of all 5 sectors is in progress. A peak of NCRs on welding in the second half of 2018 has triggered some mitigation actions in order to avoid a jeopardy of planning of all involved companies. High technical complexity, insufficient ramp-up speed and high NCR rate have impacted critical path and generated negative float in sector deliveries. Actions are in progress in the Consortium to minimize the negative float on Sector 5. Collaboration with ITER IO has further increased to implement lessons learned and harmonise the approach between KO-DA and EU-DA to further decrease risk of delays.

  Buildings

  Nine GB/IC Milestones have been achieved up to now in this area. A further key GB/IC Milestone (i.e. Completion of Assembly building) is being re-prioritized in the total project interests to allow prioritization of construction in the Tokamak Complex.
  RFE Milestones for some Auxiliary Buildings were achieved in the last year. In addition, “Taking Over Milestones” were achieved for the Assembly Hall Main Cranes and the

B64/67/68A/69 (Cooling Towers and CWS Infrastructure) as well as for B32, B33 (Magnet Power Convertors) and B38 (Reactive Power Control) completed in March 2019. Large areas of the site infrastructure (e.g. roads, drainage) are ongoing and will also need to be completed by 2020.

A critical activity will be the continued delivery and approval of the construction designs for TB04 employing frozen, clash-free and constructible configurations generated via the Holistic Integration Team (HIT, comprising both the IO and all affected DAs) processes and formalized through the requisite change/propagation mechanisms (HIT Cards, PCRs etc.) in due time. Linked to this key task will be the Qualification and Procurement of Tokamak Complex Building Services components (by EU-DA TB04 contract) and the installation of these services (by the IO TB04 Contract).

The preliminary design and tender/procurement activities for the remaining Buildings which are not on the critical path to First Plasma have also progressed and will be still carried out in 2019, including activities concerning Emergency Power Supply (EPS) Buildings (TB13), Phase 1 (non-nuclear) of the Control Building, Neutral Beam Power Supplies Buildings (TB12), B14 (TB18), and the Hot Cell and Radwaste Buildings.

The main risk for schedule adherence remains the efficient integration of Building Services installation with IO Plant system installation in the Tokamak Complex. The joint HIT is tasked with the optimization and coordination activities to deliver a detailed layout by area, thereby mitigating this risk as much as possible.

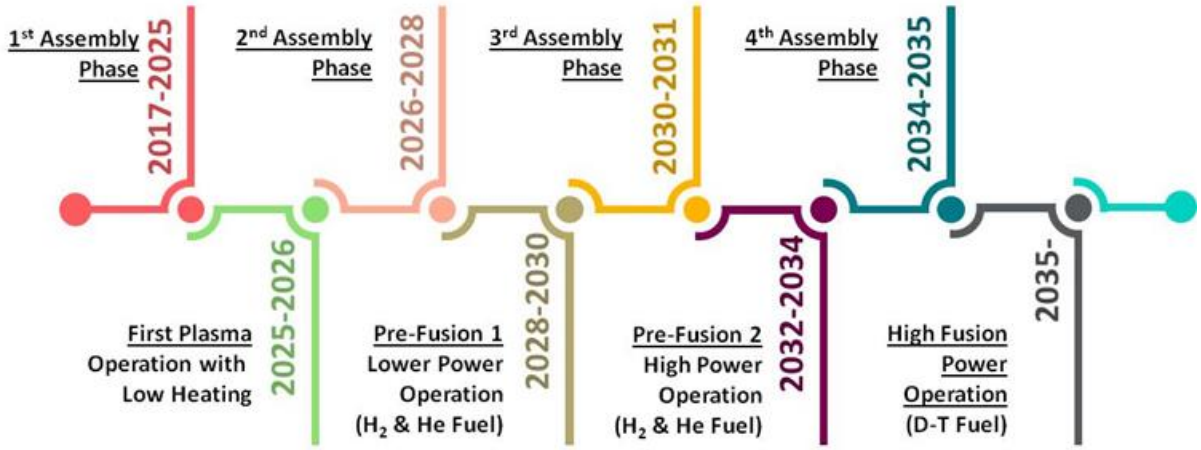

Figure 6. Detail of the Staged Approach

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.

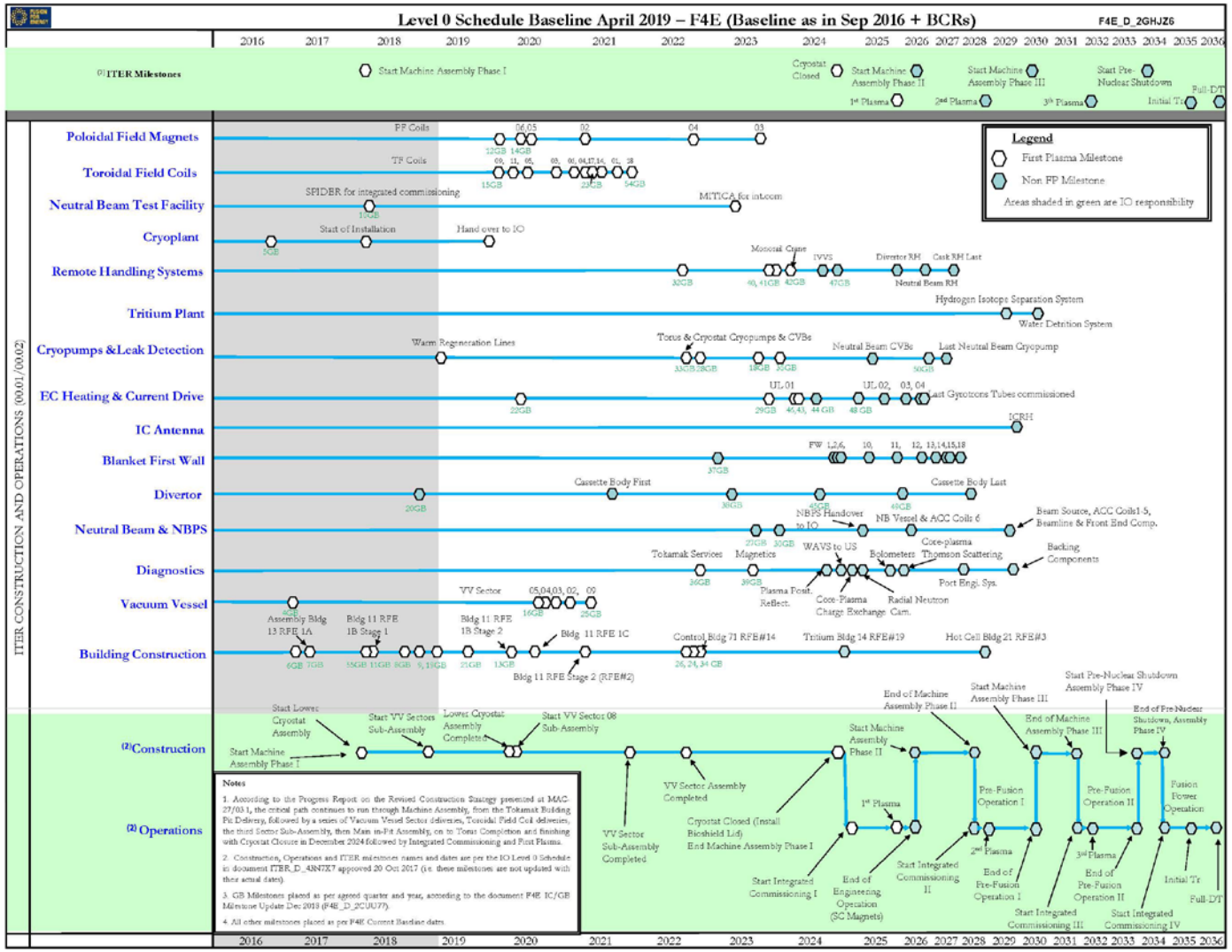

Figure 7 . F4E Level 0 baseline schedule for ITER with summary up to the DT Operation Phase (end of March 2019)

2.2 Broader Approach

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

To a large extent the EU activities to be undertaken in the frame of the BA agreement are 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, Spain. In turn, each VC channels 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 EU contributions and hence meet the requirements of each Procurement Arrangement. The direct contribution of F4E through its own budget is limited in general to a supporting, qualifying or integration role, with some direct procurement for agreed EU contributions not covered by the VCs.

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.

Further details are available in table 15 of Annexes to Project Plan.

Actions	WBS Name	BA EU Commitment (kBAUA)	Signed EU PAs (or equivalent) kBAUA	Credit already released (kBAUA)
14-Broader Approach	Satellite Tokamak (JT-60SA)	236,413	236,403	225,600
	IFMIF/EVEDA Project	147,825	147,325	133,058
	International Fusion Energy Research Centre	115,750	115,750	114,835

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

As of April 2020, it is now foreseen that a further set of activities, within the general scope provision of the Agreement, will be defined for the BA projects (so called BA Phase II). Such scope of work has been so far agreed ad-referendum by the BA Steering Committee, awaiting a conclusion of a new Joint declaration between the Parties, and includes largely the operation of the LIPAc accelerator in Rokkasho as well as enhancements and operation of the JT-60SA tokamak in Naka.

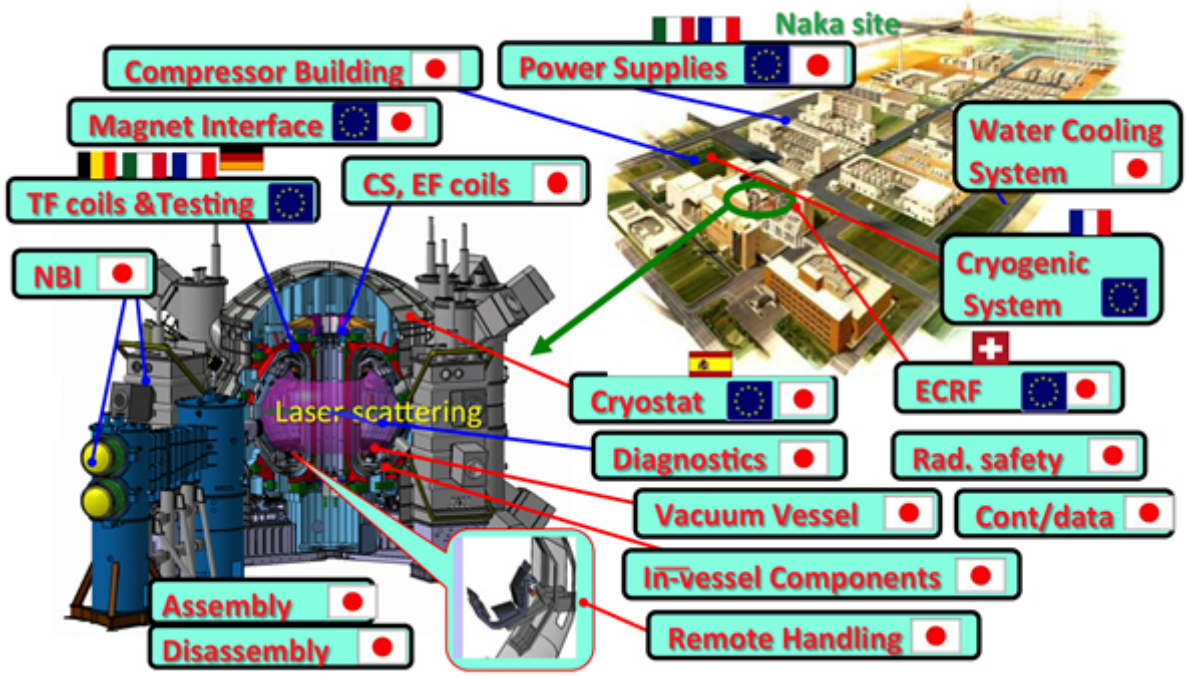

Figure 8 . JT-60SA – Who does what?

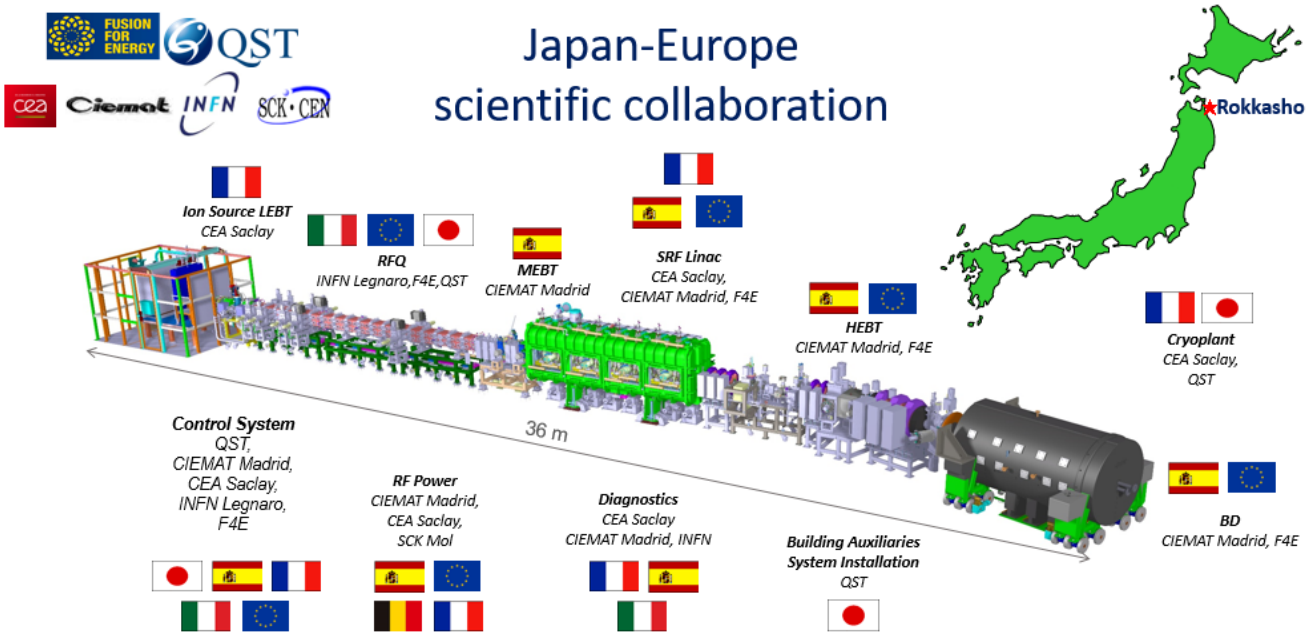

Figure 9 . IFMIF – Who does what?

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

- Satellite Tokamak (JT-60SA): There has been a steady progress of procurements, assembly, installation and commissioning activities. The tests of the 2 spare coils were successfully completed in the TF coils cold test facility. The 2nd Spare Coil was delivered to the Naka site in September 2018. The Spare Toroidal Field Coil winding pack (WP #21), was wound, stacked,

ground insulated and impregnated. The full delivery and tests of the Superconducting Magnet Power Supplies (SCMPS) procured by CEA and ENEA was finalized. As for the Electron Cyclotron Resonant Heating Power Supply (ECRH PS), the manufacturing of the units was completed in June 2018. All power modules were successfully tested at factory, with considerable time devoted to cope with enhanced requirements for this first of a kind power supply design. The factory tests are expected to be completed in May 2019. The new Procurement Arrangement for the Event Detection Intelligent Camera (EDICAM) was signed in June 2018, and work progressed swiftly with detailed design, purchase of optics, electronics and mechanical systems. The EDICAM system is expected to be ready for testing in June 2019.

- IFMIF/EVEDA: As a major milestone towards the validation of the IFMIF accelerator design, the first proton beam was injected into the Radio Frequency Quadrupole (RFQ) at the LIPAc (Linear IFMIF Prototype Accelerator) at Rokkasho in June 2018. The first deuteron injection was done in March 2019. The configuration and detailed design of the drift tube for the enhanced phase B have been validated and the procurement process has started. The main components of the High Energy Beam Transport (HEBT) line and the Beam Dump have been delivered and installed. The preparation for the cryomodule assembly in clean room has started. The assembly process will start as soon as the last components have been delivered.

- IFERC: The IFERC project comprises three activities, DEMO design and R&D activities, CSC (Computational Simulation Centre) and REC (Remote Experimentation Centre). The DEMO Design Activity (DDA) has focused on the design integration of baseline DEMO plant concepts, which work as a proxy for more detailed design integration work. 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 projects have started, sharing Japanese and European supercomputers. The demonstration of remote experiment participation in WEST was successfully implemented in November 2018.

Section II. Project Plan 2020-2024

In accordance with the Financial Regulation of F4E and its Implementing Rules, this Multiannual programming document is composed of a Project Plan (PP) that lays down an overall strategic programing foreseen to cover five years (i.e. 2020-2024). 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.
DEMO, still in a far earlier stage if compared to ITER or BA, is also presented here with the provision of high level information.

Input timeframe

The Project Plan covers 5 years; from 2020-2024 both inclusive.

The information provided is in line with the updated ITER Baseline foreseeing First Plasma (FP) in December 2025.

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 MAP, represent the peak workload for the organization. Very significant efforts will be required to maintain the programme 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 Challenges[3]

While the actual cumulative EU spending for ITER by 2020 will be close to the 6.6 billion limit established in 2010 for the construction period, the construction will not be finalized by then.
The challenge will be to make the new baseline deliver its full potential and fund it accordingly, as a radical overhaul of the project has been successfully implemented to prevent future deviations from project planning, and as the EU, as Host Party of the ITER project, cannot withdraw from the project. Accordingly, the key challenges for the next MFF will therefore be to:

[3] Extracted from Commission Ex-ante Evaluation, SWD(2018) 325 final, accompanying the Commission proposal (2018) 445

- Sustain the positive momentum in the project's performance and management achieved through recent improvements in management, governance and supervision/monitoring;
- Ensure finalisation of the construction and assembly enabling the achievement of First Plasma in December 2025 (the earliest technically achievable date) and subsequent complementary construction and advancement of the post-First Plasma components; and
- Retain the commitment of all ITER Parties to meeting in full their obligations thus enabling the timely and cost-efficient completion of the project.

Meeting these challenges will require sustained EU leadership in the project which needs to be underpinned by excellent performance of F4E and full compliance of the EU with its share of funding obligations and in-kind contributions (i.e. components under European responsibility, procured and delivered by F4E).

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 HR needs will therefore remain a key endeavour for the organisation.

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

The dates provided in this document are according to the F4E Detailed Work Schedule (DWS) submitted to IO at the end of March 2019.

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.
The management of the Project decided to assign the main priority to those activities that are relevant for achieving a FP in 2025. The recently largely agreed Revised Construction Strategy with the definition of Required Arrival Dates (RAD) is also in-line with this approach and remains fully 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 and released until end of March 2019.

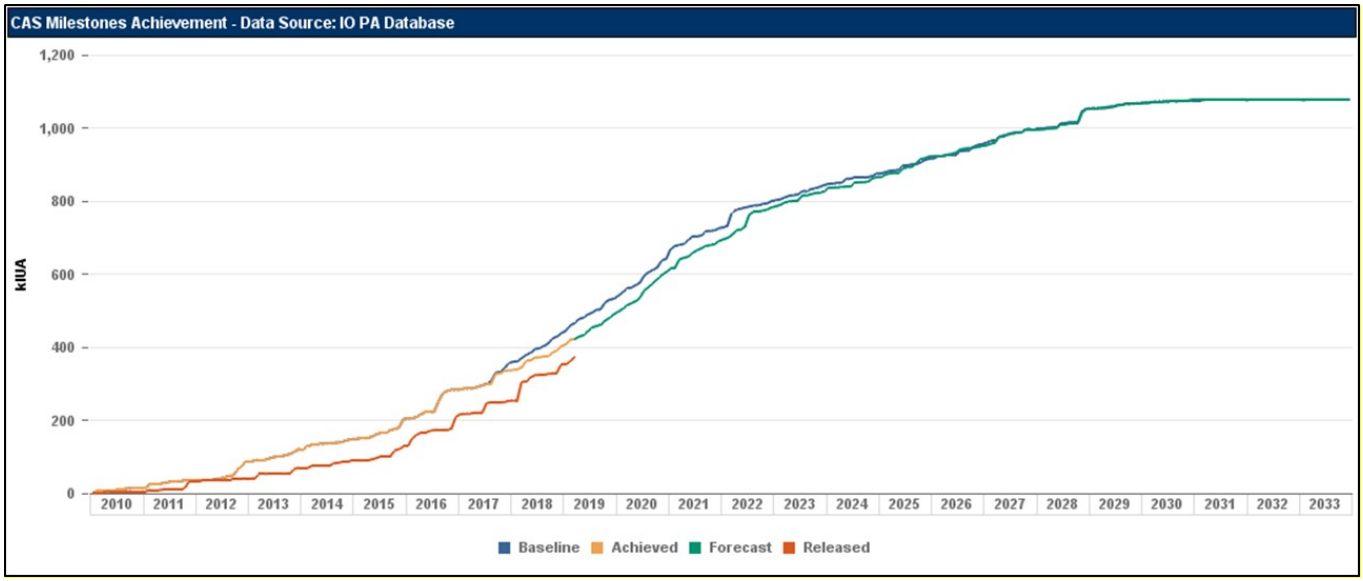

Figure 10 . Credit Graph for all EU in-kind procurements

Table 4 here below 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)						
Action	**Baseline to end March 2019 (kIUA)**	**Achieved Credit (kIUA)**	**Released Credit (kIUA)**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025+**
	473.68373	**429.65728**	**384.44499**	**65.8004704**	**111.025636**	**96.2768082**	**92.6731259**	**52.4226176**	**42.2882944**	**238.47869**
Magnets	101.6388098	100.3888098	80.23881	14.204	30.412	19.216	16.203	5.395	0	0
Vacuum Vessel	48.64	38.172	37.15000	15.598	24.614	11.176	0	0	0	0
In Vessel- Blanket	0.075	0.05	0.00000	0.225	0.225	0.1	0.5	0.5	9.8	33.452
In Vessel- Divertor	2.92	2.92	2.19000	0	0.955	0.4	0.315	1.355	1.92	20.175
Remote Handling	3.2	2	0.80000	0.8	2.14	2.45973999	5.17	4.62	5.22	16.86337
Cryoplant and Fuel Cycle	26.55153982	26.55153982	26.37154	1.43316003	2.20069	2.4526	5.31310001	5.173	5.79306	15.48226999
Antenna and Plasma Engineering	1	0.5	0.50000	0	0.6241	0.37229999	0	0	0.44	25.4756
Neutral Beam and EC Power Supplies and Sources	31.866	28.356	21.77600	7.117	7.753	6.974	4.05210999	8.853	6.92229999	33.78440998
Diagnostics	0.51005972	0.41982612	0.02491	0.79048999	2.13085749	2.84490865	2.36515527	3.33132754	1.96893445	15.78571872
Site and Buildings and Power Supplies	257.2823232	230.2991031	215.39373	25.63282037	39.97098893	50.28125952	58.75476061	23.19529001	10.224	77.46031959

Table 4 . Credit per Action

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 allowed 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.

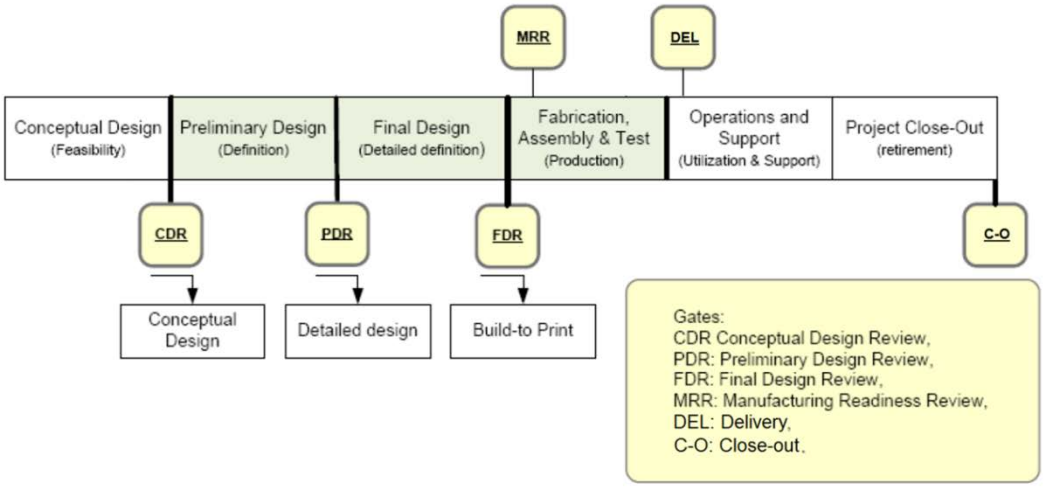

Figure 11 . Progress in the delivery of the EU contributions

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 table 3 of the Annex to the Project Plan.

In-cash

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

Contribution Year	Gross In-Cash Contribution to IO (A)	In-Cash from Staff Secondments to IO (B)	In-Cash from ITAs (C)	Total In-Cash Contribution to IO	
	In-Year Value	In-Year Value	In-Year Value	In-Year Value	In-Year Value
	(EUR)	(EUR)	(EUR)	(EUR)	(IUA)
2006	2,046,000.00	0.00	0.00	**2,046,000.00**	**1,420.83**
2007	25,762,255.00	5,814,255.00	0.00	**19,948,000.00**	**13,570.07**
2008	40,559,448.60	4,174,642.71	149,815.55	**36,234,990.34**	**24,186.33**
2009	45,542,005.03	4,220,556.69	309,518.00	**41,011,930.34**	**26,500.51**
2010	65,247,558.94	3,510,933.10	6,019,586.72	**55,717,039.12**	**35,894.60**
2011	82,538,412.26	3,155,372.37	10,519,813.89	**68,863,226.00**	**43,665.29**
2012	97,799,847.80	2,810,278.03	7,714,938.77	**87,274,631.00**	**53,884.87**
2013	70,574,478.68	2,092,787.90	6,108,338.78	**62,373,352.00**	**37,570.91**
2014	96,449,698.00	2,412,032.00	14,618,812.00	**79,418,854.00**	**47,177.93**
2015	86,113,178.00	2,247,024.00	3,855,001.00	**80,011,153.00**	**47,340.52**
2016	125,364,099.01	1,914,730.00	5,630,831.00	**117,818,538.01**	**69,710.16**
2017	139,529,383.36	1,550,905.00	4,727,379.00	**133,251,099.36**	**78,683.85**
2018	144,151,729.00	1,419,501.00	1,720,228.00	**141,012,000.00**	**82,036.19**
2019	217,380,879.68	1,573,102.00	1,028,344.00	**214,779,433.68**	**122,863.10**
2020 (Forecast)	210,234,813.00	1,169,848.00	9,381,667.00	**199,683,298.00**	**112,317.92**
2021 (Forecast)*	241,532,054.00	1,189,736.00	4,823,394.00	**235,518,924.00**	**129,877.21**
2022 (Forecast)*	296,649,901.00	1,209,961.00		**295,439,940.00**	**159,726.21**
2023 (Forecast)*	374,000,000.00			**374,000,000.00**	**198,234.12**
2024 (Forecast)*	357,000,000.00			**357,000,000.00**	**185,513.22**
Total	2,361,475,741.36			**2,601,402,408.85**	**1,470,173.85**

**** Estimations are not 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***

Table 5 . EU cash contribution to IO (as of 15th May 2019)

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.

System	Description	Percentage of System financed by EU through cash contribution to JA (approximate %)	Value of Cash Contribution	Forecasted Commitment Date	Paid by F4E until end March 2019 (kIUA)
Magnets	Toroidal Field Magnet windings 1B	8.96%	7.7362 kIUA	Already Committed	**2.5074**
	Toroidal Field Magnet Structure 2A-B	54.92%	49.3605 kIUA	Already Committed	**49.3605**
	Toroidal Field Magnet Conductors	40.14%	21.5 kIUA	Already Committed	**21.5**
	Central Solenoid Magnet Conductors	100%	90 kIUA	Already Committed	**90**
Tritium	Atmosphere Detritiation	50%	14.06213 kIUA	2020 (To be confirmed)	**0**
Neutral Beam H&CD	Beam Source and High Voltage Bushing	100%	2.075 kIUA	Already Committed	**2.075**
	Power Supply for NBTF	46.50%	22.622 kIUA	Already Committed	**22.622**
	Power Supply Heating Neutral Beam-Cadarache		20.296 kIUA	Q2/2020 (to be confirmed)	**0**
	Settlement Agreement between EU and Japan agreed in 2014		66.6 $MEuro_{2008}$	Q2/2022	**0**

Table 6. EU cash contribution to Japan

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 QST in Japan and all other European stakeholders: the EU Voluntary Contributors (EU-VCs) as well as EUROfusion. The management model follows the agreed Common Quality Management System, defining resources and processes crossing the lines between organizations. Such an approach has allowed avoiding any significant cost overruns by the EU-VCs as well as F4E and will continue to be pursued. For JT60-SA 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 the IFMIF the R&D results planned to be achieved by the beam commissioning of the LIPAc accelerator - first in low duty cycle, then in continuous wave should provide good grounds for the full experimental phases to follow in LIPAc after 2020 as well as the final design and specifications of the IFMIF-DONES. For IFERC F4E will continue to rely on the full support of EUROfusion whereby the EU-JA joint DEMO design activities led by EUROfusion will be firstly completed for the extent planned within the present BA phase, and carried forward also in BA phase II with QST in JA.

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[4]. In particular, it is

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

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 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.

A collaboration with EUROfusion is being 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 is being finalized 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.

1.5 F4E Financial Status

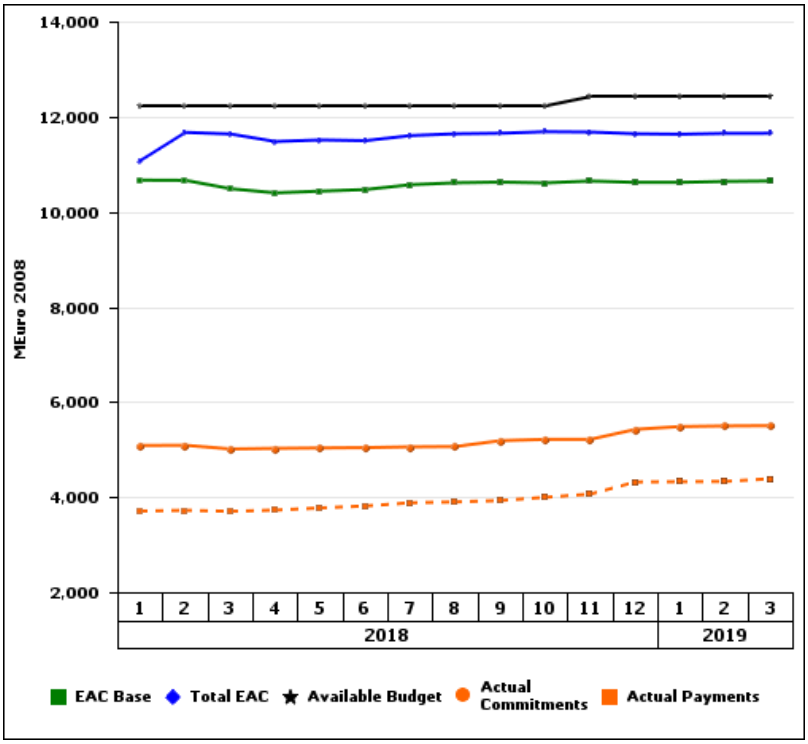

Figure 12. EAC, Actuals, Budget and Payments

The “available budget” is the budget that F4E (in agreement with the Commission) considers needed for the "Contruction phase" of ITER. The post 2020 budget is subject to the final decision by the EU Budgetary Authority on the Commission Proposals on next MFF 2021-2027.

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's objectives are divided in two types:

- Technical Objectives;
- Non-technical objectives or, so called, Corporate Objectives.

F4E has a number of additional corporate objectives covering other important areas, including Health & Safety and nuclear safety. The ones included here are the most relevant ones to measure the progress of the project.

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. workprogramme) activities, Therefore, as it can be seen in the workprogramme 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 non-Technical 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 Technical objectives for ITER project

The IC-GB milestones have been selected by both 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 both components required for the first plasma as well milestones covering later phases of the project (see Table 4 in Annex to Project Plan).

The IC/GB 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 IC-GB milestones as technical objectives and are presented in table 5 of the Annexes to the Project Plan.

The technical objective for F4E is the achievement on time of these milestones.

2.3 Technical objectives for Broader Approach

The technical objective for the European part of the BA projects, as presently defined in the Project Plan approved by the BA Steering Committee[5], is the achievement on time of the milestones that are listed, project by project, in tables 6, 7 and 8 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.
As of April 2020, it is now foreseen that a further set of activities, within the general scope provision of the Agreement, will be defined for the BA projects (so called BA Phase II). Such scope of work has been so far agreed ad-referendum by the BA Steering Committee, awaiting a conclusion of a new Joint declaration between the Parties, and includes lagely the operation of the LIPAc accelerator in Rokkasho as well as enhacements and operation of the JT-60SA tokamak in Naka.

2.4 Technical 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 Non-Technical objectives for ITER

Despite the fact that F4E has well defined technical objectives, the same attention shall be granted to other relevant tasks that are important for the organization to run smoothly. They are translated into objectives to be achieved by the organization. The Non-Technical Objectives are the ones shown in Table 9 in the Project Plan annexes.

2.6 Calculation of ITER Key Performance Indicators

Technical KPI

The KPI for the technical milestone is the variance, i.e. the comparison of the forecast milestone date with the last day of the agreed target quarter (i.e. if the agreed target quarter for a milestone is e.g. Q1 2019, then the KPI is the number of days before 31 March 2019).
The basis of measurement is the currently agreed list of target quarters. If the target quarter is changed after agreement with IC/GB, then the new target quarter is taken as the baseline and as basis of measurement.

Other KPI:

The KPI for non-technical objectives are:

- Schedule Performance Index (SPI)
- Cost Performance Index (CPI)
- EAC Vs Project Budget
- Annual Budget

[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.

- Annual Payment
- Quality [Open NCRs]
- Vacancy rate
- 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 Project Team leaders 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 Project Manager may propose one of the following alternatives:

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

- Close: The Project Manager demonstrates in the PSM that the KPI has returned within the agreed range;
- Accept: The Project Manager proposes in the PSM that the current KPI value is accepted. If the Director accepts this proposal, the Project 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 Project 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 Project 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[6].

For the period 2007-2020, the total European contribution dedicated to ITER project amounts to EUR 6.6 billion (2008 reference value)[7]. From this amount, EUR 2.915 billion (current value) corresponds to the ITER budget foreseen under the current Multiannual Financial Framework (MFF) 2014-2020[8]. The 2020 figures for F4E human and financial resources are subject to the final outcome of the 2020 budgetary procedure.

For the next MFF period 2021-2027, the European Commission has proposed EURATOM contribution to F4E amounting to a total indicative value of EUR 6 070.0 million of which EUR 5 987.7 million (in current value)[9] of direct contribution to the project. The ITER Host State and Membership contributions will be added to this figure still subject to the final decision by the EU Budgetary Authority on the next MFF 2021-2027.

For ITER The REP 2020-2024 implements Euratom's scope as defined by the ITER agreement, on a timescale defined by the ITER baseline of IC19 (November 2016). An updated Overall Project Schedule (OPS) and Overall Project Cost (OPC) for the ITER Project, together with the associated estimate of resources covering the full period 2016-2035, were approved ad referendum by the ITER Council in 2016. This updated schedule sets December 2025 as the date for First Plasma.

Likewise, until 2020 for Broader Approach (BA) Projects, F4E will execute activities in line with the scope defined in the BA Agreement while, beyond 2020, F4E plans to undertake activities foreseen in the forthcoming BA Agreement Phase-2 and IFMIF DONES.

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

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

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

[9] 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.

1. FINANCIAL OUTLOOK FOR 2020 – 2024

1.1 Overview of the past and the current situation

In 2018, the F4E budget has been implemented with the continuous engagement on ITER in-kind delivery projects, mainly the buildings, the vacuum vessel and the magnets to ensure that the MFF budget cap of EUR 6.6 billion until 2020 is respected.
As regards the administrative budget, a full implementation was reached at the year-end.
As regards the annual operational budget, 96.6% was implemented in payment appropriations, and EUR 26.36 million were automatically carried over to 2019 budget. The execution of the 2018 budget was limited by the available treasury, considering the recoverable VAT amounted to EUR 27.9 million at the end of 2018.
The main operational commitments under 2018 F4E budget include: In-cash contribution to ITER Organization (EUR 193.3 million); buildings (EUR 169.4 million); funding the additional scope, quantities and complexity increases for buildings contracts, MITICA experiment (Neutral Beam) and In-vessel (EUR 125.9 million) and under smaller contracts (EUR 145.1 million covering 530 commitments).

1.2 2018 Budget: Execution

Revenue	100.0%	of the revenue was collected		
	Revenue : 831.31	Cashed: 831.18	EUR million	
Commitments	98.4%	of Implementation of the final available budget		
	Final Budget: 706.23	Execution: 694.99	EUR million	
	113.8%	compared to the original budget		
	Original Budget: 610.93	Execution: 694.99	EUR million	
	99.9%	in individual commitments		
	Execution: 694.99	Ind.Commit.: 694.53	EUR million	
Payments	96.1%	of implementation of the final available budget		
	Final Budget: 847.37	Execution: 813.99	EUR million	
	128.4%	compared to the original budget		
	Original Budget: 634.12	Execution: 813.99	EUR million	

Figure 13 . Execution of 2018 Budget

1.3 2019 Budget

The 2019 original F4E budget has been amended In in the July meeting of the Governing Board to align it with the Euratom contribution to F4E set by the final adopted 2019 EU budget. The July amendment corresponds to an increase of EUR 2.6 million in commitment appropriations and a decrease of EUR 3.5 million in payment appropriations. A second amendment is proposed to the Governing Board for its

December meeting to approve an additional Euratom contribution of EUR 1.9 million in commitment and a transfer back of EUR 58.0 million in payment to the EU budget due to lower forecasts of execution of the 2019 budget than originally foreseen. F4E also requests the Governing Board to approve additional revenue for EUR 1.2 Million in commitment and payment and the recovery of EUR 9.2 million called from the unused commitment appropriations from previous years.

The administrative budget might need a reinforcement of EUR 2.5 million compared to the approved budget 2019, mainly due to the increase of the salaries indexation and of the Spanish cost of living coefficient from 2018.

1.4 Financial programming for the years 2020-2024

The figures for the 2020 original budget are indicative, subject to the final approval of the 2020 budgets of each contributor to F4E.
Beyond this budget F4E still plans to receive back the full compensation of the amount of the transfer from the ITER project to the European Defence Fund, in order to reach the envelope of EUR 2 915.5 million for the period 2014-2020.
F4E is finally planning to use the entire amount of unused appropriations to complete the execution of the global envelope made available to its projects until 2020.

It shall be noted that the amount of the ITER Host State Contribution for 2020 is provisional and will be recalculated when all underlining figures will be known. The possible adjustment of this contribution will be submitted again the Governing Board via an amendment to the 2020 budget.

For the period 2021-2024, 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 revenue and expenditure for the next five years, 2020 to 2024 are shown in tables 1 and 2, with reference to the previous and current budgets, respectively 2018 and 2019. The detailed corresponding figures are provided in the annex to this document as well as the global views from the beginning of the project to 2024.

Estimate of Revenue

REVENUE Commitment appropriations (EUR)	2018 Execution	2019 Budget AM2	2019 Forecast	2019 VAR 19/18	2020 Budget	2020 Forecast	2020 VAR 20/19	2021 Planned needs	2021 VAR 21/20	2022 Planned needs	2022 VAR 22/21	2023 Planned needs	2023 VAR 23/22	2024 Planned needs	2024 VAR 24/23
EU CONTRIBUTION	383.0	403.5	403.5	5%	359.5	389.5	-3%	923.1	137%	756.5	-18%	1 091.1	44%	860.0	-21%
THIRD PARTIES CONTRIBUTION	146.9	135.6	135.6	-8%	85.0	90.4	-33%	207.5	130%	166.3	-20%	238.9	44%	185.2	-22%
MISCELLANOUS REVENUE	0.0	1.2	1.2		0.8	0.8	-37%								
UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - CARRIED OVER	18.9	8.5	8.5	-55%											
UNUSED APPROPRIATIONS - MADE AVAILABLE AGAIN	120.0	149.2	149.2	24%	368.3	368.3	147%								
TOTAL REVENUE	668.9	698.0	698.0	4%	813.6	848.9	22%	1 130.6	33%	922.8	-18%	1 330.0	44%	1 045.2	-21%
ADDITIONAL REVENUE	37.3	26.7	26.7	-29%	59.8	59.8	124%	29.9	-50%	17.2	-42%	17.5	2%	41.8	139%
TOTAL REVENUE AVAILABLE	706.2	724.7	724.7	3%	873.4	908.7	25%	1 160.4	28%	940.0	-19%	1 347.6	43%	1 087.1	-19%

REVENUE Payment appropriations	2018 Execution	2019 Budget AM2	2019 Forecast	2019 VAR 19/18	2020 Budget	2020 Forecast	2020 VAR 20/19	2021 Planned needs	2021 VAR 21/20	2022 Planned needs	2022 VAR 22/21	2023 Planned needs	2023 VAR 23/22	2024 Planned needs	2024 VAR 24/23
EU CONTRIBUTION	659.9	569.3	569.3	-14%	633.6	633.6	11%	604.4	-5%	712.9	18%	674.5	-5%	686.0	2%
THIRD PARTIES CONTRIBUTION	134.9	150.6	150.6	12%	156.1	156.1	4%	135.6	-13%	162.1	20%	150.5	-7%	151.0	0%
MISCELLANOUS REVENUE	0.0	1.2	1.2												
UNUSED APPROPRIATIONS FROM PREVIOUS YEARS	5.6	2.2	2.2	-61%											
TOTAL REVENUE	800.4	723.3	723.3	-10%	789.7	789.7	9%	740.0	-6%	875.0	18%	825.0	-6%	837.0	1%
ADDITIONAL REVENUE	46.9	33.7	33.7	-28%	30.0	30.0	-11%	30.0	0%	25.0	-17%	25.0	0%	24.0	-4%
TOTAL REVENUE AVAILABLE	847.4	757.0	757.0	-11%	819.7	819.7	8%	770.0	-6%	900.0	17%	850.0	-6%	861.0	1%

Table 7. Estimate of Revenue for the period 2020-2024 in commitment and payment appropriations

Estimate of Expenditure

EXPENDITURE In Commitment Appropriations (EUR)	2018	2019			2020			2021		2022		2023		2024	
	Execution	Budget AM2	Forecast	VAR 19/18	Budget	Forecast	VAR 20/19	Planned needs	VAR 21/20	Planned needs	VAR 22/21	Planned needs	VAR 23/22	Planned needs	VAR 24/23
Title 1 Staff Expenditure	49.3	48.5	50.7	3%	52.0	54.5	8%	57.0	4%	59.3	4%	61.8	4%	62.6	1%
Title 2 Operating expenditure	7.0	7.6	7.8	11%	7.9	8.8	13%	9.0	2%	8.9	-1%	9.1	2%	9.2	2%
Title 3 Operational expenditure	637.1	668.6	666.1	5%	813.5	845.4	27%	1 094.5	29%	871.8	-20%	1 276.7	46%	1 015.3	-20%
TOTAL EXPENDITURE	693.4	724.7	724.7	5%	873.4	908.7	25%	1 160.4	28%	940.0	-19%	1 347.6	43%	1 087.1	-19%

EXPENDITURE In Payment Appropriations (EUR)	2018	2019			2020			2021		2022		2023		2024	
	Execution	Budget AM2	Forecast	VAR 19/18	Budget	Forecast	VAR 20/19	Planned needs	VAR 21/20	Planned needs	VAR 22/21	Planned needs	VAR 23/22	Planned needs	VAR 24/23
Title 1 Staff Expenditure	48.3	48.5	50.7	5%	52.0	54.5	8%	57.0	4%	59.3	4%	61.8	4%	62.6	1%
Title 2 Operating expenditure	5.6	7.6	7.8	41%	7.9	8.8	13%	9.0	2%	8.9	-1%	9.1	2%	9.2	2%
Title 3 Operational expenditure	760.1	700.9	698.4	-8%	759.7	756.3	8%	704.1	-7%	831.8	18%	779.1	-6%	789.2	1%
TOTAL EXPENDITURE	814.0	757.0	757.0	-7%	819.7	819.7	8%	770.0	-6%	900	17%	850.0	-6%	861.0	1%

Table 8. Estimate of Expenditure for the period 2020-2024 in commitment and payment appropriations

2. HUMAN RESOURCES – OUTLOOK FOR 2020 – 2024

Strategic perspective

Key HR changes currently on-going include:

- Review of the selection and recruitment processes and reducing the time to hire;
- Review of the F4E contract policy;
- Development of the HR metrics and reporting system;
- Better alignment of learning and development initiatives with strategic priorities;
- Establishment of a career management and competency framework;
- Enhancement of performance management and corresponding link with corporate performance;

Taken together these improvement initiatives are also expected to help promulgate a stronger corporate culture while at the same time be beneficial for the engagement levels of staff.

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 three 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.
- Secretary/Clerk (AST/SC) profiles for clerical and secretarial tasks.

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.

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. Following a request of the budgetary authority F4E is giving back, by the end of 2019, a total of 14 positions (i.e. 3 TAs and 11 CAs) including the two positions made redundant by the novation of the TB04 contract. This reduction will be followed by an additional one in 2024, a total of 15 positions (i.e. 8 TAs and 7 CAs).

These posts are filled using non-renewable short-term contracts.

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 i.e. 10 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.

Table 9 hereafter features the anticipated evolution of statutory staff. The reductions are consistent with the agreed arrangements to offset the short term staff complement of 45 FTEs received in 2015. Specifically, this plan foresees a phased return of these cuts as follows: 3 CA posts in 2019; 3 TA and 8 CA posts in in 2020, and 8 TA and 7 CA posts in 2024. The balance will be phased out in 2025 (8 TA and 6 CA posts) and 2026 (2 TA and 2 CA posts).

Staff population and its evolution, overview of all categories of staff									
Staff population	Actually filled as of 31.12.2017	Authorised under 2018 EU budget	Actually filled as of 31.12.2018	Authorised under 2019 EU budget	Requested for 2020	Envisaged for 2021	Envisaged in 2022	Envisaged in 2023	Envisaged in 2024
Sub Total Establishment Plan	276	283	277	283	280	280	280	280	272
Sub Total CA	174	181	168	178	170	170	170	170	163
SNE	2	3	1	3	3	3	3	3	3
TOTAL	452	467	446	464	453	453	453	453	438

Table 9. Overview of staff population and its evolution

For a more detailed view on staff see tables 2 and 3 of the annexes to HR REP.

3. Other information

Building policy

Surface area (in square metres) *- Of which office space* *- Of which non-office space*	9 500 m^2 *8 750 m^2* *750 m^2*
Annual rent (in EUR)	Rent paid by Spain Except 145 000€ paid by F4E
Type and duration of rental contract	Long term rent lease agreement until 2042 Short term rent lease agreement until 2024
Host country grant or support	Rent paid by Spain Except F4E part
Present value of the building	N/A

Table 10 . 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 has been 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.

It shall be noted that F4E has rented additional 500 m2 in order to host external experts from services contracts working on F4E site. The office space made available by Spain free of charge and according to the 2007 Host Agreement, was not sufficient to host the external experts coming to F4E Barcelona from operational service contracts. For that reason, F4E had to rent, under the title III, 2 additional office modules in the same premises exclusively dedicated to host externals experts. F4E launched an official request to the Spanish Authorities to cover these new expenses, however they didn't reply yet. If Spain finally covers the costs, F4E will regularise it.

Privileges and immunities

Joint undertaking privileges	Protocol of privileges and immunities (PPI) / diplomatic status granted to Staff
Privileges provided by the Host State and concluded in 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

Table 11 . Privileges and Immunities

Evaluations, Internal monitoring and Assessment

When the EU Council discussed the status of ITER and possible ways forward on 12th July 2010, it asked, inter alia:

- "F4E to report at least once a year on (a) the progress achieved in implementing the cost containment and savings plan, (b) as well as the performance and management of the Agency and the ITER project, and (c) the fulfillment of the scheduled activities within its annual budget.
- The F4E Governing Board (GB) to appoint an independent expert who will assess the [ITER] project progress on the basis of existing reports and will submit this opinion to the Governing Board and to the Competitiveness Council once a year".

The EU Council in its conclusions on the ITER project[10] issued in April 2018:

- "calls on all stakeholders to pay utmost attention to both risk management and improved cost control, including appropriate provisioning for risks and contingencies so as to avoid any further delays in the future. The Council urges the management of the ITER Organization and Fusion for Energy to adopt further cost containment and risk reduction measures, also with respect to other activities than the in-kind contribution to the ITER project, and recalls that design should follow budget with full respect of the intended purpose of the facility";
- "reiterates that the independent annual assessments of the progress of ITER have to be continued and intensified with a focus on the performance and project management, including cost containment, schedule project control as well as risk management. The Council calls for a consistent implementation of the respective recommendations of the assessments. The Council also stresses that the reporting duties of Fusion for Energy as laid down in the 2010 Council conclusions remain unchanged."

Accordingly, each year F4E reports to the Council on the status of the ITER Project, the evolution of the Cost containment and savings plan, an overview of the performance and management of the organization and ITER Project, the progress related to the fulfillment of scheduled activities and F4E's Response to the External Annual Assessment.

[10] Document 7881/18 RECH 127 ATO 18 COMPET 213

The actions on F4E resulting from the external assessment are added to the F4E Action Plan and the progress in their completion is reported by the Director at each Governing Board meeting.

Section IV. Work Programme 2020

This Work Programme 2020 offers an overview of the objectives of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E) for 2020 and also identifies the financial decisions for the actions that are planned to be carried out 2020 with the available budget.
It covers the work on both ITER and Broader Approach (BA) according to the tasks entrusted to the organization.
The WP2020 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 2020 in terms of achieved credit, contracts placed and budget (both in commitments and payments) allocated per action.

Action	Baseline to end March 2019 (kIUA)	Achieved Credit (kIUA)	Released Credit (kIUA)	2020
	473.68373	429.65728	384.44499	111.025636
Magnets	101.6388098	100.3888098	80.23881	30.412
Vacuum Vessel	48.64	38.172	37.15000	24.614
In Vessel- Blanket	0.075	0.05	0.00000	0.225
In Vessel- Divertor	2.92	2.92	2.19000	0.955
Remote Handling	3.2	2	0.80000	2.14
Cryoplant and Fuel Cycle	26.55153982	26.55153982	26.37154	2.20069
Antenna and Plasma Engineering	1	0.5	0.50000	0.6241
Neutral Beam and EC Power Supplies and Sources	31.866	28.356	21.77600	7.753
Diagnostics	0.51005972	0.41982612	0.02491	2.13085749
Site and Buildings and Power Supplies	257.2823232	230.2991031	215.39373	39.97098893

Table 12: Expected 2020 results in terms of discharge of Euratom obligations to ITER (status: end of March 2019)

Procurement Procedures	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020
P Serv - Contract	1	10	7	5	5	3
P Supply - Contract	7	7	12	5	2	8
Pserv - Specific Contracts	50	29	24	36	20	17
PSupply - Specific Contracts	16	1	5	7	6	1

Table 13: Indicative number, type of contract and timeframe for launching the procurement procedures.

Action	Value (In-Year Euros)	Time of call	Budget Line
Specific Grant Signed for Design and R&D for Radial Neutron Camera/Gamma Spectrometer - Phase 1 SG7	1,950,000	2020 Q4	3.1+3.5
Grant for the setup of a cryogenic test facility and performance of tests of TF coils	760,000	2020 Q4	3.3

Table 14 - List of 2020 Grants/Specific Grants

WP2020 Executive summary

The work programme 2020 is mostly focused on the following activities (FP-relevant areas are shown):

- Magnets (FP): All major contracts have already been signed. The 9 Pre-Compression Rings will be fully completed and will be handed over to ITER IO for final testing. The first 2 (out of 10) TF Coils will be completed and delivered to the ITER IO site and all 10 TF Coil Winding Packs will be finished. PF Coils #5 and #6 will be fully assembled, cold tested and handed over to ITER IO.

- Main Vacuum Vessel (FP): During 2020, the European Vacuum Vessel (VV) will continue to be in full production for all sectors, heading towards final assembly of sectors 5 and 4. This assumes the successful execution the final assembly strategy at HHI (KO DA), enabling the European VV supplier to implement lessons learned from the Korean manufacturing. Inspectors task orders will be placed according to the manufacturing rate as well as support tasks for the resolution of design changes and non-conformities. Preparatory activities for the final acceptance and the transportation of the Sectors to Cadarache will start in 2020.
- Blanket System (non-FP): The most important activity in 2020 will be the negotiation with the candidate manufacturers for the series manufacturing of the EU share of First Wall panels (Normal Heat Flux first wall design) for ITER. After the end of the negotiation, still in the course of 2020, there will be the award and signature of the contract(s). In parallel, there will be negotiations for the adjudication of a Task Order for the manufacturing of the first batch of Beryllium tiles to be used during the preliminary phases of preparation of the series production line(s). On a similar topic, an Invitation To Tender will be launched for the procurement of the CuCrZr raw material. For the Blanket Cooling Manifold, after completion of the on-going design activities for the alternative support design, a decision will be met with IO for the final configuration of the manifold and the PA will be signed (Q2 2020).
- Divertor (non-FP): For the divertor inner vertical target (IVT), the main activities will be devoted to the follow-up of the on-going manufacture of the full-scale prototypes by the additional suppliers. For the divertor cassette, the main activities will consist in the follow-up of the on-going manufacture of the two contracts for Stage I of the cassette body (CB) series production. All manufacturing activities will be supported by inspectors through the on-going framework contracts.
- Remote Handling (partly FP): The procurement of the Remote Handling Systems (RHS) will mainly focus on the continuation of preliminary design activities and starting, in some areas, the final design activities. 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.

- Vacuum Pumping (Partly FP): The contract for Leak Detection systems will be signed. Manufacturing of the Torus and Cryostat Cryopumping System will be initiated. MITICA contracts will focus on manufacturing and assembly. As for the Front-end Cryopump Distribution System, final design will be completed and all components will be in the manufacturing stage. As for the Warm Regeneration lines, the work will be completed and the PA closed.
- Tritium Plant and REMS (Partly FP): First pre-PA activities will start in support of the Hydrogen Isotope Separation system. As for REMS (Radiation and Environmental Monitoring Systems), the tendering process for 1st plasma activities will be on-going.
- Cryoplant (FP): End of installation for LN2 Plant and Auxiliary Systems components will take place. The contract for MITICA Cryoplant will be completed.
- RF Heating & Current-Drive (partly FP): The Electron Cyclotron (EC) system (Upper Launchers and ex-vessel waveguide systems) procurement activities will continue in 2020 (staged PA signed in 2019) with contracts for the fabrication of the blanket shield module and material procurement, in parallel to final design/prototype and testing activities related to the ex-vessel systems. For the EC Plant Control (ECPC) system, the main activity will be the delivery, installation and commissioning of the ECPC Stage 2 in ITER-IO.
  Electron Cyclotron (EC) Gyrotrons, Power Sources and Power Supplies (PS): the manufacturing and testing of the last units of the Main and Body HV Power Supplies will continue, the first sets will be delivered to ITER Cadarache, and the installation and commissioning will start. The EU Gyrotrons PA will be signed and the preparation of the EU Gyrotrons tendering procedure will be initiated.
- Neutral Beam (NB) Heating & Current Drive (non FP): As for the NB Test Facility at RFX-Padua, for MITICA, the activities in the test bed will continue with commissioning and testing of vessel and power supplies, including assembling of auxiliaries (CODAS, Interlock, and Safety). The contracts for MITICA diagnostics, MITICA Beam Source, MITICA Beam line components will proceed as planned. As for the NB at ITER-Cadarache, detailed design and manufacturing design consolidation for Neutral Beam power supplies systems of the ITER units will be developed, subject to the negotiation to adapt the contractual schedule with the readiness of buildings. The PA (53-4) - Confinement and Shield, for the NB-Vessels, Drift-Duct and Absolute Valve is foreseen to be signed in 2020, subject to timely preparation of technical documentation by IO.
- Diagnostics (partly FP): The work in the Diagnostics team will focus in two different areas: manufacturing of several components to be delivered to ITER mainly for first plasma and the design of all remaining Diagnostics. Several diagnostics systems will finalize either the preliminary design phase or the final design phase with the approval of the relevant design review. Procurement activities will encompass manufacturing contracts- as for the electrical auxiliary components (including clips, clamps, bosses and critical junction boxes) and the captive ex-vessel transmission components for the plasma position reflectometry- and design contracts as for the core plasma Thomson scattering system.
- Test Blanket Systems (TBS – non-FP): The activities will be mainly focused on the Preliminary Design and Safety Analyses. In addition, framework contract tendering activities for the welding procedures qualification of the TBM Box and for the storage of EUROFER will be carried on as planned. The collaboration with EUROfusion and the EU Fusion Laboratories will continue for the finalization of the Water Cooled Lead-Lithium Test Blanket System conceptual design and R&D in support of TBS design (including EUROFER qualification).
- Site, Buildings and Power supply: The focus of the Buildings works will be on the completion of the civil works in the Tokamak Complex and erection of the Tokamak Building steel structure in order to fulfil key milestone Q1 2020 granting crane access from the Assembly Building to the Tokamak Pit to allow installation of the Cryostat Base by IO. Alongside this there will be deliveries of building services equipment for the Tokamak Complex, deliveries related to electrical networks and load centres and the completion of the Cryoplant and Building Services auxiliary buildings.

- Broader Approach: The activities in 2020 will focus on the delivery of the remaining EU contributions within the frame of BA Phase I, and the preparation for BA Phase II.

See details of the Work Programme 2020 in the annexes to Work Programme.

List of Figures

List of Tables

Annexes to Project Plan

The ITER Procurement Arrangements and their Status
Life Cycle of the PAs and main Steps in the Delivery of the ITER EU Contribution
Broader Approach overall information
Objectives and Key Performance Indicators
F4E Organization Chart
Risk and Opportunity
Quality Assurance
Credits per Procurement Arrangement
European Obligation to ITER project
PAs, cash contributions, secondment agreements for Broader Approach

Annexes of Financial REP

Specific assumptions for the establishment of the F4E Budget
Estimate of Revenue
Estimate of Expenditure
Estimate of Revenue and Expenditure for the next 5 years
Content of the financial tables

Annexes to HR REP

Selection procedures
Performance management
Schooling
Staff mobility
Staff population overview
Multiannual staff policy plan
Advancement, reclassification and promotion
Gender balance
Geographical balances
Human Resources per action for 2020-2024

Annexes to Work Programme

Definitions, assumptions and supporting information to wp2020
Objectives and key performance indicators
List of 14 WP2020 actions
Work Programme 2020 budget summary
WP2020 indicative value of financial resources for the actions
2020 main procurement activities (per action)
2020 list of grants per action
Time of call for the procurement plan
Essential selection, award criteria and upper funding limits for grants

List of figures in annexes to Project Plan

List of tables in annexes to Project Plan

List of tables in annexes to financial REP

List of tables in annexes to HR REP

List of tables in annexes to Annual Work Programme

List of Acronyms

ASN	Autorité de Sûreté Nucléaire
BA	Broader Approach
BAUA[11]	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

[11] 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[12]	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

[12] 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
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

MAP2020_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	89.560	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	Incl. in Main Vessel	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 2019 from the IO PA Database

[2] IC-23/05.2 Proposal for the Update of the Overall Project Cost (OPC) – November 2018

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	NA	NA
	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	0.600	0.600	26-Sep-13
	6.4.P1.EU.02	Radiological Protection for procurement	3.600	NA	NA
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	NA	NA
	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	NA	NA
	5.5.P1.EU.04	Core-Plasma Charge Exchange Recombination Spectrometer	3.42495	NA	NA
	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	NA	NA
	5.5.P1.EU.07	Pressure Gauges	0.95798	NA	NA
	5.5.P1.EU.08	Core Thomson Scattering	3.55361	NA	NA
	5.5.P1.EU.09	Low Field Side Collective Thomson Scattering	1.14786	NA	NA
	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	NA	NA
	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		349.06661	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

Table 1. Action, WBS name and PA status (as of end March 2019)

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.

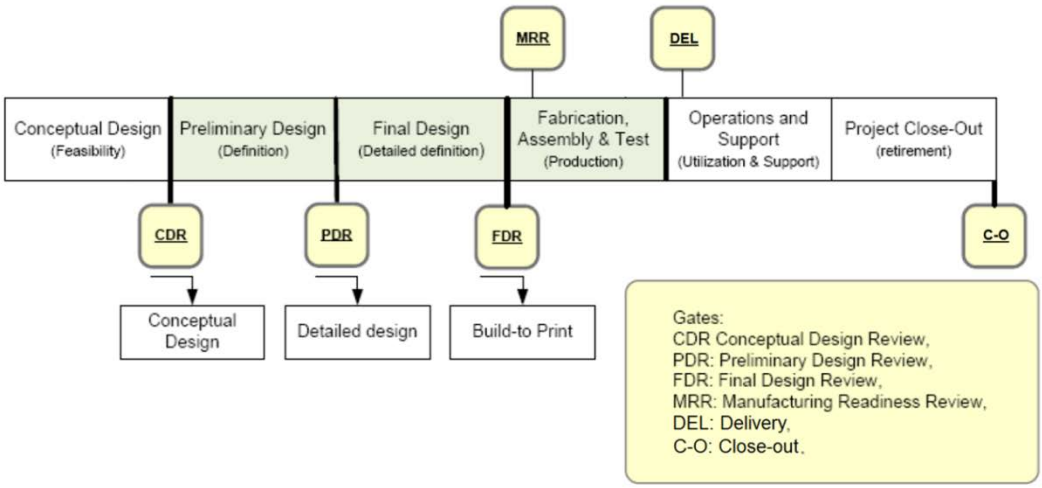

Figure 1 . Progress in the delivery of the EU contributions

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

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 2019).

	Nr and Name of Building (yellow where construction has started)	RFOC[3] Date		RFIOC / RFE[3] Dates		Completion Date
11-Site and Buildings and Power Supplies	11 - Tokamak Building	RFOC Pit	Jun-19	RFE 1B Stage1	Apr-2018	Aug-2022
		Blg 11 - Crane Hall RFOC	May-20	RFE 1B Stage2	Mar-2020	
				RFE 2 Stage2	Jan-2022	
		Bldg 11 - B2	Dec-18	RFIOC B2	Dec-2018	
				RFIOC DTR	Jun-2019	
				RFIOC B2M	Nov-2019	
		Bldg 11 - B1	Jun-19	RFIOC B1 (Exc. NB Cell)	Jun-2019	
				RFIOC B1 (below NB Cell)	Dec-2019	
		Bldg 11 - L1	Mar-20	RFIOC L1 (Exc. NB Cell)	Mar-2020	
		Bldg 11 - L2	Apr-20	RFIOC L2 (Exc. NB Cell)	Apr-2020	
				RFIOC (NB Cell)	Sep-2020	
		Bldg 11 - L3	May-20	RFIOC L3 (Axis T4-T5)	May-2020	
				RFIOC L3 (Axis T5-T11)	Sep-2020	
				RFIOC L3M area	Jan-2021	
		Bldg 11 - L4	Nov-20	RFIOC L4/L5 (Axis T4-T5)	Nov-2020	
		Bldg 11 - L5	Nov-20	RFIOC L4/L5 (Axis T10-T12)	Jan-2021	
		Bldg 11 - R1	Dec-20	RFIOC R1 (Axis T4-T5 & T10-T12)	Sep-2020	
	13 - Assembly Building	Sep-2016		RFE 1A stage 1	Jun-2017	Nov-2019
				RFE 1A stage 2	Sep-2017	
	14 - Tritium Building	Bldg 14	N/A	RFE 19	Mar-2025	Oct-2025
		Bldg 14 - B2	Jul-21	RFIOC B2	Jul-2021	

[3] RFOC=Ready For Other Contractors; RFIOC=Ready For IO Contractors; RFE=Ready For Equipment

	Bldg 14 - B1	Jul-21	RFIOC B1	Jul-2021	
	Bldg 14 - L1	Jul-21	RFIOC L1	Jul-2021	
	Bldg 14 - L2	May-22	RFIOC L2	May-2022	
	Bldg 14 - L3	Aug-22	RFIOC L3	Aug-2022	
	Bldg 14 - L4	Jan-23	RFIOC L4	Jan-2023	
	Bldg 14 - L5	May-23	RFIOC L5	May-2023	
	Bldg 14 - R1	May-23	RFIOC R1	May-2023	
15 - RF Heating Building	Jun-2017		Early Acces L1	Jul-19	Jul-2021
			Early Acces L2	Aug-19	
			RFE	Dec-19	
			Early Access PBS 26	Aug-19	
			Early Acces CCWS Annex	Dec-19	
			Early Access North and South dummy load	Apr-20	
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-17	Mar-2019
			Milestone 2 - IO Early Access B32, 33	Sep-17	
			Milestone 3 - IO Early Access B32, 33, 38	Oct-17	
			RFE 7	Dec-17	
33 - Magnets Power Conversion Building	N/A, no RFOC as Design & Built contract		RFE 7	Dec-17	Mar-2019
34 - NB Power Supply Building	N/A, no RFOC as Design & Built contract		Feb-23		Sep-2023

37 - NB High-Voltage Power Supply Building	N/A, no RFOC as Design & Built contract		Jul-23		Feb-2024
51 - Cryoplant Compressor Building	Sep-2017		RFE 8A	Sep-17	Jun-2020
			RFE 8B	Dec-19	
52 - Cryoplant Coldbox Building	Sep-2017		RFE 8A	Sep-17	Jun-2020
			RFE 8B	Dec-19	
53 - Cryoplant Infrastructure Building	Jan-2018		RFE 8A stage2	Sep-17	Jun-2020
			RFE 8A stage3	Oct-17	
			RFE 8A stage4	Dec-17	
61 - Site Services Building	Aug-2016		RFE 17A	Apr-17	Dec-2019
			RFE 17B	Mar-18	
71 - Control Building (North: non-PIC)	Sep-2021		Bldg 71 North (Non PIC)	Jun-2022	May-2023
71 - Control Building (South: PIC)	Apr-2026		Bldg 71 South (PIC)	May-2027	Mar-2028
74 - Diagnostics Building	Bldg 74	N/A	RFE 20	Nov-2021	May-2022
	Bldg 74 - B2	05/12/2018	RFIOC B2	Dec-2018	
	Bldg 74 - B1	28/02/2019	RFIOC B1	Feb-2019	
	Bldg 74 - L1	18/04/2019	RFIOC L1	Apr-2019	
	Bldg 74 - L2	19/06/2019	RFIOC L2	Jun-2019	
	Bldg 74 - L3	23/09/2019	RFIOC L3	Sep-2019	
	Bldg 74 - L4	14/04/2020	RFIOC L4	Apr-2020	
	Bldg 74 - L5	14/04/2020	RFIOC L5	Apr-2020	
	Bldg 74 - R1	14/04/2020	RFIOC R1	Apr-2020	
75 - FD & Switching Network Resistor Building	Jun-2021		Bldg 75	Apr-2022	Jan-2023

Table 3 . Life cycle of the EU procurements (as of end of March 2019)

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.
The primary reference for the Satellite Tokamak Programme is the Project Plan yearly revised and submitted for endorsement to the BA Steering Committee (BA SC 24-8.5-1 Project Plan v1.0 (F4E_D_2GL39R v1.0)[4].

All the EU Procurement Arrangements and the relevant corresponding industrial contracts have been placed and are well underway[5]. All the European contributions are in line with the project baseline schedule. The facility is going to be completed by March 2020 within the presently agreed Broader Approach (BA) period. The integrated commissioning of the system including initial plasma operation from September 2020 is foreseen to be part of BA Phase II, presently under negotiation with Japan. In addition, a collaboration between F4E (through EUROfusion) is on-going with QST (i.e. the Japanese Implementing Agency) for the preparation of the research plan and the BA Phase II joint exploitation phase of the device.
The total commitment for the EU corresponding to the STP (JT-60SA) amounts to 236,413 BAUA. At present date (April 2019) the credit awarded to EU is 225,600 BAUA. The remaining credits to be earned amount to 10,813 BAUA (from now until March 2020).

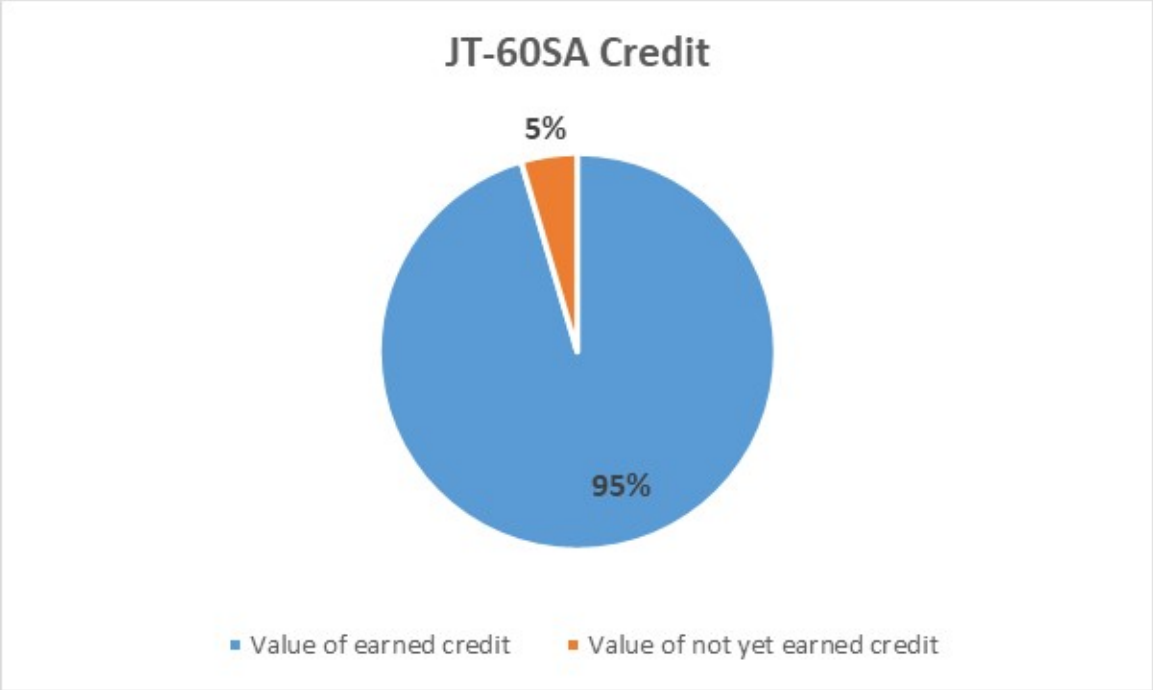

Figure 2. JT-60SA: percentage of earned/not yet earned credits (Status April 2019)

[4] The Project Plans for the BA Phase II (from April 2020) for all three projects were approved ad referendum as a working basis for further consideration, and subject to follow-up political decision by both Parties by the Broader Approach Steering Committee on 11th April 2019.

[5] The Procurement Arrangement for the Supply of the Displacement and Stresses Monitoring System for the JT-60SA TF coils amounting to 10BAUA is in the signature process and the related contract is to be placed within Q3 2019.

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 2020 approved by the BA Steering Committee in April 2017. 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 2020.
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.

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 2020.
The global total commitment for the EU corresponding to the IFMIF/EVEDA amounts to 147,825 BAUA. At present date (April 2019) the credit awarded to EU is 133,058 BAUA. The remaining credits to be earned amount to 14,767 BAUA (from now till March 2020).

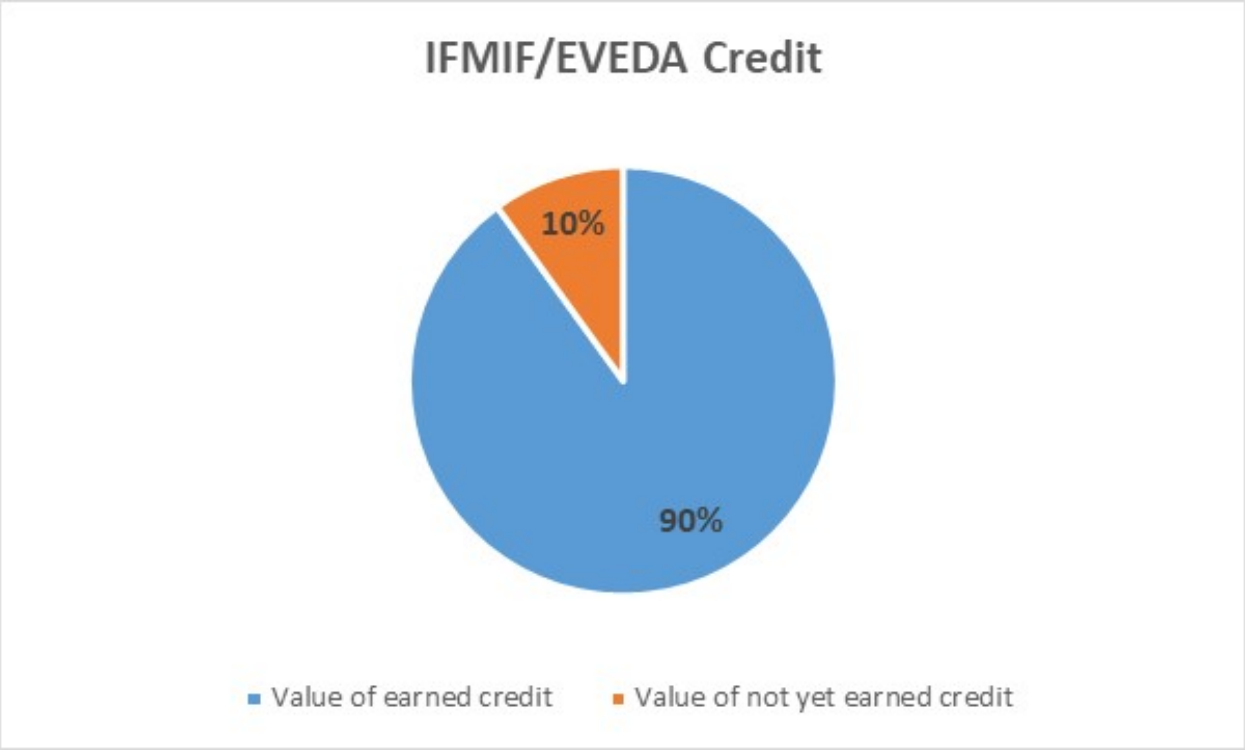

Figure 3 . IFMIF/EVEDA: percentage of earned/not yet earned credits (Status April 2019)

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)

EUROfusion acts as a Voluntary Contributor in performing DEMO Design Activities. 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 DEMO R&D activities focus 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; activities currently continue with under the DEMO Design umbrella, with EUROfusion acting as Voluntary Contributor.
It should also be noted that the scope of work on DEMO design and R&D in the BA is defined for the extension of the Programme until 2020. F4E currently negotiates the following phase (BA Phase II) with the relevant stakeholders.

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 continues using domestic supercomputers.

The Remote Experimentation Centre in Rokkasho aims to facilitate broad participation of scientists into ITER experiments. Remote experimentation techniques will be tested on existing machines, such as JT60-SA, JET and WEST. Most of the contribution to REC is provided by F4E.

The total commitment for the EU corresponding to the IFERC amounts to 115,750 BAUA. At present date (April 2019) the credit awarded to EU is 114,835 BAUA. The remaining credits to be earned amount to 915 BAUA (from now till March 2020).

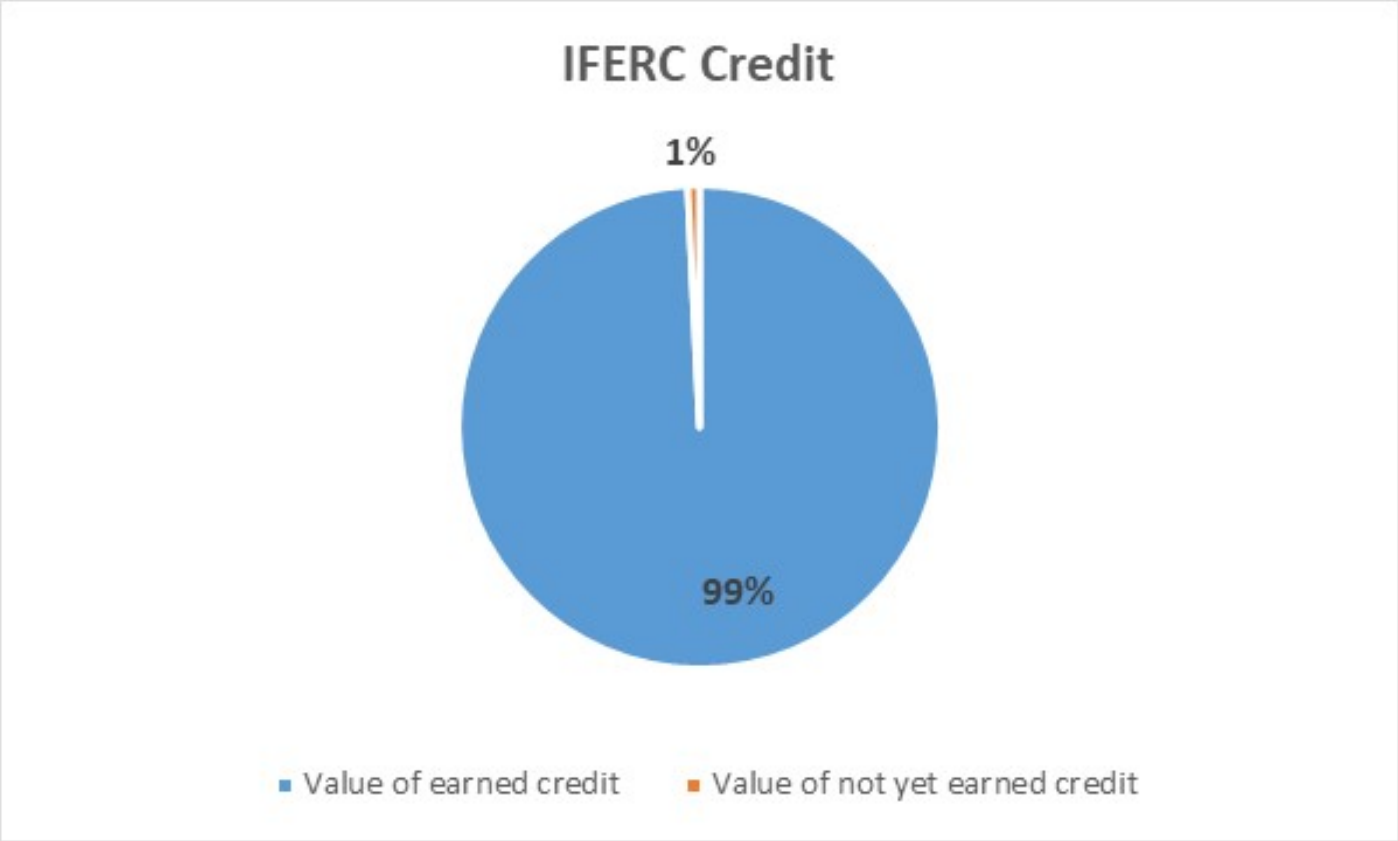

Figure 4 . IFERC: percentage of earned/not yet credits (Status April 2019)

Objectives and KPIs

Technical Objectives for the ITER Project

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 IC/GB 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 IC/GB 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. workprogramme) activities, F4E is tracking in the Workprogramme some selected existing technical 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.
The 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	Action	Milestone	Type of Milestone	Agreed Quarter	Forecast Date of Achievement	PA	PA Deliverable
GB00/IC02	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
GB01/IC04	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
GB02/IC05	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
GB03/IC09	11-Buildings Infrastructure and Power Supplies	Installation of WDS tanks in Tritium building	IC	Q2 2016	Achieved	6.2.P2.EU.05	Building Construction
GB04/IC13	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
GB05/IC14	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
GB06/IC19	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
GB07/IC21	11-Buildings Infrastructure and Power Supplies	Completion of RFE 1A (Assembly Hall)	IC	Q2 2017	Achieved	6.2.P2.EU.05	Building Construction
GB08/IC24	11-Buildings Infrastructure and Power Supplies	Tokamak Concrete crown civil works achieved	IC	Q3 2018	Achieved	6.2.P2.EU.05	Building Construction
GB09/IC25	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
GB10/IC30	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
GB11/IC33	11-Buildings Infrastructure and Power Supplies	First limited access to Tokamak pit for installation without large crane availability (RFE 1B stage 1)	IC	Q4 2018	Achieved	6.2.P2.EU.05	Building Construction
GB12/IC42	1-Magnets	PF Coil: EU PF 5 coil ready for cold test	IC	Q1 2020	19/03/2020	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)

GB13/IC50	11-Buildings Infrastructure and Power Supplies	Limited crane access between Assembly Hall and Tokamak Building (RFE 1B stage 2)	IC	Q1 2020	31/03/2020	6.2.P2.EU.05	Building Construction
GB14/IC54	1-Magnets	PF Coil: Manufacturing complete for EU PF 6 Coil and delivery to site	IC	Q2 2020	26/06/2020	1.1.P3A-B.EU.01	5 Poloidal Field (PF) coils (PF2-PF6)
GB15/IC53	1-Magnets	TF Coil: Complete FAT for PA work scope for First EU TF Coil	IC	Q1 2020	13/02/2020	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
GB16/IC58	2- Vacuum Vessel	First EU Vacuum Vessel Sector fabrication complete and delivered to IO site	IC	Q4 2020	29/07/2020	1.5.P1A.EU.01	Vacuum Vessel: 5 sectors
GB17/IC55[6]	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
GB18/IC76	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	20/12/2019	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	30/06/2020	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	20/04/2020	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	14/12/2021	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
GB24/IC64	11-Buildings Infrastructure and Power Supplies	Medium Voltage distribution LC1A Ready for Equipment	IC	Q4 2022	18/07/2023	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	11/08/2021	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	18/07/2023	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

[6] Milestone removed following ITER Council decision.

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	07/09/2023	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	02/01/2024	5.3.P6.EU.01	NB Power Supply
GB31[7]	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	17/02/2022	2.3.P3.EU.01	15 Cask and Plug RH systems
GB33[8]	6-Cryoplant & Fuel Cycle	Delivery of Torus & Cryostat Cryopumps by EU-DA to ITER Site	GB	Q3 2022	01/03/2023	3.1.P1.EU.03	Cryopumps: 6 Torus and 2 Cryostat Cryopumps
GB34	11-Buildings Infrastructure and Power Supplies	Control Building (71) RFE (RFE #14)	GB	Q4 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	29/03/2023	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[9]	4-Divertor	Completion of Stage I of the series production of Divertor Cassette Bodies.	GB	Q2 2023	10/12/2024	1.7.P1.EU.01	54 Divertor cassette bodies
GB39	9-Diagnostics	Electronics and Software for Magnetics Delivered to ITER Site	GB	Q3 2023	20/02/2023	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	01/08/2023	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	13/10/2023	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	18/08/2023	2.3.P5.EU.01	1 Neutral Beam RH system.

[7] Removed following agreement with IO on ICRH activities.

[8] Milestone pending redefinition to be approved by GB in July 2019

[9] Milestone pending redefinition to be approved by GB in July 2019

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	15/10/2021	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	06/05/2024	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	16/09/2024	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	06/03/2024	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 2026	11/11/2025	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	28/10/2026	3.1.P1.EU.04	Cryopumps for the Neutral Beam system (ITER and MITICA)
GB51/IC43	11-Buildings Infrastructure and Power Supplies	Assembly building complete	IC	Q4 2018	07/11/2019	6.2.P2.EU.05	Building Construction
GB53/IC66	11-Buildings Infrastructure and Power Supplies	Tokamak building construction complete	IC	Q3 2022	25/08/2022	6.2.P2.EU.05	Building Construction
GB54/IC67	1-Magnets	TF Coils: Complete FAT for PA work scope for 18 TF Coils	IC	Q4 2021	15/06/2022	1.1.P1A.EU.01	10 Toroidal Field (TF) Magnet Windings
GB55/IC32	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) Delivered to ITER Site by EU-DA	GB	Q1 2020	17/01/2020	5.2.P4.EU.01	67% EC High Voltage Power Supplies
GB57/IC90.1	11-Buildings Infrastructure and Power Supplies	Cryoline Bridge available for installation of systems	IC	Q2 2022	09/06/2022	6.2.P2.EU.05	Building Construction
GB58/IC91.1	11-Buildings Infrastructure and Power Supplies	Busbar Bridge available for installation of systems	IC	Q4 2022	21/02/2023	6.2.P2.EU.05	Building Construction

Table 4 . Technical objectives of the ITER project (IC-GB milestones) (as of 31st March 2019).

Technical 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 TBM shall replace one of the two Helium-cooled TBM concepts;
ii) joint co-operation by F4E and EUROfusion, both coordinating their activities and resources within a single project team.

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 procurement of WCLL and HCPB ancillary systems	Q2 2026
TBM07	10-Test Blanket Module	Signature of procurement of WCLL TBM and HCPB TBM	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 to ITER site	Q3 2029

Table 5 . Technical objectives of the TBM project

Technical Objectives for the Broader Approach and DEMO

The technical objective for the European part of the BA projects, 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.

Related PA (BA)	Description	Baseline[10] 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	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	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	0.345
STP-EU-RWMPS	Transport and delivery on Site of the RWMPSs	Mar-20	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	1.119
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Delivery on Site	Jul-19	0.746
STP-EU-ECRHPS	Implementation of the procurement of the ECRH Power Supplies – Acceptance Tests on Site and transfer of ownership	Jan-20	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

Table 6 . Technical objectives JT-60SA

[10] 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	Credit Allocation (kBAUA)
IFMIF-EU-PA-04	SRF Linac with its Delivery Report at BA site in Rokkasho	Feb-20	1.220
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	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	3.670
IFMIF-EU-PA-10-B+	Phase B+: Completion of commissioning @ 5 MeV high duty cycle full LIPAc with drift line	Mar-20	6.720
IFMIF-EU-PA-12	Cryoplant Installation and Acceptance Test Report at Rokkasho BA Site	Sep-17 Achieved	1.870

Table 7. Technical objectives IFMIF/EVEDA

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	0.610
(Remote Exper. Centre) RECPA01-EU	Delivery of software codes and reports on remote participation tests	Feb-20	0.225

Table 8 . Technical objectives IFERC

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

Non-Technical Objectives

In addition to the technical objectives, some non-technical ones have also been defined and are constantly monitored by F4E and they are reported upon.
The table 9 below provide a list of these objectives.

AREA	OBJECTIVE
Overall Costs	- Cost estimation until 2035 should be less than total budget assumed to be available until 2035
Annual budget	- Implementation of Annual budget achieved [100%]
Annual payment	- Implementation of payment fully achieved. [100%]
WP objectives	- Implementation of Work Programme Objectives [100%]
Quality	- To reduce the number of Long Non Conformity Report (NCRs) compared to the previous year. IO defines Individual Long aging NCRs as the ones open for more than 12 months.
Human Resources	- Vacancy rate should be less than 4%

Table 9 . F4E Non-technical Objectives

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

Technical KPI

The KPI for the technical milestone is the variance, i.e. the comparison of the forecast milestone date with the last day of the agreed target quarter. If the agreed target quarter for a milestone is e.g. Q1 2020, then the KPI is the number of days before 31 March 2020.
KPIs 1 to 6 are reported in the F4E Dashboard.

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

Equation 1: Variance

Other KPI:

$$\frac{\text{Achieved Credit [Euros 2008]}}{\text{Baseline Credit to date [Euros 2008]}}$$

Equation 2: Schedule Performance Index (SPI)

$$\frac{\text{Achieved Credit [Euros 2008]}}{\text{Payments to date [Euros 2008]}}$$

Equation 3: Cost Performance Index (CPI)

$$\frac{\text{Project Budget assigned to all cost centres}}{\text{EAC of all cost centres}}$$

Equation 4: EAC Vs Project 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 5: Annual commitment

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

Equation 6: Annual payment

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

Equation 7: Quality

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

Equation 8: Vacancy rate

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

Equation 9: Turnover rate

$$\frac{\text{Cumulative number of days of sick leave of all active staff member}}{\text{Total number of active staff member * number of days in the month}}$$

Equation 10: Absenteeism rate

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

Technical KPI

- Variance (IC-GB Milestones)

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

Other KPI:

- Schedule Performance Index (SPI)

Green	SPI ≥ 1.0
Amber	1.0 > SPI ≥ 0.80 (or Project Manager has flagged KPI as being at risk)
Red	SPI < 0.80

- EAC Vs Project Budget

Green	KPI ≥ 1.0
Amber	1.0 > KPI ≥ 0.95 AND (EAC-Project Budget) ≤ €5M (or Project Manager has flagged KPI as being at risk)
Red	KPI < 0.95 OR (EAC-Project Budget) > €5M

- Annual Commitment (overall at F4E Level)

Green	0.9 ≤ KPI ≤ 1.0
Amber	0.75 ≤ KPI < 0.9
Red	KPI <0.75

- Annual Payment (overall at F4E Level)

Green	0.95 ≤ KPI ≤ 1.0
Amber	0.85 ≤ KPI < 0.95
Red	KPI <0.85

- Quality (Open NCRs)

Green	KPI ≤0.1
Amber	KPI >0.1 and KPI <0.4
Red	KPI ≥ 0.4

- Vacancy rate

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

F4E Organization Chart (as of May 2019)

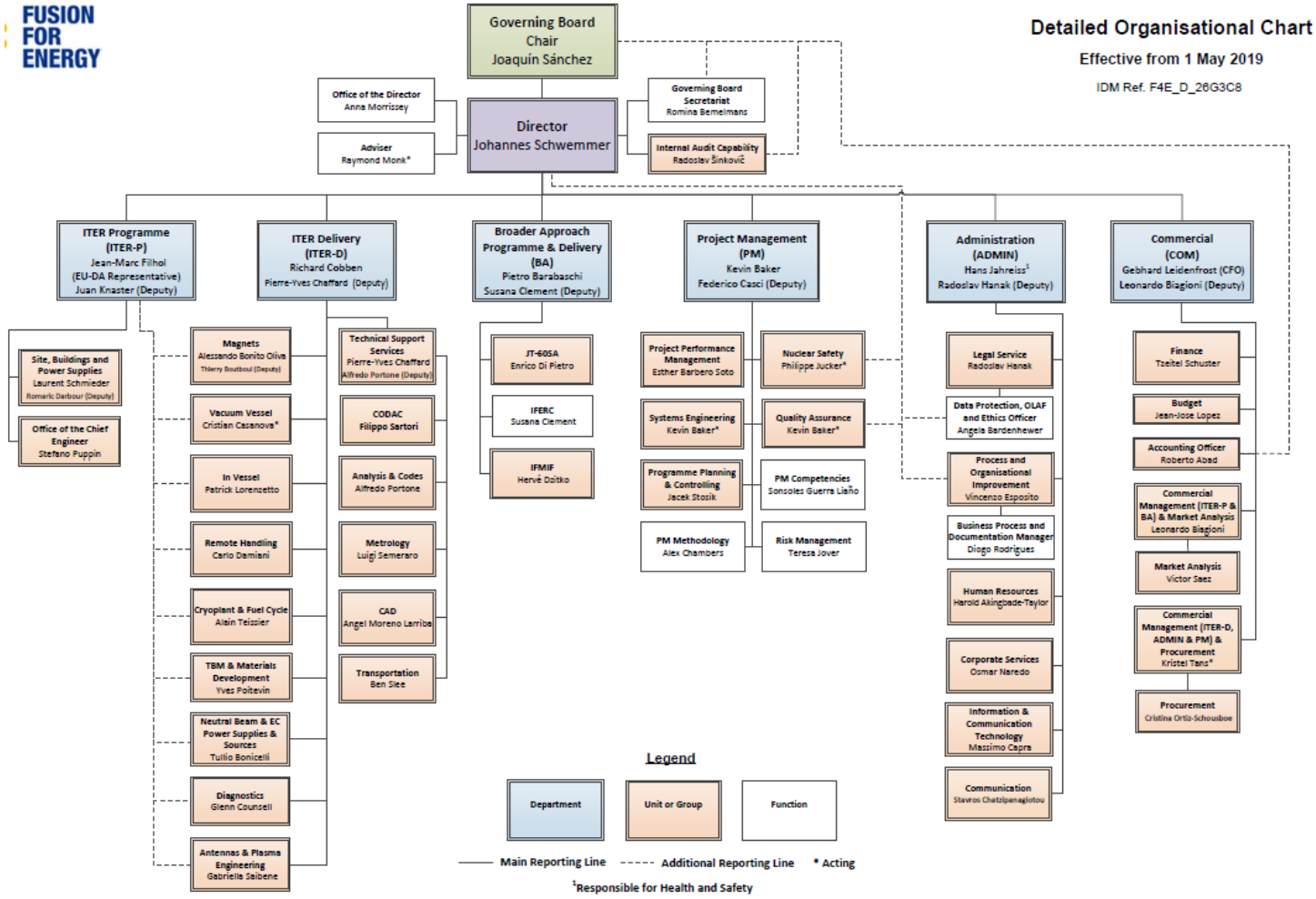

Figure 5 . Organization Chart (2019)

Risk and Opportunity 2020-2024

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.

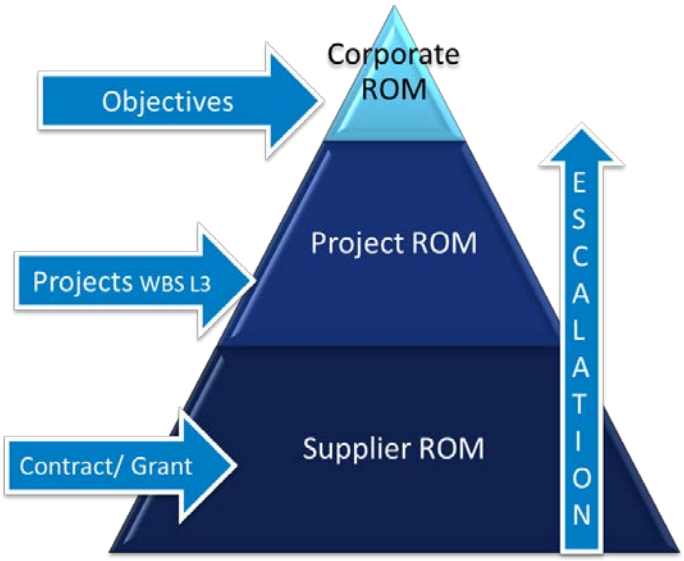

Figure 6 . F4E Risk Management levels

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 2019 update is shown in the following table 10. 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 2019					End of September 2018	TREND May 2018 April 2019	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	=	Update action plan, pending agreement on need dates for not critical systems to reevaluate
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	=	Update action plan, pending agreement on need dates for not critical systems to reevaluate
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
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
EU.CO-CR-032	Supplier not able to deliver or to comply with obligations (schedule/cost/scope/QA)	Low (<10% - <=30%) (2)	High (6m - 1y) (4)	Very High (>100M€) (5)	50	50	25	↑	Probability increased from 5% to 15%
EU.CO-CR-053	Requirements not properly propagated	Low (<10% - <=30%) (2)	Medium (3m - 6m) (3)	Very High (>100M€) (5)	50	50	100	↓	Decrease in the probability from 65% to 30% due to implementation of requirements management and DOORS
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)	48	48	48	=	No changes

Table 10 . 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)

Table 11 . 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 2020 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.

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.

Table 12 . Threats and mitigation action associated to Work Programme 2020

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.

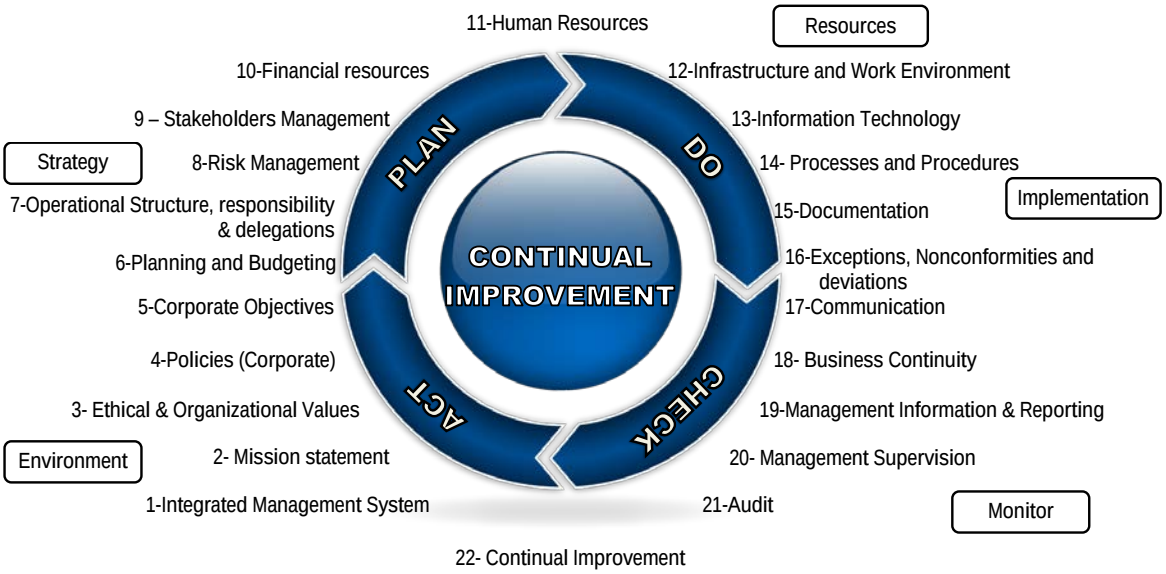

Figure 7 . F4E Integrated Management System (IMS)

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 corrective actions, arising from nonconformities, or preventive actions, arising from comments. The reports of quality audits are one of the main inputs of the quality improvement.

Quality Target

During 2017, 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 2020 is to reduce the number of NCRs open for longer than 12 months to less than 10% 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.

Table 13 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 2019 (kIUA)**	**Achieved Credit (kIUA)**	**Released Credit (kIUA)**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025+**
		473.68373	**429.65728**	**384.44499**	**65.8004704**	**111.02564**	**96.276808**	**92.673126**	**52.422618**	**42.288294**	**238.47869**
Magnets	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	38.8	38.8	19.40000	7.654	18.862	14.216	10.208	0	0	0
	PA 1.1.P2A.EU.01 Pre Compression Rings	0	0	0.00000	0.3	0.3	0	0	0	0	0
	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	8.22	6.97	6.22000	6.25	11.25	5	5.995	5.395	0	0
	PA 1.1.P6A.EU.01 Toroidal Field Conductors	43.39	43.39	43.39000	0	0	0	0	0	0	0
	PA 1.1.P6C.EU.01 Poloidal Field Conductors	11.22880977	11.22880977	11.22881	0	0	0	0	0	0	0
Vacuum Vessel	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	48.64	38.172	37.15000	15.598	24.614	11.176	0	0	0	0
In Vessel-Blanket	PA 1.5.P1A.EU.02 Blanket Manifolds	0	0	0.00000	0.2	0.2	0	0	0	1.4	2.722
	PA 1.6.P1A.EU.01 Blanket First Wall	0.075	0.05	0.00000	0.025	0.025	0.1	0.5	0.5	8.4	30.73
In Vessel-Divertor	PA 1.7.P1.EU.01 Cassette Body	0.53	0.53	0.53000	0	0.03	0	0.09	0.83	1.14	3.42
	PA 1.7.P2B.EU.01 Inner Vertical Target	2.39	2.39	1.66000	0	0.725	0	0.025	0.025	0.78	15.675

	PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails	0	0	0.00000	0	0.2	0.4	0.2	0.5	0	1.08
Remote Handling	PA 2.3.P2.EU.01 Divertor Remote Handling System	1.4	0.8	0.00000	0.4	0	0.6	0.8	0	1.92	5.1
	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.3	0.3	0.00000	0	0.5	1	2	3	1.7	8.11337
	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.3	0.1	0.00000	0	0.36	0.55973999	0.77	0.92	0.9	2.63
	PA 5.7.P1.EU.01 In-Vessel Viewing System	1.2	0.8	0.80000	0.4	1.28	0.3	1.6	0.7	0.7	1.02
Cryoplant and Fuel Cycle	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	0	0	0.00000	0	1	0	2.5	1.322	0	0
	PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.18	0.18	0.18000	0	0	1.02	0	0	0	2.464
	PA 3.1.P1.EU.01 Warm Regeneration Lines	0.06	0.06	0.02000	0.14	0	0	0	0	0	0
	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.0766	0.0766	0.07660	0	0.15319	0.0766	0.30560001	0	0	0.15319
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0	0	0.00000	0	0	0.7	0.7	1.3	0	0
	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II)	0	0	0.00000	0	0	0.2	0.2	0	0	0
	Leak Detection and Localization System Common Activities	0	0	0.00000	0	0	0	0	1.3	0	0
	PA 3.2.P3.EU.01 Isotope Separation System	0	0	0.00000	0	0	0.456	0.5	0	0.63806	3.6
	PA 3.2.P5.EU.01 Water Detritiation System - Tanks	3.252	3.252	3.11200	0	0	0	0	0	0	0
	PA 3.2.P5.EU.02 Water Detritiation System - Main System	0	0	0.00000	0	0	0	0	0.531	0	0.90007999
	PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	22.98293982	22.98293982	22.98294	1.29316003	1.0475	0	1.0475	0	0	0
	PA 6.4.P1.EU.01 for Design of REMS	0	0	0.00000	0	0	0	0.06	0.72	0.105	3.315

	PA 6.3.P1.EU.01 Type A Radwaste Treatment and Storage System	0	0	0.00000	0	0	0	0	0	5.05	5.05
Antenna and Plasma Engineering	PA 5.1.P1.EU.01 Ion Cyclotron Antenna	0	0	0.00000	0	0	0	0	0	0.44	14.29
	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0	0	0.00000	0	0.1241	0.37229999	0	0	0	10.7856
	PA 5.2.P1B.EU.01 Electron Cyclotron Control System	1	0.5	0.50000	0	0.5	0	0	0	0	0.4
Neutral Beam and EC Power Supplies and Sources	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	0	0	0.00000	0	0	0	0.39910999	1.193	1.193	5.17
	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	3.556	3.556	3.55600	0.987	3.948	1.974	1.163	0	0	0
	PA 5.3.P1.EU.01 Neutral Beam Assembly and Testing	0	0	0.00000	0	0	0	0	0	0	3.8
	PA 5.3.P2.EU.01 Heating Neutral Beam Beam Source	0	0	0.00000	0	0	0	0	0	0.38929999	3.50370006
	PA 5.3.P3.EU.01 Heating Neutral Beam Beamline Components	0	0	0.00000	0	0	0	0	0	0.39	3.51
	PA 5.3.P4A.EU.01 Heating Neutral Beam Drift Duct + NB Vessel + Absolute Valve	0	0	0.00000	0	0.595	0.2	0	1.2	0.6	9.30499988
	PA 5.3.P5.EU.01 Heating Neutral Beam Active Correction Coils	0	0	0.00000	0	0	0	0.44	0.44	0	3.52000003
	PA 5.3.P6.EU Neutral Beam Power Supply	13.41	11.11	10.91000	3.05	1.75	4.8	0.6	3.3	0.95	4.97571001
	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	14.9	13.69	7.31000	3.08	1.46	0	1.45	2.72	3.4	0
Diagnostics	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics	0.50962	0.41962	0.02491	0.26835	0.14965	0.59624	0	0.4	0.11882	0.14023
	PA 5.5.P1.EU.03 Diagnostics - Bolometers	0	0	0.00000	0	0	0.39179001	0.50281	0.34647999	0.27941001	1.42957999
	PA 5.5.P1.EU.05 Diagnostics - Plasma Position Reflectometry	0	0	0.00000	0.09503	0	0.09503	0.3326	0	0.31676	0.7444
	PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0	0	0.00000	0	0.19159	0.19159	0	0.19159	0	0.38321
	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00043972	0.00020612	0.00000	0	0.00074752	0.00017864	0.00033529	0.0003875	0.00046445	0.00042872

	PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0	0	0.00000	0.13769	0	0.13769	0.07868	0	0	1.61301
	PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0	0	0.00000	0	0	0	0	0.88840002	0.53303998	2.13216998
	PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0	0	0.00000	0.17217999	0.17217999	0	0.17217999	0.60836002	0.02296	0
	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0	0	0.00000	0	0.11264	0.38621001	0	0.42716001	0.25783001	2.15921003
	PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0	0	0.00000	0.11724	0.11724	0.23448	0.70344	0.46895	0.43965	1.28963003
	PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	0	0	0.00000	0	1.38680998	0.81169999	0.57510999	0	0	5.89384997
Site and Buildings and Power Supplies	COMMON	52.50669007	51.52365009	44.54060	2.85	3.425	5.225	4.7	0	4	9.25543995
	TOKAMAK COMPLEX	45.73273387	42.68374367	40.39142	9.68334039	14.00614889	12.86261987	45.79783062	3.659	2.724	16.05237964
	AUX BUILDINGS TB03/TB04	65.4236391	55.08915912	55.08916	8.62947998	7.235	6.65	0	0	0	0
	AUX BUILDINGS D&B TB05	15.15	14.3	12.87000	0.85	0	0	0	0	0	0
	AUX BUILDINGS D&B TB06	6.81071001	4.2	0.00000	3.28	3.47284004	0	0	0	0	0
	AUX BUILDINGS D&B TB07	6.3742002	6.0342002	6.03420	0.34	0	0.03	0	0	0	0
	AUX BUILDINGS TB09/TB10	0	0	0.00000	0	0	0	0	0	0	42.4625
	AUX BUILDINGS D&B TB12	0	0	0.00000	0	0	4.19562012	4.49207007	10.39829001	1.4	0
	AUX BUILDINGS D&B TB13	0	0	0.00000	0	0	0	0.912	6.698	0	0
	LOAD CENTERS	7.916	0	0.00000	0	10.932	1.953	0	1.8	0	0
	INTERCONNECTING ACTIVITIES	0.72834998	0.72834998	0.72835	0	0	19.36501953	2.85285992	0	0	0
	AUX BUILDINGS D&B TB17	0	0	0.00000	0	0	0	0	0	0	9.69
	COMMON CONTRACTUAL ACTIVITIES	42.79	41.89	41.89000	0	0.9	0	0	0.64	2.1	0
	PA 6.2.P2.EU.06 Headquarters Building	13.85	13.85	13.85000	0	0	0	0	0	0	0

Table 13. Credits per PA

Table 14 European Obligation to ITER project[11]

Procurement Package			Package Total (kIUA)	Funding Source	IC-22 Value kIUA	Notes
1.1 Magnets	P1A	Toroidal Field Magnet Windings	89.74000	EU	89.74000	
	P1B	Toroidal Field Magnet Windings	86.38600	EU-JA	7.73620	
				JA	78.64980	
	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	53.47490	US	49.84000	
				IO	3.63490	(3)
	P5A	Feeders	31.98556	CN	31.98556	
	P5B	Feeder Sensors	34.16925	IO	34.16925	
	P5C	Magnets and feeders workshop	13.14060	IO	13.14060	
	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	
	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		118.50911	EU	89.56000	

[11] IC-23/05.2 (MAC-26) Proposal for the Update of the Overall Project Cost – November 2018

		Vacuum Vessel - Main Vessel, Vacuum Vessel - Blanket Manifolds & Hydraulic Connectors, and Vacuum Vessel		KO	25.20000	
				IO	3.74911	(3)
	P1B	In-Wall Shielding (VV-IWS) Block Assemblies - Divertor Pipe Enclosures	38.14396	IN	37.50791	
				IO	0.63605	
	P2A	Equatorial and Lower Ports	55.30949	KO	55.30949	
	P2B	Upper Ports	20.24241	RF	20.24241	
	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	965.62717	IO	965.62717	(3)
	P2A	Machine Assembly Tooling 3-11	18.53300	KO	18.53300	
	P2B	Assembly Tooling 1-2, 12-13	4.92287	IO	4.92287	(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	73.23222	
		Cryostat Rectangular Bellows		IO	3.02853	
	P1B	Vacuum Vessel Pressure Suppression System	8.86366	IN	8.78812	
				IO	0.07554	
	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	0.64118	IO	0.64118	(3)
	P2A	Heat Rejection System (HRS) & Comp Cooling Water System	50.59206	IN	50.59206	
	P2B	Heat Rejection & Comp Cooling Water: Engineering, On-Site	0.87110	IO	0.87110	(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)

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	4.40000	EU	4.40000	
				IO	0.00000	(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	19.40029	IO	19.40029	
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 & Distribution System	P1A-8B	SSEN & PPEN Design	6.93810	EU	6.93810	
	P1B	Pulsed Power Electrical Network (PPEN)	21.89000	CN	21.89000	
	P2	AC/DC Convertors and RPC-HF	122.61342	CN	77.03471	

				KO	45.57871	
	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	20.00000	EU	5.00000	
				US	15.00000	
	P9	Cable Procurement	30.29109	IO	30.29109	
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	14.24457	US	12.69906	
				IO	1.54551	(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	11.83790	EU	10.65795	
				EU-JA	0.00000	
				IO	1.17995	(2)
	P5	NB Active Correction and Compensation Coils	4.38821	EU	4.16428	
				IO	0.22393	(2)
	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	0.87775	IO	0.87775	
	P11	Temporary Items from Four-Staged Approach	0.88267	IO	0.88267	
	P12	Component Qualification	1.06289	IO	1.06289	
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	506.59051	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	349.06661	
	P2/06	Office Building		EU	13.85000	
	P2	Buildings		IO	37.89900	
6.3 Waste	P1	Waste Treatment Storage (Type A Radwaste System)	36.49575	EU	10.05610	
	P2	Waste Treatment Storage		IO	23.74373	
	P3	Tokamak Assembly Preparation Building		IO	2.69592	(2)
6.4 Radiological	P1	Radiological Protection	4.20000	EU	4.20000	
6.9 Access Control	P1	Access Control and Security Systems	11.39853	IO	11.39853	
				In-Kind PA (a)	**2,892.57276**	
		Transfers from the Reserve Fund to In-Kind (b)			**3.00380**	
				IO Fund (c)	**1,807.75925**	
		Transfers from the Reserve Fund to IO Fund for IO and DAs (d)			**94.82211**	
				TBM (e)	**50.36541**	
		Total Direct Capital Cost (a + b + c + d + e)			**4,854.52333**	

Table 14. 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	0.000	
EU Contribution to assembly	1.572	1.572	23/03/2018
Satellite Project (Total)	**236.413**	**236.403**	
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)	6.110	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)	1.590	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)	1.810	1.810	15/12/2010
IFMIF/EVEDA (Total)	**147.825**	**147.325**	
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)	0.975	0.975	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)	**115.750**	**115.750**	

Table 15 . PAs, cash contributions, secondment agreements for Broader Approach

List of Figures

List of Tables

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 Programmes and a detailed Payment Forecast.

The information below is based on the general assumptions introduced in the Annual and Multiannual Programme 2020-2024 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	after 2021
Operational Expenditure (Title III) linked to the delivery of in-kind contributions	2.6%	2%
Cash Contribution (IO, Japan, NBTF, BA etc.)	2%	2%
Administrative expenditure (Title I and II)	2%	2%
Appropriations from ITER Organization (Reserve Fund and Undistributed Budget)	2%	2%

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 F4E planned needs, as laid down in the Legislative Financial statement attached to Commission Proposal (2018) 445 from 7 June 2018[1].

The figures for the Cash Contribution until 2020 are the latest available at ITER Council 24[2].

[1] Legislative financial statement to 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] IC 24 on 19-20 June 2019

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. Revenue from ITER Organization (Reserve Fund and Undistributed Budget) and from recoveries.
2.5. Utilisation of unused commitment appropriations

2.1. EURATOM contribution (European Union)

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.

2.2. ITER Host State Contribution (IHS) France

The contribution from the ITER Host State constitutes the second biggest 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 (excluding the expenditure related to Administration, Broader Approach, Test Blanket Modules and Transportation).[4]

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

In Commitment Appropriations Current value (EUR)	<2007 ITER Construction	2007- 2020 ITER Construction	2021- 2024 ITER Construction	*TOTAL*
Total F4E budget	42 129 070	7 593 615 486	4 428 612 000	**12 064 356 555**
Of which scope for IHS contribution	42 129 070	6 880 732 215	3 850 730 768	**10 773 592 052**
IHS contribution	**1 484 200**	**1 376 146 443**	**770 100 000**	**2 147 730 643**
Ratio IHS/IHS Scope	3.52%	20.00%	20.00%	**19.94%**

In Commitment Appropriations Constant 2008 value (EUR)*	TOTAL <2007	TOTAL 2007- 2020	*TOTAL*
Total F4E budget	43 912 668	6 524 076 104	**6 567 988 772**
Of which scope for IHS contribution	43 912 668	5 911 142 846	**5 955 055 514**
IHS contribution	**1 556 614**	**1 173 245 859**	**1 174 802 472**
Ratio IHS/IHS Scope	3.54%	19.85%	**19.73%**

*calculations in 2008 value applies until 2020 only

[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).

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 exact total amount for the period 2007-2020 and the calculation method for the French contribution beyond 2020 are updated according to the budget implementation of the previous year.

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 possible adjustment of this contribution will be submitted again the Governing Board via an amendment to the 2020 budget.
The tables 15 and 16 provide further details on the annual revenue coming from the IHS contribution (in current value).

2.3. Membership Contributions (F4E Members except EURATOM)

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

The revenue from the ITER Organization (IO) [5] is covering the tasks implemented by F4E at IO request.

- 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 2.4 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 revenue already accounted against the EUR 6.6 billion (2008 value).

5 Art. 6e of F4E Financial Regulation in accordance with art. 4(2) and art. 12 (1e) of the F4E Council Decision and Statutes

2.5. Utilisation of unused commitment appropriations

The F4E Financial Regulation foresees the possibility to make the unused appropriations[6] 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, IO Reserve Fund and IO Undistributed budget).

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:

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 Forecast	B-2020 Forecast	TOTAL
Commitment Appropriation	Cancelled	375.819	282.097	53.535	4.872	25.400	1.553			**743.276**
	Made available again	9.760				96.000	120.007	149.170	368.340	**743.276**
	Total CA still to be made available again	**366.059**	**648.156**	**701.692**	**706.563**	**635.963**	**517.509**	**368.340**	**0.000**	**0.000**

Table 3 Commitments appropriations made available again (current value)

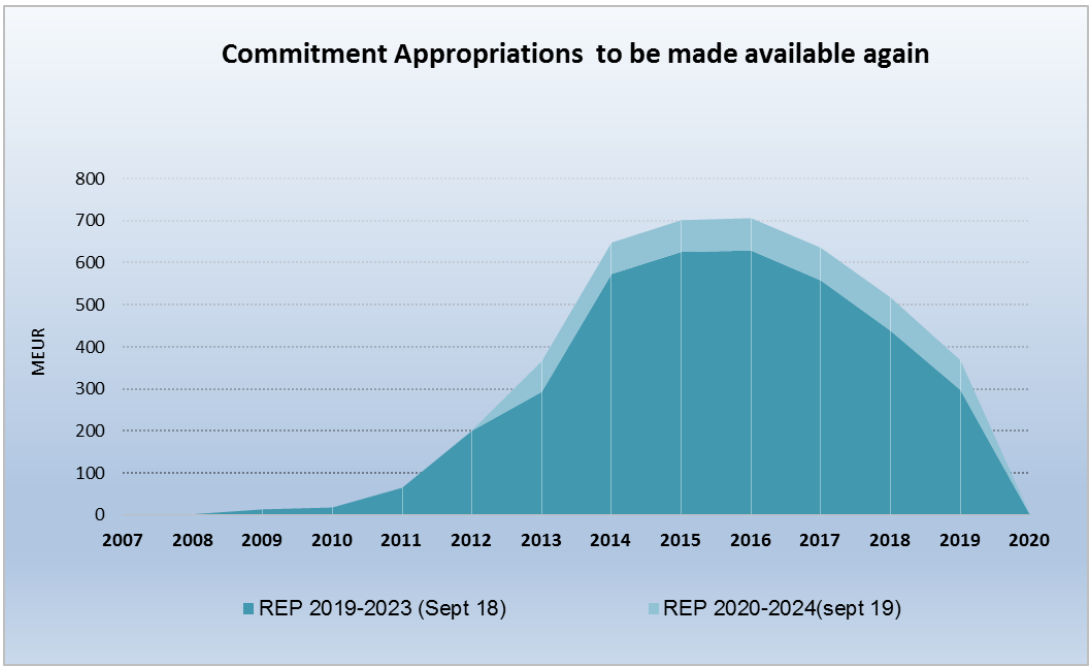

Table 4 Estimated evolution of the cancelled appropriations

The main changes in REP 2020-2024 compared to the profile from the REP 2019-2023[7] are:

- Additional de-commitments amounting to EUR 79.7 million, mainly related to the TB04 Novation contract modifying the scope of the TB04 original contract.
- An increased call to unused appropriations for the 2019 budget (+ EUR 9.2 million);

6 According to the annuality principle of the F4E Financial Regulation, unused appropriations at the end of each year are cancelled, as well as de-committed (cancellation of budgetary commitments).

7 MAP 2019-2023; F4E_D_2BPYUA

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[8];

B. EURATOM contribution to the Broader Approach (BA) activities, in accordance with the BA Agreement with Japan[9];

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.

The forecast for budget 2020 is based on the following main assumptions:

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

- Annual salary adjustment: 2.5% for 2020 as requested by the Commission[10] and 2 % inflation coefficient for the period 2021-2024 based on Brussels as reference with correction for the cost of living in Spain;
- Vacancy rate: 3%;
- Inflation coefficient on other administrative expenditure: 2%.

It shall be noted that the administrative budget is capped to the revenue from EURATOM for administrative expenditure plus the Membership contributions. Further details on the staff plan are given under the Annex for the Human Resources REP.

According to the recommendations of the F4E Assessment Report 2017[11], all administrative and operational costs directly linked to projects should be fully allocated to the relevant project expenditure.

In line with this recommendation, F4E decided from 2018 onwards to allocate the budget for missions for operational purposes to the operational expenditure.

[10] Budget Circular 2020 “Agency instructions” issued by DG BUDG, European Commission
[11] Sixth Annual Assessment of F4E, from 30 November 2017

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

Revenue in Commitment Appropriations

REVENUE	2018	2019			2020			2021		2022		2023		2024	
Commitment appropriations (EUR)	Execution	Budget AM2	Forecast	VAR 2019/18	Budget	Forecast	VAR 2020/19	Planned needs	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23
1 REVENUE FROM FEES AND CHARGES															
2. EU CONTRIBUTION	383 018 862	403 538 332	403 538 332	5.4%	359 455 340	389 455 340	-3.5%	923 081 000	137.0%	756 463 000	-18.1%	1 091 144 000	44.2%	860 024 000	-26.9%
Administrative (Title 1 and 2)	*48 806 981*	*49 517 000*	*49 517 000*	*1.5%*	*52 781 500*	*52 781 500*	*6.6%*	*65 945 000*	*24.9%*	*68 195 000*	*3.4%*	*70 855 000*	*3.9%*	*71 815 000*	*1.3%*
Operational (Title 3)	*333 028 782*	*353 058 200*	*353 058 200*	*6.0%*	*305 609 356*	*335 609 356*	*-4.9%*	*857 136 000*	*155.4%*	*688 268 000*	*-19.7%*	*1 020 289 000*	*48.2%*	*788 209 000*	*-29.4%*
Recovery from previous years administrative	*1 183 099*	*963 132*	*963 132*	*-18.6%*	*1 064 484*	*1 064 484*	*10.5%*								
Recovery from previous years operational															
3 THIRD PARTIES CONTRIBUTION	146 920 000	135 600 000	135 600 000	-7.7%	85 045 115	90 365 115	-33.4%	207 500 000	129.6%	166 300 000	-19.9%	238 900 000	43.7%	185 200 000	-29.0%
ITER Host State contribution	*142 000 000*	*130 000 000*	*130 000 000*	*-8.5%*	*78 945 115*	*84 265 115*	*-35.2%*	*201 000 000*	*138.5%*	*159 500 000*	*-20.6%*	*231 900 000*	*45.4%*	*178 100 000*	*-30.2%*
Membership contribution	*4 920 000*	*5 600 000*	*5 600 000*	*13.8%*	*6 100 000*	*6 100 000*	*8.9%*	*6 500 000*	*6.6%*	*6 800 000*	*4.6%*	*7 000 000*	*2.9%*	*7 100 000*	*1.4%*
4 MISCELLANOUS REVENUE	1 474	1 231 520	1 231 520		771 042	771 042	-								
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	18 941 940	8 471 089	8 471 089	-55.3%											
9 BIS UNUSED APPROPRIATIONS FROM PREVIOUS YEARS - MADE AVAILABLE AGAIN	120 006 781	149 169 582	149 169 582	24.3%	368 339 608	368 339 608	146.9%								
TOTAL REVENUE	668 889 057	698 010 524	698 010 524	4.4%	813 611 104	848 931 104	21.6%	1 130 581 000	33.2%	922 763 000	-18.4%	1 330 044 000	44.1%	1 045 224 000	-27.2%
ADDITIONAL REVENUE	37 341 174	26 681 851	26 681 851	-28.5%	59 812 315	59 812 315	124.2%	29 851 894	-50.1%	17 188 932	-42.4%	17 532 710	2.0%	41 841 589	58.1%
IO Reserve Fund and Undistributed Budget	*13 646 994*	*15 185 767*	*15 185 767*	*11.3%*	*59 812 315*	*59 812 315*	*294%*	*29 851 894*	*-50.1%*	*17 188 932*	*-42.4%*	*17 532 710*	*2.0%*	*41 841 589*	*58.1%*
IO Reserve Fund and Undistributed Budget carried over	*558 147*	*10 814 233*	*10 814 233*	*1838%*											
Recoveries	*22 948 932*	*39 835*	*39 835*	*-100%*											
Recoveries carried over	*187 101*	*642 016*	*642 016*	*243.1%*											
TOTAL REVENUE AVAILABLE	706 230 232	724 692 375	724 692 375	2.6%	873 423 420	908 743 420	25.4%	1 160 432 894	32.9%	939 951 932	-19.0%	1 347 576 710	43.4%	1 087 065 589	-24.0%

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

Table 5 Revenue in Commitment Appropriations for 2018-2024

Revenue in Payment Appropriations

REVENUE Payment appropriations	2018 Execution	2019 Budget AM2	2019 Forecast	2019 VAR 2019/18	2020 Budget	2020 Forecast	2020 VAR 2019/18	2021 Planned needs	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
1 REVENUE FROM FEES AND CHARGES															
2. EU CONTRIBUTION	**659 910 844**	**569 253 761**	**569 253 761**	**-13.7%**	**633 593 734**	**633 593 734**	**11.3%**	**604 400 000**	**-4.6%**	**712 900 000**	**18.0%**	**674 500 000**	**-5.4%**	**686 040 000**	**1.7%**
Administrative (Title 1 and 2)	*48 806 981*	*49 517 000*	*49 517 000*	*1.5%*	*52 781 500*	*52 781 500*	*6.6%*	*65 945 000*	*24.9%*	*68 195 000*	*3.4%*	*70 855 000*	*3.9%*	*71 815 000*	*1.3%*
Operational (Title 3)	*605 222 443*	*502 500 568*	*502 500 568*	*-17.0%*	*579 495 500*	*579 495 500*	*15.3%*	*538 455 000*	*-7.1%*	*644 705 000*	*19.7%*	*603 645 000*	*-6.4%*	*614 225 000*	*1.7%*
Recovery from previous years administrative	*1 183 099*	*963 132*	*963 132*	*-18.6%*	*1 064 484*	*1 064 484*	*10.5%*								
Recovery from previous years operational	*4 698 321*	*16 273 060*	*16 273 060*	*246.4%*	*252 251*	*252 251*	*-98.4%*								
3 THIRD PARTIES CONTRIBUTION	**134 920 000**	**150 600 000**	**150 600 000**	**11.6%**	**156 100 000**	**156 100 000**	**3.7%**	**135 600 000**	**-13.1%**	**162 100 000**	**19.5%**	**150 500 000**	**-7.2%**	**151 000 000**	**0.3%**
Of which ITER Host State contribution	*130 000 000*	*145 000 000*	*145 000 000*	*11.5%*	*150 000 000*	*150 000 000*	*3.4%*	*129 100 000*	*-13.9%*	*155 300 000*	*20.3%*	*143 500 000*	*-7.6%*	*143 900 000*	*0.3%*
Of which Membership contribution	*4 920 000*	*5 600 000*	*5 600 000*	*13.8%*	*6 100 000*	*6 100 000*	*8.9%*	*6 500 000*	*6.6%*	*6 800 000*	*4.6%*	*7 000 000*	*2.9%*	*7 100 000*	*1.4%*
4 MISCELLANOUS REVENUE	**1 474**	**1 231 520**	**1 231 520**												
5 ADMINISTRATIVE OPERATIONS															
6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT															
7 CORRECTION OF BUDGETARY IMBALANCES															
8 INTERESTS GENERATED															
9 UNUSED APPROPRIATIONS FROM PREVIOUS YEARS	**5 615 662**	**2 198 145**	**2 198 145**	**-60.9%**											
TOTAL REVENUE	**800 447 981**	**723 283 426**	**723 283 426**	**-9.6%**	**789 693 734**	**789 693 734**	**9.2%**	**740 000 000**	**-6.3%**	**875 000 000**	**18.2%**	**825 000 000**	**-5.7%**	**837 040 000**	**1.4%**
ADDITIONAL REVENUE	**46 919 008**	**33 694 755**	**33 694 755**	**-28.2%**	**30 000 000**	**30 000 000**	**-11.0%**	**30 000 000**	**0.0%**	**25 000 000**	**-16.7%**	**25 000 000**	**0.0%**	**23 960 000**	**-4.3%**
IO Reserve Fund and Undistributed Budget	*13 148 645*	*9 000 000*	*9 000 000*	*-31.6%*	*30 000 000*	*30 000 000*	*233.3%*	*30 000 000*	*0.0%*	*25 000 000*	*-16.7%*	*25 000 000*	*0.0%*	*23 960 000*	*-4.3%*
IO Reserve Fund and Undistributed Budget carried over	*10 634 329*	*14 311 525*	*14 311 525*	*34.6%*											
Recoveries	*22 948 932*	*39 835*	*39 835*	*-99.8%*											
Recoveries carried over	*187 101*	*10 343 394*	*10 343 394*	*5428%*											
TOTAL REVENUE AVAILABLE	**847 366 988**	**756 978 181**	**756 978 181**	**-10.7%**	**819 693 734**	**819 693 734**	**8.3%**	**770 000 000**	**-6.1%**	**900 000 000**	**16.9%**	**850 000 000**	**-5.6%**	**861 000 000**	**1.3%**

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

Table 6 Revenue in Payment Appropriations for 2018-2024

Expenditure in Commitment Appropriations

EXPENDITURE In Commitment Appropriations (EUR)	2018	2019			2020			2021		2022		2023		2024	
	Execution	Budget AM2	Forecast	VAR 2019/18	Budget	Forecast	VAR 2020/19	Planned needs	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23
Title 1 Staff Expenditure	**49 260 446**	**48 529 720**	**50 736 226**	**3.0%**	**52 007 284**	**54 548 643**	**7.5%**	**56 964 621**	**4.4%**	**59 304 266**	**4.1%**	**61 786 858**	**4.2%**	**62 565 896**	**1.3%**
Salaries & allowances	43 225 512	43 975 332	45 504 916	5.3%	46 887 284	48 689 870	7.0%	50 841 964	4.4%	53 060 856	4.4%	55 420 281	4.4%	56 073 686	1.2%
Establishment plan posts	*32 627 937*	*32 952 832*	*34 577 117*	6.0%	*35 298 784*	*36 803 552*	*6.4%*	*38 410 644*	*4.4%*	*40 122 673*	*4.5%*	*41 887 151*	*4.4%*	*42 470 931*	*1.4%*
External staff	*10 597 575*	*11 022 500*	*10 927 799*	3.1%	*11 588 500*	*11 886 318*	*8.8%*	*12 431 320*	*4.6%*	*12 938 183*	*4.1%*	*13 533 130*	*4.6%*	*13 602 755*	*0.5%*
Expenditure relating to Staff recruitment	644 756	853 000	540 670	-16.1%	891 000	684 150	26.5%	685 030	0.1%	698 731	2.0%	712 705	2.0%	726 959	2.0%
Mission expenses	1 815 000	450 000	890 000	-51%	460 000	910 000	2.2%	928 200	2.0%	946 764	2.0%	965 699	2.0%	985 013	2.0%
Socio-medical infrastructure	420 000	428 000	336 000	-20.0%	343 200	477 000	42.0%	350 000	-26.6%	357 000	2.0%	364 000	2.0%	371 000	1.9%
Training	629 861	665 031	663 000	5.3%	676 000	694 500	4.8%	687 010	-1.1%	700 750	2.0%	714 765	2.0%	729 061	2.0%
External Services															
Receptions, events and representation	10 000	10 000	10 000	0.0%	10 000	10 000	0.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%
Social welfare	52 300	53 500	94 000	79.7%	46 000	94 000	0.0%	47 000	-50.0%	48 000	2.1%	49 000	2.1%	50 000	2.0%
Other Staff related expenditure	2 463 017	2 094 856	2 697 640	9.5%	2 693 800	2 989 123	10.8%	3 415 417	14.3%	3 482 165	2.0%	3 550 408	2.0%	3 620 177	2.0%
Title 2 Infrastructure and operating expenditure	**7 037 952**	**7 555 800**	**7 819 294**	**11.1%**	**7 938 700**	**8 797 341**	**12.5%**	**8 980 379**	**2.1%**	**8 890 734**	**-1.0%**	**9 068 142**	**2.0%**	**9 249 104**	**2.0%**
Rental of buildings and associated costs	1 381 500	1 428 000	1 548 000	12.1%	1 619 000	1 604 240	3.6%	1 460 305	-9.0%	1 489 511	2.0%	1 519 301	2.0%	1 549 687	2.0%
Information, communication technology and data proc.	3 490 813	3 570 400	3 602 400	3.2%	3 642 200	3 770 000	4.7%	3 959 800	5.0%	4 039 600	2.0%	4 119 984	2.0%	4 201 984	2.0%
Movable property and associated costs	157 705	261 000	176 000	11.6%	231 000	449 860	155.6%	458 857	2.0%	198 178	-56.8%	202 142	2.0%	206 184	2.0%
Current administrative expenditure	1 064 450	1 244 000	1 321 394	24.1%	1 410 000	1 572 397	19.0%	1 619 750	3.0%	1 652 145	2.0%	1 685 188	2.0%	1 718 892	2.0%
Postage / Telecommunications	348 335	391 000	402 000	15.4%	358 000	507 810	26.3%	566 155	11.5%	577 478	2.0%	589 028	2.0%	600 808	2.0%
Meeting expenses	358 000	355 400	463 500	29.5%	347 500	586 144	26.5%	609 122	3.9%	621 304	2.0%	633 731	2.0%	646 405	2.0%
Running costs in connection with operational activities															
Information and publishing	15 000	21 000	30 000	100.0%	46 000	40 000	33.3%	47 000	17.5%	48 000	2.1%	49 000	2.1%	50 000	2.0%
Studies															
Other infrastructure and operating expenditure	222 150	285 000	276 000	24.2%	285 000	266 890	-3.3%	259 390	-2.8%	264 518	2.0%	269 768	2.0%	275 144	2.0%
Title 3 Operational expenditure	**637 116 209**	**668 606 855**	**666 136 855**	**4.6%**	**813 477 436**	**845 397 436**	**26.9%**	**1 094 487 894**	**29.5%**	**871 756 932**	**-20.4%**	**1 276 721 710**	**46.5%**	**1 015 250 589**	**-20.5%**
ITER construction including site preparation	453 590 510	481 909 040	479 439 040	5.7%	640 213 357	672 133 357	40.2%	800 161 000	19.0%	631 358 000	-21.1%	925 554 000	46.6%	703 494 000	-24.0%
Technology for ITER and DEMO	8 701 901	2 000 000	2 000 000	-77%	3 110 000	3 110 000	55.5%	6 875 000	121.1%	6 210 000	-10%	14 535 000	134.1%	3 115 000	-78.6%
Technology for Broader Approach	3 572 788	5 000 000	5 000 000	39.9%	17 401 159	17 401 159	248.0%	41 600 000	139.1%	42 500 000	2.2%	43 300 000	1.9%	44 200 000	2.1%
Technology for DONES												28 900 000	-	29 500 000	2.1%
Other Expenditure	6 694 438	15 226 726	15 226 726	127.5%	13 995 491	13 995 491	-8.1%	15 000 000	7.2%	15 000 000	0.0%	15 000 000	0.0%	15 000 000	0.0%
ITER construction- from ITER host state contribution	160 941 940	138 471 089	138 471 089	-14.0%	78 945 115	78 945 115	-43.0%	201 000 000	154.6%	159 500 000	-20.6%	231 900 000	45.4%	178 100 000	-23.2%
IO Reserve Fund and Undistributed Budget	3 614 632	26 000 000	26 000 000	619.3%	59 812 315	59 812 315	130.0%	29 851 894	-50.1%	17 188 932	-42.4%	17 532 710	2.0%	41 841 589	138.6%
TOTAL EXPENDITURE	**693 414 607**	**724 692 375**	**724 692 375**	**4.5%**	**873 423 420**	**908 743 420**	**25.4%**	**1 160 432 894**	**27.7%**	**939 951 932**	**-19.0%**	**1 347 576 710**	**43.4%**	**1 087 065 589**	**-19.3%**

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

Table 7 Expenditure in Commitment Appropriations for 2018-2024

Expenditure in Payment Appropriations

EXPENDITURE In Payment Appropriations (EUR)	2018	2019			2020			2021		2022		2023		2024	
	Execution	Budget AM2	Forecast	VAR 2019/18	Budget	Forecast	VAR 2020/19	Planned needs	VAR 2021/20	Planned needs	VAR 2022/21	Planned needs	VAR 2023/22	Planned needs	VAR 2024/23
Title 1 Staff Expenditure	**48 318 823**	**48 529 720**	**50 736 226**	**5.0%**	**52 007 284**	**54 548 643**	**2.5%**	**56 964 621**	**4.4%**	**59 304 266**	**4.1%**	**61 786 858**	**4.2%**	**62 565 896**	**1.3%**
Salaries & allowances	43 126 900	43 975 332	45 504 916	5.5%	46 887 284	48 689 870	7.0%	50 841 964	4.4%	53 060 856	4.4%	55 420 281	4.4%	56 073 686	1.2%
Establishment plan posts	*32 627 937*	*32 952 832*	*34 577 117*	*6.0%*	*35 298 784*	*36 803 552*	*6.4%*	*38 410 644*	*4.4%*	*40 122 673*	*4.5%*	*41 887 151*	*4.4%*	*42 470 931*	1.4%
External staff	*10 498 963*	*11 022 500*	*10 927 799*	*4.1%*	*11 588 500*	*11 886 318*	*8.8%*	*12 431 320*	*4.6%*	*12 938 183*	*4.1%*	*13 533 130*	*4.6%*	*13 602 755*	0.5%
Expenditure relating to Staff recruitment	645 511	853 000	540 670	-16.2%	891 000	684 150	26.5%	685 030	0.1%	698 731	2.0%	712 705	2.0%	726 959	2.0%
Mission expenses	1 244 751	450 000	890 000	-28%	460 000	910 000	2.2%	928 200	2.0%	946 764	2.0%	965 699	2.0%	985 013	2.0%
Socio-medical infrastructure	420 000	428 000	336 000	-20.0%	343 200	477 000	42.0%	350 000	-26.6%	357 000	2.0%	364 000	2.0%	371 000	1.9%
Training	565 716	665 031	663 000	17.2%	676 000	694 500	4.8%	687 010	-1.1%	700 750	2.0%	714 765	2.0%	729 061	2.0%
External Services															
Receptions, events and representation	3 635	10 000	10 000	175.1%	10 000	10 000	0.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%	10 000	0.0%
Social welfare	52 300	53 500	94 000	79.7%	46 000	94 000	0.0%	47 000	-50.0%	48 000	2.1%	49 000	2.1%	50 000	2.0%
Other Staff related expenditure	2 260 012	2 094 856	2 697 640	19.4%	2 693 800	2 989 123	10.8%	3 415 417	14.3%	3 482 165	2.0%	3 550 408	2.0%	3 620 177	2.0%
Title 2 Infrastructure and operating expenditure	**5 552 161**	**7 555 800**	**7 819 294**	**40.8%**	**7 938 700**	**8 797 341**	**12.5%**	**8 980 379**	**2.1%**	**8 890 734**	**-1.0%**	**9 068 142**	**2.0%**	**9 249 104**	**2.0%**
Rental of buildings and associated costs	1 283 369	1 428 000	1 548 000	20.6%	1 619 000	1 604 240	3.6%	1 460 305	-9.0%	1 489 511	2.0%	1 519 301	2.0%	1 549 687	2.0%
Information, communication technology and data proc.	2 317 625	3 570 400	3 602 400	55.4%	3 642 200	3 770 000	4.7%	3 959 800	5.0%	4 039 600	2.0%	4 119 984	2.0%	4 201 984	2.0%
Movable property and associated costs	155 439	261 000	176 000	13.2%	231 000	449 860	155.6%	458 857	2.0%	198 178	-56.8%	202 142	2.0%	206 184	2.0%
Current administrative expenditure	959 816	1 244 000	1 321 394	37.7%	1 410 000	1 572 397	19.0%	1 619 750	3.0%	1 652 145	2.0%	1 685 188	2.0%	1 718 892	2.0%
Postage / Telecommunications	289 593	391 000	402 000	38.8%	358 000	507 810	26.3%	566 155	11.5%	577 478	2.0%	589 028	2.0%	600 808	2.0%
Meeting expenses	346 189	355 400	463 500	33.9%	347 500	586 144	26.5%	609 122	3.9%	621 304	2.0%	633 731	2.0%	646 405	2.0%
Running costs in connection with operational activities															
Information and publishing	15 000	21 000	30 000	100.0%	46 000	40 000	33.3%	47 000	17.5%	48 000	2.1%	49 000	2.1%	50 000	2.0%
Studies															
Other infrastructure and operating expenditure	185 129	285 000	276 000	49.1%	285 000	266 890	-3.3%	259 390	-2.8%	264 518	2.0%	269 768	2.0%	275 144	2.0%
Title 3 Operational expenditure	**760 115 387**	**700 892 661**	**698 422 661**	**-8.1%**	**759 747 751**	**756 347 751**	**8.3%**	**704 055 000**	**-6.9%**	**831 805 000**	**18.1%**	**779 145 000**	**-6.3%**	**789 185 000**	**1.3%**
ITER construction including site preparation	601 329 468	507 754 058	505 284 058	-16.0%	549 787 751	546 387 751	8.1%	514 355 000	-5.9%	616 505 000	19.9%	564 545 000	-8.4%	565 925 000	0.2%
Technology for ITER and DEMO	7 871 073	4 200 000	4 200 000	-46.6%	4 760 000	4 760 000	13.3%	4 100 000	-13.9%	7 000 000	70.7%	8 200 000	17.1%	6 500 000	-20.7%
Technology for Broader approach	8 147 792	7 400 000	7 400 000	-9.2%	10 200 000	10 200 000	37.8%	11 500 000	12.7%	13 000 000	13.0%	19 100 000	46.9%	24 900 000	30.4%
Technology for DONES												3 800 000	-	9 000 000	136.8%
Other Expenditure	3 977 147	11 028 932	11 028 932	177.3%	15 000 000	15 000 000	36.0%	15 000 000	0.0%	15 000 000	0.0%	15 000 000	0.0%	15 000 000	0.0%
ITER construction- from ITER host state contribution	129 318 457	147 198 145	147 198 145	13.8%	150 000 000	150 000 000	1.9%	129 100 000	-13.9%	155 300 000	20.3%	143 500 000	-7.6%	143 900 000	0.3%
IO Reserve Fund and Undistributed Budget	9 471 449	23 311 525	23 311 525	146.1%	30 000 000	30 000 000	28.7%	30 000 000	0.0%	25 000 000	-16.7%	25 000 000	0.0%	23 960 000	-4.2%
TOTAL EXPENDITURE	**813 986 372**	**756 978 181**	**756 978 181**	**-7.0%**	**819 693 734**	**819 693 734**	**8.3%**	**770 000 000**	**-6.1%**	**900 000 000**	**16.9%**	**850 000 000**	**-5.6%**	**861 000 000**	**1.3%**

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

Table 8 Expenditure in Payment Appropriations for 2018-2024

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	2016	2017	2018
Revenue actually received (+)	724 394 086.29	860 132 786.99	831 182 146.33
Payments made (-)	710 869 498.62	832 636 609.01	810 953 065.56
Carry-over of appropriations (-)	8 843 632.49	16 437 092.48	32 314 863.41
Cancellation of appropriations carried over (+)	1 202 662.37	943 268.23	1 064 674.13
Adjustment for carry over of assigned revenue appropriations from previous year (+)	24 879.81	5 214 390.36	12 338 033.29
Exchange rate differences (+/-)	- 27 076.85	19 448.54	- 190.61
Adjustment for negative balance from previous year (-)			
Total	**5 881 420.51**	**17 236 192.63**	**1 316 734.17**

Table 9 Budget Outturns for the years 2016, 2017 and 2018

The budget outturn is calculated as the total revenue actually cashed 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 2019, this service in-kind amounts to EUR 2.9 million.

5. Content of the Financial Tables

Financial Status

The tables 10 and 11 provide the link between the Resource Estimate Plan and the Annual Accounts.

Table 10 Annual Expenditure in Commitment Appropriations according to the successive Annual Accounts

The figures in Table 10 reflect the series of annual accounts for the past years (execution in ABAC). The first row of the table refers to the final budget, to allow verifying the revenue and expenditure are balanced and showing the percentage of implementation of the budget for each year.

Table 11 Annual Expenditure in Payment Appropriations according to the successive Annual Accounts

The figures in Table 11 reflect the series of annual accounts for the past years (execution in ABAC). The first row of the table refers to the final budget, showing the balance between the revenue and expenditure and the percentage of implementation of the budget per year.

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

The tables 12-16 link the financial status to the project planning.

A. Expenditure

Table 12 Annual expenditure in commitment appropriations (in 2008 value)

The Table 12 shows an expenditure of EUR 6.55 billion for the period 2007-2020, 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).

Table 13 Annual expenditure in commitment appropriations (in current value)
Table 14 Annual Expenditure in Payment Appropriations

The figures are detailed for the link to the annual accounts. The figures 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.

The figures after year 2020 are indicative and based on the legislative financial statement accompanying the Commission proposal (2018) 445 for amending the Council decision on F4E[12],

[12] 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.

subject to the final decision by the EU Budgetary Authority on the Commission Proposals on next MFF 2021-2027.

B. Revenue

Table 15 Revenue in Commitment Appropriations

Table 16 Revenue in Payment Appropriations

Tables 15 and Table 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 are based on the Legislative financial statement accompanying the Commission proposal (2018) 445 for amending the decision on F4E for the IHS contribution, the Membership contributions and the current F4E estimate for the French contribution.

Table 10 Annual Expenditure in Commitment Appropriations (According to the successive annual accounts)

Current Value MEUR		< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Commitment Appropriations	**ITER Construction**	**42.129**	**75.048**	**163.470**	**300.323**	**424.886**	**433.105**	**1 257.107**	**986.731**	**3 640.669**
	(of Which Transportation)						*0.352*	*0.010*	*1.491*	*1.853*
	Technology			**4.540**	**25.495**	**9.916**	**18.574**	**2.229**	**12.093**	**72.847**
	Technology for ITER			4.428	15.285	3.750	17.905	1.045	8.836	51.250
	(of which TBM)			*3.278*	*0.709*	*0.748*	*6.065*	*0.072*	*6.315*	*17.187*
	Technology for Broader Approach			0.112	10.210	6.166	0.669	1.184	3.257	21.597
	Technology for DONES									-
	Other Expenditure			**0.500**	**1.000**	**1.257**	**2.176**	**1.567**	**1.316**	**7.816**
	F4E Administration		**1.113**	**20.751**	**28.600**	**31.330**	**37.859**	**41.286**	**42.536**	**203.475**
	F4E Total Budget	**42.129**	**76.160**	**189.261**	**355.418**	**467.388**	**491.714**	**1 302.189**	**1 042.676**	**3 924.807**
	IO Reserve Fund and Undistributed Budget									-
	F4E Total Expenditure	**42.129**	**76.160**	**189.261**	**355.418**	**467.388**	**491.714**	**1 302.189**	**1 042.676**	**3 924.807**
	F4E Total available budget (In revenue)	**42.129**	**76.160**	**194.338**	**358.837**	**467.796**	**492.607**	**1 302.416**	**1 042.737**	**3 934.891**
	% of implementation	**100%**	**100%**	**97%**	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**

Current Value MEUR		2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	Total 2014-2018	Total 2007-2018
Commitment Appropriations	**ITER Construction**	**851.431**	**398.844**	**409.033**	**511.103**	**615.659**	**2 786.070**	**6 426.739**
	(of Which Transportation)	*3.731*	*5.542*	*5.467*	*6.247*	*3.205*	*24.192*	*26.045*
	Technology	**21.217**	**19.507**	**13.122**	**17.580**	**12.686**	**84.111**	**156.958**
	Technology for ITER	10.104	7.657	6.754	6.582	9.084	40.182	91.431
	(of which TBM)	*8.119*	*4.151*	*2.753*	*0.210*	*1.578*	*16.811*	*33.998*
	Technology for Broader Approach	11.112	11.850	6.367	10.998	3.602	43.930	65.527
	Technology for DONES						-	-
	Other Expenditure	**2.257**	**2.949**	**2.031**	**4.607**	**6.727**	**18.571**	**26.386**
	F4E Administration	**43.587**	**45.266**	**48.613**	**53.431**	**56.299**	**247.197**	**450.672**
	F4E Total Budget	**918.492**	**466.566**	**472.799**	**586.721**	**691.371**	**3 135.949**	**7 060.756**
	IO Reserve Fund and Undistributed Budget		**1.301**	**14.248**	**1.450**	**3.615**	**20.615**	**20.615**
	F4E Total Expenditure	**918.492**	**467.867**	**487.047**	**588.171**	**694.986**	**3 156.563**	**7 081.371**
	F4E Total available budget (In revenue)	**918.513**	**467.902**	**487.802**	**588.916**	**706.230**	**3 169.363**	**7 104.254**
	% of implementation	**100%**	**100%**	**100%**	**100%**	**98%**	**100%**	**100%**

Note1: The Transportation and TBM domains are shown for the purpose of establishment of the ITER Host State contribution.

Table 11 Annual Expenditure in Payment Appropriations (According to the successive annual accounts)

	Current Value MEUR	< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Payment Appropriations	**ITER Construction**	**42.129**	**2.658**	**83.822**	**109.308**	**157.077**	**209.784**	**314.272**	**344.170**	**1 221.090**
	(of Which Transportation)					-	-	*0.065*	*0.719*	*0.785*
	Technology			**0.112**	**1.361**	**4.293**	**9.207**	**6.469**	**7.563**	**29.005**
	Technology for ITER				1.229	4.027	4.282	3.415	2.279	15.231
	(of which TBM)				*0.687*	*0.342*	*2.162*	*2.530*	*1.139*	*6.860*
	Technology for Broader Approach			0.112	0.132	0.266	4.925	3.054	5.285	13.774
	Technology for DONES									
	Other Expenditure			**0.085**	**0.539**	**0.645**	**0.647**	**1.118**	**1.249**	**4.283**
	F4E Administration		**1.113**	**10.316**	**22.407**	**29.790**	**35.601**	**39.971**	**40.245**	**179.443**
	F4E Total Budget	**42.129**	**3.770**	**94.335**	**133.615**	**191.805**	**255.239**	**361.830**	**393.227**	**1 433.822**
	IO Reserve Fund and Undistributed Budget									
	F4E Total Expenditure	**42.129**	**3.770**	**94.335**	**133.615**	**191.805**	**255.239**	**361.830**	**393.227**	**1 433.822**
	F4E Total revenue	**42.129**	**3.770**	**151.328**	**208.910**	**301.276**	**297.616**	**384.421**	**438.884**	**1 786.204**
	% of implementation	**100%**	**100%**	**62%**	**64%**	**64%**	**86%**	**94%**	**90%**	**80%**

	Current Value MEUR	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	Total 2014-2018	Total 2007-2018
Payment Appropriations	**ITER Construction**	**451.465**	**467.697**	**649.149**	**759.169**	**730.648**	**3 058.128**	**4 279.218**
	(of Which Transportation)	*1.223*	*3.258*	*4.895*	*4.094*	*3.684*	*17.154*	*17.938*
	Technology	**11.350**	**11.058**	**14.437**	**15.827**	**16.019**	**68.691**	**97.696**
	Technology for ITER	5.905	5.342	8.576	10.438	7.871	38.132	53.363
	(of which TBM)	*4.718*	*4.286*	*5.580*	*6.368*	*2.300*	*23.253*	*30.113*
	Technology for Broader Approach	5.445	5.715	5.862	5.390	8.148	30.559	44.333
	Technology for DONES							
	Other Expenditure	**0.912**	**2.027**	**2.300**	**2.896**	**3.977**	**12.111**	**16.394**
	F4E Administration	**43.443**	**43.085**	**49.688**	**52.018**	**53.872**	**242.106**	**421.549**
	F4E Total Budget	**507.169**	**523.867**	**715.574**	**829.910**	**804.516**	**3 381.036**	**4 814.857**
	IO Reserve Fund and Undistributed Budget				**4.671**	**9.471**	**14.142**	**14.142**
	F4E Total Expenditure	**507.169**	**523.867**	**715.574**	**834.581**	**813.987**	**3 395.178**	**4 829.000**
	F4E Total revenue	**574.385**	**530.768**	**730.452**	**868.544**	**847.367**	**3 551.515**	**5 337.720**
	% of implementation	**88%**	**99%**	**98%**	**96%**	**96%**	**96%**	**90%**

Note: The Transportation and TBM domains are shown for the purpose of establishment of the ITER Host State contribution

Table 12 Annual Expenditure in Commitment Appropriations (2008 value)

	Constant Value MEUR(2008)	< 2007 Executed	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Commitment Appropriations	**ITER Construction**	**43.91**	**75.62**	**158.06**	**271.51**	**362.52**	**336.47**	**974.16**	**713.71**	**2 892.06**
	(of Which Transportation)						*0.33*	*0.01*	*1.31*	*1.65*
	Technology			**3.99**	**16.23**	**8.17**	**6.77**	**1.69**	**8.70**	**45.55**
	Technology for ITER			3.88	6.36	2.31	6.15	0.63	6.62	25.95
	(of which TBM)			*3.28*	*0.69*	*0.71*	*5.62*	*0.06*	*5.55*	*15.91*
	Technology for Broader Approach			0.11	9.88	5.86	0.62	1.05	2.08	19.60
	Technology for DONES									0.00
	Other Expenditure			**0.45**	**0.44**	**0.71**	**1.56**	**0.95**	**0.81**	**4.91**
	F4E Administration		**1.14**	**13.88**	**23.78**	**28.29**	**33.86**	**36.44**	**36.16**	**173.55**
	F4E Total Budget	**43.91**	**76.76**	**176.39**	**311.97**	**399.68**	**378.66**	**1 013.23**	**759.38**	**3 116.06**
	IO Reserve Fund and Undistributed Budget									**0.00**
	F4E Total Expenditure	**43.91**	**76.76**	**176.39**	**311.97**	**399.68**	**378.66**	**1 013.23**	**759.38**	**3 116.06**

	Constant Value MEUR(2008)	2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Budget AM2	2020 Budget	Total 2014-2020	Total 2007-2020	2021 Planned needs	2022 Planned needs	2023 Planned needs	2024 Planned needs	Total 2021-2024	Total <2007-2024
Commitment Appropriations	**ITER Construction**	**483.25**	**296.71**	**323.26**	**379.53**	**484.51**	**477.56**	**546.18**	**2 991.01**	**5 883.07**	**773.93**	**599.37**	**860.01**	**642.19**	**2 875.50**	**8 802.48**
	(of Which Transportation)	*3.20*	*4.63*	*4.45*	*4.96*	*2.48*	*7.67*	*11.38*	*38.77*	*40.42*	*8.61*	*6.73*	*10.19*	*4.81*	*30.34*	*70.76*
	Technology	**13.79**	**12.86**	**10.75**	**13.08**	**9.89**	**5.29**	**15.11**	**80.76**	**126.31**	**37.47**	**36.92**	**64.45**	**55.96**	**194.79**	**321.10**
	Technology for ITER	8.19	5.78	5.60	4.99	7.06	1.52	2.30	35.45	61.40	5.31	4.71	10.80	2.27	23.09	84.49
	(of which TBM)	*6.96*	*3.51*	*2.24*	*0.17*	*1.22*	*1.32*	*1.92*	*17.34*	*33.25*	*5.31*	*4.71*	*10.80*	*2.27*	*23.09*	*56.34*
	Technology for Broader Approach	5.59	7.08	5.15	8.08	2.83	3.78	12.81	45.32	64.91	32.16	32.21	32.17	32.20	128.74	193.65
	Technology for DONES								0.00	0.00			21.47	21.49	42.96	42.96
	Other Expenditure	**1.36**	**2.12**	**1.54**	**3.47**	**5.18**	**11.48**	**10.29**	**35.44**	**40.35**	**11.60**	**11.37**	**11.15**	**10.93**	**45.04**	**85.38**
	F4E Administration	**37.85**	**38.33**	**40.27**	**43.81**	**46.18**	**47.09**	**47.27**	**300.81**	**474.35**	**50.98**	**51.68**	**52.65**	**52.31**	**207.62**	**681.97**
	F4E Total Budget	**536.25**	**350.02**	**375.81**	**439.89**	**545.77**	**541.43**	**618.84**	**3 408.01**	**6 524.08**	**873.98**	**699.34**	**988.24**	**761.39**	**3 322.95**	**9 890.94**
	IO Reserve Fund and Undistributed Budget		**0.94**	**11.72**	**1.18**	**2.97**	**20.91**	**47.16**	**84.87**	**84.87**	**23.08**	**13.03**	**13.03**	**30.48**	**79.61**	**164.48**
	F4E Total Expenditure	**536.25**	**350.96**	**387.53**	**441.07**	**548.73**	**562.34**	**666.00**	**3 492.89**	**6 608.95**	**897.05**	**712.37**	**1 001.27**	**791.87**	**3 402.56**	**10 055.42**

Note 1: The Transportation and TBM domains are shown for the purpose of establishment of the ITER Host State contribution.

Note 2: The past executed figures in this MAP can differ from the figures in previous MAP due to the impact of de-commitments and recoveries, accounted in the year of origin of the initial commitment.

Table 13 Annual Expenditure in Commitment Appropriations (current value)

Current Value MEUR		< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Commitment Appropriations	**ITER Construction**	**42.129**	**73.656**	**158.057**	**278.225**	**380.589**	**361.540**	**1 072.747**	**806.166**	**3 130.981**
	(of Which Transportation)						*0.352*	*0.010*	*1.491*	*1.853*
	Technology			**3.994**	**16.656**	**8.593**	**7.308**	**1.859**	**9.863**	**48.272**
	Technology for ITER			3.882	6.524	2.431	6.640	0.697	7.506	27.679
	(of which TBM)			*3.278*	*0.709*	*0.748*	*6.065*	*0.072*	*6.315*	*17.187*
	Technology for Broader Approach			0.112	10.132	6.162	0.669	1.162	2.357	20.593
	Technology for DONES									-
	Other Expenditure			**0.452**	**0.450**	**0.743**	**1.684**	**1.050**	**0.918**	**5.297**
	F4E Administration		**1.113**	**13.884**	**24.258**	**29.428**	**35.932**	**39.442**	**39.925**	**183.982**
	F4E Total Budget	**42.129**	**74.769**	**176.387**	**319.589**	**419.354**	**406.465**	**1 115.098**	**856.871**	**3 368.532**
	IO Reserve Fund and Undistributed Budget									-
	F4E Total Expenditure	**42.129**	**74.769**	**176.387**	**319.589**	**419.354**	**406.465**	**1 115.098**	**856.871**	**3 368.532**

Current Value MEUR		2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Budget AM2	2020 Budget	Total 2014-2020	Total 2007-2020	2021 Planned needs	2022 Planned needs	2023 Planned needs	2024 Planned needs	Total 2021-2024	Total <2007-2024
Commitment Appropriations	**ITER Construction**	**561.383**	**349.692**	**384.588**	**470.518**	**614.532**	**617.910**	**719.158**	**3 717.783**	**6 848.343**	**1 001.161**	**790.858**	**1 157.454**	**881.594**	**3 831.067**	**10 721.539**
	(of Which Transportation)	*3.731*	*5.542*	*5.467*	*6.247*	*3.205*	*10.179*	*15.483*	*49.854*	*51.707*	*11.135*	*8.881*	*13.711*	*6.609*	*40.336*	*92.043*
	Technology	**16.037**	**15.189**	**12.937**	**16.053**	**12.275**	**7.000**	**20.511**	**100.003**	**148.274**	**48.475**	**48.710**	**86.735**	**76.815**	**260.735**	**409.009**
	Technology for ITER	9.521	6.740	6.694	5.949	8.702	2.000	3.110	42.717	70.395	6.875	6.210	14.535	3.115	30.735	101.130
	(of which TBM)	*8.119*	*4.151*	*2.753*	*0.210*	*1.578*	*1.738*	*2.585*	*21.134*	*38.321*	*6.875*	*6.210*	*14.535*	*3.115*	*30.735*	*69.056*
	Technology for Broader Approach	6.516	8.449	6.243	10.104	3.573	5.000	17.401	57.286	77.879	41.600	42.500	43.300	44.200	171.600	249.479
	Technology for DONES												28.900	29.500	58.400	58.400
	Other Expenditure	**1.588**	**2.537**	**1.893**	**4.369**	**6.694**	**15.227**	**13.995**	**46.304**	**51.600**	**15.000**	**15.000**	**15.000**	**15.000**	**60.000**	**111.600**
	F4E Administration	**42.625**	**44.028**	**47.180**	**52.361**	**56.298**	**58.556**	**59.946**	**360.995**	**544.977**	**65.945**	**68.195**	**70.855**	**71.815**	**276.810**	**821.787**
	F4E Total Budget	**621.634**	**411.447**	**446.598**	**543.301**	**689.800**	**698.692**	**813.611**	**4 225.083**	**7 593.615**	**1 130.581**	**922.763**	**1 330.044**	**1 045.224**	**4 428.612**	**12 064.357**
	IO Reserve Fund and Undistributed Budget	**-**	**1.078**	**13.734**	**1.406**	**3.615**	**26.000**	**59.812**	**105.645**	**105.645**	**29.852**	**17.189**	**17.533**	**41.842**	**106.415**	**212.060**
	F4E Total Expenditure	**621.634**	**412.524**	**460.333**	**544.707**	**693.415**	**724.692**	**873.423**	**4 330.728**	**7 699.260**	**1 160.433**	**939.952**	**1 347.577**	**1 087.066**	**4 535.027**	**12 276.417**

Note 1: The Transportation and TBM domains are shown for the purpose of establishment of the ITER Host State contribution.

Note 2: The past executed figures in this MAP can differ from the figures in previous MAP due to the impact of de-commitments and recoveries, accounted in the year of origin of the initial commitment.

Table 14 Annual Expenditure in Payment Appropriations

Current Value MEUR		< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Payment Appropriations	**ITER Construction**	**42.129**	**2.658**	**83.821**	**108.971**	**157.077**	**209.661**	**290.061**	**343.964**	**1 196.214**
	(of Which Transportation)					-	-	*0.065*	*0.719*	*0.785*
	Technology			**0.110**	**1.359**	**4.293**	**9.207**	**6.469**	**7.563**	**29.002**
	Technology for ITER				1.226	4.027	4.282	3.415	2.279	15.229
	(of which TBM)				*0.687*	*0.342*	*2.162*	*2.530*	*1.139*	*6.860*
	Technology for Broader Approach			0.112	0.132	0.266	4.925	3.054	5.285	13.774
	Technology for DONES									-
	Other Expenditure			**0.085**	**0.539**	**0.645**	**0.641**	**1.107**	**1.249**	**4.266**
	F4E Administration		**1.113**	**13.884**	**24.258**	**29.428**	**35.932**	**39.442**	**39.925**	**183.982**
	F4E Total Budget	**42.129**	**3.770**	**97.900**	**135.127**	**191.443**	**255.441**	**337.080**	**392.702**	**1 413.464**
	IO Reserve Fund and Undistributed Budget									**-**
	F4E Total Expenditure	**42.129**	**3.770**	**97.900**	**135.127**	**191.443**	**255.441**	**337.080**	**392.702**	**1 413.464**

Current Value MEUR		2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Budget AM2	2020 Budget	Total 2014-2020	Total 2007-2020	2021 Planned needs	2022 Planned needs	2023 Planned needs	2024 Planned needs	Total 2021-2024	Total <2007-2024
Payment Appropriations	**ITER Construction**	**451.253**	**467.352**	**648.866**	**759.133**	**730.648**	**652.482**	**699.788**	**4 409.521**	**5 605.735**	**643.455**	**771.805**	**708.045**	**709.825**	**2 833.130**	**8 480.994**
	(of Which Transportation)	*1.223*	*3.258*	*4.895*	*4.094*	*3.684*	*10.254*	*16.936*	*44.344*	*45.128*	*12.396*	*10.530*	*5.803*	*5.787*	*34.515*	*79.644*
	Technology	**11.350**	**11.058**	**14.437**	**15.827**	**16.019**	**11.600**	**14.960**	**95.251**	**124.252**	**15.600**	**20.000**	**31.100**	**40.400**	**107.100**	**231.352**
	Technology for ITER	5.905	5.342	8.576	10.438	7.871	4.200	4.760	47.092	62.321	4.100	7.000	8.200	6.500	25.800	88.121
	(of which TBM)	*4.718*	*4.286*	*5.580*	*6.368*	*2.300*	*1.205*	*1.856*	*26.314*	*33.173*	*4.876*	*7.009*	*8.022*	*6.096*	*26.003*	*59.177*
	Technology for Broader Approach	5.445	5.715	5.862	5.390	8.148	7.400	10.200	48.159	61.933	11.500	13.000	19.100	24.900	68.500	130.433
	Technology for DONES								-	-	-	-	3.800	9.000	12.800	12.800
	Other Expenditure	**0.912**	**2.026**	**2.300**	**2.896**	**3.948**	**11.029**	**15.000**	**38.110**	**42.376**	**15.000**	**15.000**	**15.000**	**15.000**	**60.000**	**102.376**
	F4E Administration	**42.625**	**44.028**	**47.180**	**52.361**	**56.298**	**58.556**	**59.946**	**360.995**	**544.977**	**65.945**	**68.195**	**70.855**	**71.815**	**276.810**	**821.787**
	F4E Total Budget	**506.140**	**524.464**	**712.782**	**830.217**	**806.913**	**733.667**	**789.694**	**4 903.877**	**6 317.341**	**740.000**	**875.000**	**825.000**	**837.040**	**3 277.040**	**9 636.510**
	IO Reserve Fund and Undistributed Budget				**4.671**	**9.471**	**23.312**	**30.000**	**67.454**	**67.454**	**30.000**	**25.000**	**25.000**	**23.960**	**103.960**	**171.414**
	F4E Total Expenditure	**506.140**	**524.464**	**712.782**	**834.888**	**816.385**	**756.978**	**819.694**	**4 971.331**	**6 384.795**	**770.000**	**900.000**	**850.000**	**861.000**	**3 381.000**	**9 807.924**

Note 1: The Transportation and TBM domains are shown for the purpose of establishment of the ITER Host State contribution.

Note 2: The past executed figures in this MAP can differ from the figures in previous MAP due to the impact of recoveries, accounted in the year of origin of the initial commitment.

Table 15 Annual Revenue in Commitment Appropriations

Current Value MEUR		< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Commitment Appropriations	Euratom contribution	40.645	73.503	142.710	282.720	374.240	387.660	1 106.900	904.900	**3 272.633**
	France contribution	1.484	2.658	48.945	61.200	66.500	90.700	141.200	105.000	**516.202**
	F4E Members contribution			2.683	2.900	3.400	3.835	3.900	4.300	**21.018**
	Miscellaneous revenue				0.252	0.105	0.186	1.040	0.109	**1.691**
	F4E Total Contributions	**42.129**	**76.160**	**194.338**	**347.072**	**444.245**	**482.381**	**1 253.040**	**1 014.309**	**3 811.544**
	IO Reserve Fund and Undistributed Budget									
	F4E Total Revenue	**42.129**	**76.160**	**194.338**	**347.072**	**444.245**	**482.381**	**1 253.040**	**1 014.309**	**3 811.544**
	Recoveries (Reimbursement)							0.006	0.010	**0.017**
	Carry Over from the previous year				3.457	23.552	0.467	39.325	25.959	**92.759**
	Recovery of the budgetary outturn				8.308			10.045	2.458	**20.812**
	Utilisation of unused appropriations						9.760			**9.760**
	F4E Total available Revenue	**42.129**	**76.160**	**194.338**	**358.837**	**467.796**	**492.607**	**1 302.416**	**1 042.737**	**3 934.891**

Current Value MEUR		2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Budget AM2	2020 Budget	Total 2014-2020	Total 2007-2020	2021 Planned needs	2022 Planned needs	2023 Planned needs	2024 Planned needs	Total 2021-2024	Total <2007-2024
Commitment Appropriations	Euratom contribution	720.918	382.215	323.270	315.184	381.836	402.575	358.391	**2 884.389**	**6 157.021**	923.081	756.463	1 091.144	860.024	**3 630.712**	**9 828.378**
	France contribution	170.000	64.000	130.000	145.000	142.000	130.000	78.945	**859.945**	**1 376.147**	201.000	159.500	231.900	178.100	**770.500**	**2 148.132**
	F4E Members contribution	4.400	4.390	4.600	4.860	4.920	5.600	6.100	**34.870**	**55.888**	6.500	6.800	7.000	7.100	**27.400**	**83.288**
	Miscellaneous revenue	0.210	0.207	0.024	0.001	0.001		0.771	**2.446**	**4.137**						**4.137**
	F4E Total Contributions	**895.528**	**450.813**	**457.894**	**465.045**	**528.757**	**539.407**	**444.207**	**3 781.650**	**7 593.194**	**1 130.581**	**922.763**	**1 330.044**	**1 045.224**	**4 428.612**	**12 063.935**
	IO Reserve Fund and Undistributed Budget		1.301	14.984	0.715	13.647	15.186	59.812	**105.645**	**105.645**	29.852	17.189	17.533	41.842	**106.415**	**212.060**
	F4E Total Revenue	**895.528**	**452.114**	**472.878**	**465.760**	**542.404**	**554.592**	**504.019**	**3 887.295**	**7 698.839**	**1 160.433**	**939.952**	**1 347.577**	**1 087.066**	**4 535.027**	**12 275.996**
	Recoveries (Reimbursement)	0.004	1.996	0.435	0.893	22.949	0.040	-	**26.317**	**26.333**						**26.333**
	Carry Over from the previous year	21.109	10.793	13.461	25.211	19.687	19.927	-	**110.188**	**202.948**						**202.948**
	Recovery of the budgetary outturn	1.873	2.998	1.028	1.053	1.183	0.963	1.064	**10.162**	**30.974**						**30.974**
	Utilisation of unused appropriations				96.000	120.007	149.170	368.340	**733.516**	**743.276**						**743.276**
	F4E Total available Revenue	**918.513**	**467.902**	**487.802**	**588.916**	**706.230**	**724.692**	**873.423**	**4 767.479**	**8 702.370**	**1 160.433**	**939.952**	**1 347.577**	**1 087.066**	**4 535.027**	**13 279.526**

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.

Table 16 Annual Revenue in Payment Appropriations

Current Value MEUR		< 2007 Final Execution	2007 Executed	2008 Executed	2009 Executed	2010 Executed	2011 Executed	2012 Executed	2013 Executed	Total 2007-2013
Payment Appropriations	Euratom contribution	40.645	1.113	123.500	131.790	207.600	226.336	261.240	245.002	**1 196.580**
	France contribution	1.484	2.658	25.145	30.400	13.600	12.000	48.000	130.000	**261.802**
	F4E Members contribution			2.683	3.285	3.400	3.835	3.900	4.300	**21.403**
	Miscellaneous revenue				0.252	0.105	0.186	1.040	0.109	**1.691**
	F4E Total Budget	**42.129**	**3.770**	**151.328**	**165.727**	**224.705**	**242.357**	**314.179**	**379.411**	**1 481.477**
	IO Reserve fund and Undistributed Budget									
	F4E Total Revenue	**42.129**	**3.770**	**151.328**	**165.727**	**224.705**	**242.357**	**314.179**	**379.411**	**1 481.477**
	Recoveries (Reimbursement)							0.006	0.010	**0.017**
	Carry over from the previous year				24.000	51.188	48.626	32.995	0.836	**157.645**
	Recovery of the budgetary outturn				8.308	17.096	-	29.944	52.133	**107.481**
	Carry over unpaid admin expenditure				10.875	8.287	6.633	7.297	6.493	**39.585**
	F4E Total available Revenue	**42.129**	**3.770**	**151.328**	**208.910**	**301.276**	**297.616**	**384.421**	**438.884**	**1 786.204**

Current Value MEUR		2014 Executed	2015 Executed	2016 Executed	2017 Executed	2018 Executed	2019 Budget AM2	2020 Budget	Total 2014-2020	Total 2007-2020	2021 Planned needs	2022 Planned needs	2023 Planned needs	2024 Planned needs	Total 2021-2024	Total <2007-2024>
Payment Appropriations	Euratom contribution	421.101	386.171	567.040	716.611	654.029	552.018	632.277	**3 929.247**	**5 125.828**	604.400	712.900	674.500	686.040	**2 677.840**	**7 844.312**
	France contribution	123.000	77.000	120.000	125.000	130.000	145.000	150.000	**870.000**	**1 131.802**	129.100	155.300	143.500	143.900	**571.800**	**1 705.087**
	F4E Members contribution	4.400	4.390	4.600	4.937	4.920	5.600	6.100	**34.947**	**56.350**	6.500	6.800	7.000	7.100	**27.400**	**83.750**
	Miscellaneous revenue	0.210	0.207	0.024	0.001	0.001	1.232	-	**1.675**	**3.366**						**3.366**
	F4E Total Budget	**548.711**	**467.768**	**691.664**	**846.549**	**788.951**	**703.849**	**788.377**	**4 835.870**	**6 317.346**	**740.000**	**875.000**	**825.000**	**837.040**	**3 277.040**	**9 636.515**
	IO Reserve fund and Undistributed Budget			4.121	11.185	13.149	9.000	30.000	**67.454**	**67.454**	30.000	25.000	25.000	23.960	**103.960**	**171.414**
	F4E Total Revenue	**548.711**	**467.768**	**695.785**	**857.734**	**802.100**	**712.849**	**818.377**	**4 903.324**	**6 384.800**	**770.000**	**900.000**	**850.000**	**861.000**	**3 381.000**	**9 807.929**
	Recoveries (Reimbursement)	0.004	1.996	0.435	0.893	22.949	0.040	-	**26.317**	**26.333**						**26.333**
	Carry over from the previous year	17.022	33.000	0.025	5.214	12.338	26.853	-	**94.452**	**252.097**						**252.097**
	Recovery of the budgetary outturn	1.881	23.317	28.289	1.073	5.881	17.236	1.317	**78.995**	**186.476**						**186.476**
	Carry over unpaid admin expenditure	6.768	4.686	5.918	3.629	4.099	5.462	-	**30.562**	**70.147**						**70.147**
	F4E Total available revenue	**574.385**	**530.768**	**730.452**	**868.544**	**847.367**	**762.440**	**819.694**	**5 133.649**	**6 919.853**	**770.000**	**900.000**	**850.000**	**861.000**	**3 381.000**	**10 342.982**

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.

List of Tables

MAP2020_ANNEXES TO HR REP

Human Resources – Outlook for 2020 – 2024

Selection procedures

F4E applies the General Implementing Provisions (GIP) on the Procedure governing the Engagement and use of Temporary Agents by analogy. Pending the adoption by the Commission of the same rules for Contract Agents, F4E follows the same provisions for the engagement and use of its 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. As such, F4E is increasingly trying to reach skilled candidates that are not necessarily looking for new employments or who would not typically be exposed to EU employment opportunities.

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 contingent. This decision was taken during 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);
- AD 13 for Heads of Department[1].
- AD14 for the F4E Director.

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] 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 (Project managers in the ITER Department).

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. ,
Other information on Advancement, Reclassification and balances are provided in tables 4 to 7.

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).

1. American School of Barcelona	15. Swiss School
2. Deutsche Schule Barcelona	16. Highlands School
3. Europa International School	17. École Bel Air Sitges
4. Hamelin International School	18. Benjamin Franklin
5. Lycée Français de Barcelona	19. Agora Sant Cugat
6. Saint Paul’s School	20. Escoles Betlem
7. Istituto Statale Italiano Comprensivo	21. La Miranda
8. St. Peter’s School	22. Bon Soleil
9. Escoles Pérez Iborra	23. Santa Clara International School
10. The British School	24. Fundación Akua
11. Scuola Materna Montessori	25. Sainte Victoire International School (SVIS) - Cadarache
12. École Ferdinand de Lesseps	26. CIPEC - Cadarache
13. Kensington School	27. IBS - Cadarache

14. Col.legi Paideia	28. ISM - Cadarache

Table 1. Service Level Agreements with International schools

Staff mobility

1. 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.

2. 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.

3. 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.

STAFF POPULATION OVERVIEW

Staff population and its evolution, overview of all categories of staff

Staff population (1)		Actually filled as of 31.12.2017	Authorised under 2018 EU budget (2)	Actually filled as of 31.12.2018 (3)	Authorised under 2019 EU budget (2)	Requested for 2020 (8)	Envisaged for 2021 (9)	Envisaged in 2022	Envisaged in 2023	Envisaged in 2024(10)
Officials	AD	37	39	38	40	40	40	40	40	40
	AST	14	12	13	11	11	11	11	11	11
	AST/SC	-	-	-	-	-	-	-	-	-
TA	AD	194	204	195	205	203	203	203	203	195
	AST	31	28	31	27	26	26	26	26	26
	AST/SC	-	-	-	-	-	-	-	-	-
Sub Total(4) Establishment Plan		**276**	**283**	**277**	**283**	**280**	**280**	**280**	**280**	**272**
CA GFIV		105	107	99	104	97	97	97	97	90
CA GF III		54	50	55	50	50	55	55	55	55
CA GF II		15	24	14	24	23	18	18	18	18
CA GFI		0	0	0	0	0	0	0	0	0
Sub Total CA(5)		**174**	**181**	**168**	**178**	**170**	**170**	**170**	**170**	**163**
SNE		2	3	1	3	3	3	3	3	3
TOTAL		**452**	**467**	**446**	**464**	**453**	**453**	**453**	**453**	**438**
Structural service providers (6)		21	21	17	tbd	tbd	tbd	tbd	tbd	tbd
External staff for occasional replacement (7)		16	16	10	16	16	16	16	16	16

[1] All F4E staff is EU-Financed.
[2] As authorised for officials and temporary agents (TA) and as estimated for contract agents (CA) and seconded national experts (SNE)
[3] Of which 4 sent (and accepted) Contract Agent offer letters.
[4] Headcounts.
[5] Filled including job offer letters sent and accepted in Full time Equivalent (FTE).
[6] Filled in and envisaged FTE. Service providers are contracted by a private company selected through framework contracts /specific task orders. They have individual contracts with F4E .They carry out specialised outsourced tasks of horizontal/support nature, for instance in the area of information technology.
[7] Filled in and envisaged FTE, as instance for replacement due to maternity or long sick leave.
[8] Return of 6 CA FG IV posts and 3 TA AD posts in the framework of the phasing out of the 24 CA short term posts granted in 2015 and the 21 TA short term posts granted in 2016. In addition, 1 CA FGII post and 1 FGIV are returned in relation to the TB04 contract novation. Finally, a AST post is converted in a AD post.
[9] 5 CA FGII are converted into FGIII.
[10] Return of 8 TA AD posts and 7 CA FG IV posts in the framework of the phasing out of the 24 CA short term posts granted in 2015 and the 21 TA short term posts granted in 2016.

Table 2 . Overview of staff population and its evolution

MULTIANNUAL STAFF POLICY PLAN

Multi-annual staff policy plan 2020-2024																
Category and grade	Establishment Plan in EU Budget 2018 (1)		Filled as of 31/12/2018		Establishment plan in voted EU Budget 2019		Establishment plan in Draft EU Budget 2020 (1)		Establishment plan 2021		Establishment plan 2022		Establishment plan 2023		Establishment plan 2024 (2)	
	officials	TA	officials	TA	officials	TA	officials	TA	officials	TA	officials	TA	officials	TA	officials	TA
AD 16																
AD 15		1				1		1		1		1		1		1
AD 14	3	1		1	5	2	5	3	5	4	6	5	7	7	8	9
AD 13	14	7	8	6	14	7	14	9	14	9	14	10	14	12	14	14
AD 12	15	17	11	4	14	21	15	21	15	21	15	25	14	28	13	32
AD 11	4	21	5	21	3	23	2	27	2	28	2	29	2	30	2	31
AD 10		26	2	20		28		31		33		35		35	0	35
AD 9		35	5	49		39		41		42		42		42	0	41
AD 8	1	40	5	41	1	37	1	33	1	33	1	33	1	31	1	24
AD 7		28	1	18	1	21	2	21	2	21	1	17	1	13	1	8
AD 6	1	28	1	35	2	25	1	16	1	11	1	6	1	4	1	
AD 5	1					1										
Total AD	**39**	**204**	**38**	**195**	**40**	**205**	**40**	**203**	**40**	**203**	**40**	**203**	**40**	**203**	**40**	**195**
AST 11	4				4		5		5		6		6		6	
AST 10	2		1		2		1		2		1		1		2	
AST 9	3		2		4		4		3	1	3	2	4	3	3	4
AST 8	2	1	1		1	1	1	2	1	2	1	2	0	3		4
AST 7	1	1	2	1		3		4		5		6	0	6		6
AST 6		8	1	1		9		9		9		9	0	8		7
AST 5		12	2	13		11		9		8		6	0	5		4
AST 4		5	2	5		3		2		1		1	0	1		1
AST 3		1	1	11												
AST 2			1													
AST 1																
Total AST	**12**	**28**	**13**	**31**	**11**	**27**	**11**	**26**	**11**	**26**	**11**	**26**	**11**	**26**	**11**	**26**
Tot AST/SC	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL	**51**	**232**	**51**	**226**	**51**	**232**	**51**	**229**	**51**	**229**	**51**	**229**	**51**	**229**	**51**	**221**
GRAND TOTAL	**283**		**277**		**283**		**280**		**280**		**280**		**280**		**272**	

Notes:

- The requested posts for 2020 and the forecasts for 2021-2024 are calculated according to the promotions slots rates of Annex I of the Staff Regulations. The excess of TA AD14 posts above the F4E Director post will be used in lower category slots.
- F4E does not use of the flexibility rule (Art 38 of FR). The corresponding colums, systematically showing no changes in the establishment plan are not shown.

[1] Return of 3 TA AD posts in the framework of the phasing out of the 21 short term posts granted in 2016.
In addition, two conversions are implemented: 1 AST6 into 1 AD6 and 1 AD5 into 1 AD6

[2] Return of 8 TA AD posts in the framework of the phasing out of the 21 short term posts granted in 2016

Table 3 . Multi-annual staff policy Plan 2020-2024

Advancement, reclassification and promotion

Staff who has been at one step in their grade for two years shall automatically advance to the next step in that grade, unless their performance has been evaluated as unsatisfactory pursuant to their last performance assessment report.

By decision of the appointing authority and/or authority authorized to conclude contracts, staff shall also be entitled to appointment to the next higher grade of their function group. Such decisions shall be made as part of an annual promotion/reclassification exercise which considers the comparative merit of staff.

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, F4E significantly reduced the rate of promotion in 2017 for temporary agents and officials in grades AD8 and above. The Tables below provide an overview of the number of promotions awarded in each grade during the last exercise.

Reclassification of temporary staff / promotion of officials in 2018

Category and grade	Staff in activity at 01.01.2017		Number of staff members promoted / reclassified in 2018		Average number of years in grade of reclassified/promoted staff members
	officials	TA	officials	TA	
AD 16					
AD 15					
AD 14		1			
AD 13	8	3			
AD 12	9	1			
AD 11	5	15	2	4	4.91
AD 10	3	22		4	4.96
AD 9	1	29		6	2.8
AD 8	8	39	5	21	2.84
AD 7	2	34	1	10	2.45
AD 6		34		4	5.19
AD 5	1				
Total AD	**37**	**178**	**8**	**49**	**-**
AST 11					
AST 10	1				
AST 9	1				
AST 8	2				
AST 7	2				
AST 6	3	1		1	2.00
AST 5		9			
AST 4	3	8	2	2	2.50
AST 3	1	9	1	1	3.07
AST 2	2				
AST 1					
Total AST	**15**	**27**	**3**	**4**	**-**
Total AST/SC	**0**	**0**	**0**	**0**	-
Total	**52**	**205**	**11**	**53**	**-**

Table 4 . Table of reclassification of temporary staff / promotion of officials in 2018

Reclassification of contract staff in 2018

Function Group	Grade	Staff in activity at 01.01.2017	How many staff members were reclassified in 2018	Average number of years in grade of reclassified staff members
CA IV	18			
	17	2	-	-
	16	6	-	-
	15	26	7	2.77
	14	44	11	2.49
	13	16	3	3.28
CA III	12			
	11	8	-	-
	10	23	3	3.94
	9	12	3	2.87
	8	1	-	-
CA II	7	3	-	-
	6	8	1	2.76
	5	8	3	3.32
	4			
CA I	3			
	2			
	1			
Total		**157**	**31**	**-**

Table 5 . Reclassification of temporary staff and contractual agents /promotion of officials

Gender balance

The Table below shows the gender balance as at 31.12.2018 based on the filled in posts on 31.12.2018 (accepted job offers are included).
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.

Staff	EU Official		TA		CA	SNE	TOTAL
	AD	*AST*	*AD*	*AST*			
Female	12	8	43	11	88		162
Male	26	5	152	20	80	1	284
Total	**38**	**13**	**195**	**31**	**168**	**1**	**446**

Table 6 . Gender balance on 31/12/2018

A Staff Committee led working group was entrusted the task of analysing the gender situation in the organization. The report concluded that gender balance would be improved most effectively if F4E sought to work simultaneously in the 5 business areas of recruitment, management positions, working conditions, career development and behavior. It is proposed that the works carried out by the WG serve as a basis for an action plan on this particular area of gender equality.

Subsequently, F4E adopted a Diversity, Equal Opportunities and Non-discrimination Strategy. The strategy foresees a long list of measures also aimed at improving the gender parity issue. The following are examples of some of the specific measures foreseen under this heading:
(i) Remind the GB of the need to strive for gender balance, when disseminating vacancy announcements through their respective national networks;

(ii) Not require applications to include pictures, age and gender information or details pertaining to civil status;
(iii) Aim for the constitutions of gender balanced selection panels;

Geographical balances

The table below provides the geographical distribution as at 31.12.2018 based upon the filled in posts on 31.12.2018 (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.

Staff	EU Official		TA		CA	SNE	TOTAL
	AD	*AST*	*AD*	*AST*			
Belgian	1	1	7	4	7		**20**
British	1		13	3	5		**22**
Bulgarian			1		3		**4**
Croatian					1		**1**
Czech			2		2		**4**
Dutch			4		1		**5**
Estonian					1		**1**
Finnish			3		1		**4**
French	5	4	51	7	14		**81**
German	3		5	1	9	1	**19**
Greek	1	1	4	1	1		**8**
Hungarian	2		1		4		**7**
Irish			3	1			**4**
Italian	13	3	38	5	30		**89**
Lithuanian		1		1	2		**4**
Maltese	1						**1**
Polish			3		2		**5**
Portuguese		1	4		6		**11**
Romanian			5	1	4		**10**
Slovak	1						**1**
Spanish	9	2	49	7	74		**141**
Swedish	1		2		1		**4**
Total	**38**	**13**	**195**	**31**	**168**	**1**	**446**

Table 7 . Geographical balance on 31/12/2018

NB: figures are based on filled in posts including staff in place and employment offers.

Human Resources per action for 2020-2024

It should be noted that the staff costs represent a very small part of the total investment.

- Matrix Staff includes the staff working in a matrix structure within the Project Teams (i.e. Project Performance Management, Nuclear Safety, Quality Assurance, Contracts & Procurement, Finance and Legal Service).
- The "Management and Overheads" value takes into account the remaining staff, assigned to the teams on a pro-rata basis.

The allocation of the F4E manpower, consisting of both F4E staff members and external contractors in-sourced through existing framework contract, varies according to the needs of the project and it 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 modification of 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.

	2020				
	Core Staff	Assigned (Matrixed) Staff	Direct Staff	Management & Overheads	Total Staff
Magnets	22.35	8.72	31.07	10.11	41.18
Vacuum Vessel	20.61	6.02	26.63	8.66	35.29
In-Vessel[2]	19.15	6.82	25.97	8.45	34.42
Remote Handling	17.15	6.72	23.87	7.77	31.64
Cryoplant & Fuel Cycle	15.38	4.56	19.93	6.48	26.42
Antennas & Plasma Engineering	12.99	5.88	18.87	6.14	25.01
Neutral Beam & EC Power Supplies and Sources	20.90	7.01	27.91	9.08	36.98
Diagnostics	17.06	9.01	26.07	8.48	34.55
Test Blanket Modules	9.24	5.64	14.88	4.84	19.72
Site and Buildings and Power Supplies	29.73	21.76	51.49	16.75	68.25
Technical Support Activities[3]	30.21	12.91	43.12	14.03	57.15
Broader Approach	30.43	1.55	31.98	10.40	42.38
Total	245.21	96.59	341.80	111.20	453.00

Table 8 . Human Resources per action - 2020

[2] Due to the various input collected from the different teams in the organization for the forecast, it has not been possible to detail the breakdown of the In-Vessel project into Blanket and Divertor.

[3] A part of the staff assigned in the previous MAP edition to the Technical Support Activities figure , has been re-distributed among the rest of the projects, to better reflect the allocation of resources. It explains for instance the increase in the actions In Vessel and in Site and Buildings and Power Supplies compared to 2019.

	2021				
	Core Staff	Assigned (Matrixed) Staff	Direct Staff	Management & Overheads	Total Staff
Magnets	16.75	8.72	25.47	8.29	33.76
Vacuum Vessel	16.27	6.02	22.29	7.25	29.54
In-Vessel	21.47	6.82	28.29	9.20	37.49
Remote Handling	18.11	6.82	24.93	8.11	33.04
Cryoplant & Fuel Cycle	14.96	4.56	19.51	6.35	25.86
Antennas & Plasma Engineering	13.83	5.88	19.71	6.41	26.12
Neutral Beam & EC Power Supplies and Sources	23.97	7.01	30.98	10.08	41.06
Diagnostics	18.05	9.01	27.06	8.80	35.86
Test Blanket Modules	11.44	5.64	17.08	5.56	22.63
Site and Buildings and Power Supplies	29.73	21.76	51.49	16.75	68.25
Technical Support Activities	30.10	12.92	43.02	14.00	57.02
Broader Approach	30.42	1.55	31.97	10.40	42.38
Total	245.10	96.70	341.80	111.20	453.00

Table 9 . Human Resources per action - 2021

	2022				
	Core Staff	Assigned (Matrixed) Staff	Direct Staff	Management & Overheads	Total Staff
Magnets	4.21	4.55	8.76	2.87	11.63
Vacuum Vessel	8.63	5.95	14.58	4.79	19.36
In-Vessel	26.61	7.91	34.52	11.33	45.85
Remote Handling	21.36	7.21	28.57	9.38	37.95
Cryoplant & Fuel Cycle	13.56	4.60	18.16	5.96	24.12
Antennas & Plasma Engineering	15.84	6.17	22.01	7.23	29.24
Neutral Beam & EC Power Supplies and Sources	31.24	7.36	38.61	12.67	51.28
Diagnostics	19.98	9.17	29.15	9.57	38.72
Test Blanket Modules	14.41	5.77	20.17	6.62	26.79
Site and Buildings and Power Supplies	28.45	22.11	50.57	16.60	67.16
Technical Support Activities	30.51	13.20	43.71	14.35	58.06
Broader Approach	30.70	1.55	32.25	10.58	42.83
Total	245.51	95.54	341.05	111.95	453.00

Table 10 . Human Resources per action - 2022

	2023				
	Core Staff	Assigned (Matrixed) Staff	Direct Staff	Management & Overheads	Total Staff
Magnets	0.00	1.00	1.00	0.33	1.33
Vacuum Vessel	0.00	0.00	0.00	0.00	0.00
In-Vessel	29.09	12.18	41.27	13.63	54.90
Remote Handling	23.06	8.55	31.61	10.44	42.05
Cryoplant & Fuel Cycle	13.86	5.42	19.28	6.37	25.65
Antennas & Plasma Engineering	16.90	7.44	24.34	8.04	32.38
Neutral Beam & EC Power Supplies and Sources	35.39	7.18	42.56	14.05	56.62
Diagnostics	20.80	11.03	31.84	10.51	42.35
Test Blanket Modules	17.15	5.54	22.70	7.49	30.19
Site and Buildings and Power Supplies	27.92	23.96	51.87	17.13	69.00
Technical Support Activities	31.05	10.57	41.62	13.74	55.36
Broader Approach	30.82	1.64	32.46	10.72	43.18
Total	246.05	94.50	340.55	112.45	453.00

Table 11 . Human Resources per action - 2023

	2024				
	Core Staff	Assigned (Matrixed) Staff	Direct Staff	Management & Overheads	Total Staff
Magnets	0.00	0.00	0.00	0.00	0.00
Vacuum Vessel	0.00	0.00	0.00	0.00	0.00
In-Vessel	27.40	12.28	39.68	13.06	52.74
Remote Handling	24.51	8.45	32.96	10.85	43.81
Cryoplant & Fuel Cycle	13.84	5.48	19.32	6.36	25.68
Antennas & Plasma Engineering	16.33	8.58	24.91	8.20	33.11
Neutral Beam & EC Power Supplies and Sources	32.71	7.29	40.01	13.17	53.17
Diagnostics	18.81	9.02	27.83	9.16	36.99
Test Blanket Modules	17.17	5.69	22.86	7.52	30.38
Site and Buildings and Power Supplies	23.54	24.83	48.37	15.92	64.29
Technical Support Activities	32.68	9.62	42.30	13.92	56.21
Broader Approach	29.68	1.64	31.32	10.31	41.63
Total	236.68	92.87	329.55	108.45	438.00

Table 12 . Human Resources per action - 2024

List of Tables

MAP2020_ANNEXES WORK PROGRAMME 2020

1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2020

The 2020 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 2020, detailed objectives, expected results and target for each WP Action.

Main assumptions

The following assumptions are considered as the basis of the Work Programme 2020:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of March 2019.
- The F4E schedule supporting a First Plasma by the end of 2025 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 available yearly commitment and payment budgets for the work on the EU in-kind procurements until end 2020. It should be borne in mind that the current F4E budget is assigned only until the end of 2020 and therefore the achievement and completion of activities beyond this date depend on the availability of the required budget after 2020.
  - ✓ 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.
- 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 Regulations.
- Grants related to recurring and sequential R&D activities, with a well-defined development path eventually leading to an EU procurement package, will be implemented whenever appropriate, through Framework Partnership Agreements (FPA), in order to streamline and channel R&D funding, improve its effectiveness and decrease the administrative burden to beneficiaries and F4E alike.
- Procurements which require a very close coordination between F4E and other entities will be implemented, whenever appropriate, through the Joint Procurement procedure.
- All the activities described in the overview of each Action and the list of contracts in 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 WP2020 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.

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 MAP.

2. Each Action of WP2020 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 2020 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 2020. 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[1]. These tasks will be mainly implemented through specific contracts under existing framework contracts.

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

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

iv. Provisions for BREXIT-related contractual modifications, in accordance with F4E Implementing Rules.

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

i. ITER Council/Governing Board (IC/GB) milestones in 2020;

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.

[1] 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

(d) The **target** is defined, when applicable, as the yearly CAS foreseen to be achieved in 2020 and the cumulative CAS foreseen to be achieved by the end of 2020 per PA (PAs associated with each Action are listed in Table 2 of the main text of the MAP).The value is according to the CAS profile implemented in the F4E DWS.

(e) **Human resources** (see tables 8 of 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 2020. 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 table 3 of these annexes): these are, per Action, the list of the foreseen main contracts with value higher than 144,000 Euros[2]. 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 WP2020. 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 2020 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: 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 2020 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 table 9 in Annexes of Project Plan). Any additional budget required and exceeding the currently available one will consist of unused appropriations adjusted to match the final needs.

iii. Indicative timeframe for launching the procurement and type of procedure/contract: the foreseen time of publication of calls and type of contracts is shown in 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 WP2020 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.

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

vi. Grants and specific Grants are clearly identified and information is provided to fulfill art.58 of the Financial Regulation (see 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

The objectives for the WP are:

- Technical: F4E defines as its technical objectives the achievement on time of the selected milestones. The technical objectives are provided in each Action (see tables 4 to 8 in Annexes to Project Plan).
- Non-technical: F4E defines as its non-technical objective the implementation of the budget allocated to each Action . As this definition is applicable to all the Actions, this objective is not repeated in the description of each Action.

There is a close link between the long-term (i.e. Project Plan) planning and the short-term (i.e. workprogramme) activities. In the Workprogramme, F4E is tracking some selected existing technical 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.

The KPI for technical objectives is the variance while the KPI for the budget is the annual commitment.

3. LIST OF WP2020 ACTIONS

Action 1. Magnets

Action 1	Magnets

TF & PF Conductors

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

The manufacturing of all 9 Pre-Compression Rings will be completed in 2020.

Procurement Activities

Task orders related to Quality Inspection services will 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

The first of the three major contracts for the production of the Toroidal Field Coils (70 Radial Plates) was completed in 2017.

For the second major contract (10 Winding Packs), during 2020 all 10 Winding Packs will be assembled and completed.

The third major contract (Winding Pack Cold Test and Insertion into Coil Case) will continue at full manufacturing speed during 2020. The 1st and 2nd TF Coils will be completed and delivered to the ITER IO site in Cadarache.

Procurement Activities (contracts and grants)

Task orders related to Quality Inspection and/or Engineering services will be renewed to follow up the TF Coil manufacturing activities.

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

Poloidal Field Coils

Progress of Work

The first two PF Coils, PF5 and PF6, will be completely finished and handed over to ITER IO for assembly. Thus, all manufacturing activities at the ASIPP site in China will be finished. In Cadarache, the manufacturing of PF2 will be well advanced and all 6 Double Pancakes will be completed and ready for stacking.

Procurement Activities

Amendments and/or options for existing contracts may be signed (i.e., contract extensions, claims, transportation, deviation notices, Jumpers manufacturing, Liquid Nitrogen for additional Cold Tests, etc.)

Task orders related to Quality Inspection services will be renewed to follow up the PF Coil manufacturing activities.

One or more task order(s) might be signed for the supply of “Off the Shelf Components” for the PF Coil workshop.

One or more task order(s) might be signed to cover for Engineering, Qualification and Testing activities related to the manufacturing of the coils.

For PF6 Coil International Cooperation agreement, contributions to regularize the cooperation agreement will be signed.

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.1A.11680	Delivery of TF09 (EU 01) by EU-DA to ITER Site	Q1 2020	GB15	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.21882	ATPC - IO Approval for Insulate, impregnate and Cure (8.3.5) TFWP14	Q3 2020	Predecessor of GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.22600	Delivery of TFWP01 to Cold Test and Coil Insertion site	Q2 2020	Predecessor of GB23	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.3B.527810	GB12 - PF Coil: EU PF 5 coil ready for cold test	Q1 2020	GB12	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
EU11.3B.527830	GB14 - PF Coil: Manufacturing Complete for EU PF 6 Coil and Delivery to Site	Q2 2020	GB14	PA 1.1.P3A-B.EU.01 Poloidal Field

				Magnets 2,3,4,5,6

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. All 9 Pre-Compression Rings completed.
2. All 10 TF Coil Winding Packs completed.
3. 1st and 2nd TF Coils completed.
4. PF5 and PF6 completed.
5. All 6 Double Pancakes of PF2 completed.

EXPECTED RESULTS AND TARGET

The target of 2020 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	18.862	65.316
PA 1.1.P2A.EU.01 Pre Compression Rings	0.3	0.6
PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	11.25	24.47
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

During 2020, the European Vacuum Vessel (VV) will continue to be in full production for all sectors, heading towards final assembly of sectors 5 and 4. This assumes the successful execution of the final assembly strategy at HHI (KO DA), enabling the European VV supplier to implement lessons learned from the Korean manufacturing.

Free-issued Items

The following free-issued items shall be delivered during 2020 by other DAs for assembly by the European supplier during segments and sectors fabrication:

- Upper Port Stub Extensions from RF-DA
- Equatorial and lower Port Stub Extensions from KO-DA

At the time of writing, PCR's are under discussion for de-scoping of the VV splice plates and overall sharing of the transportation frames, which could lead to additional Cash Contribution or PA credits amendment in favor of IO.

Final Assembly Activities

Preparatory activities by the F4E VV supplier required to assemble the 4 segments into a sector will be ongoing:

- For sector 5: at Monfalcone (Mangiarotti)
- For sector 4: at Ortona (Walter Tosto)

Procurement Activities

Provisions will be made for the transportation frames, for the free-issued items received from the other DAs (i.e. additional tests at acceptance stage, resolution of non-conformities, if required), participation in collaboration meetings with the Korean DA for the final assembly and commissioning of the sectors baking facility and for site acceptance tests.

To support the work on the manufacturing sites, inspector contracts will be placed according to the manufacturing rate as well as technical support tasks possibly required for the resolution of the design changes, or studies in support of the non-conformities resolutions. Other provisions that include, inter alia, legal support or project management support might be requested for the follow-up of the main vacuum vessel contract as well as for acceleration measures.

Additional Cash Contribution or PA credits amendment in favor of IO might be needed (see above).

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU15.1A.08500	Delivery of Sector 5 by EU-DA to ITER Site	Q3 2020	GB16	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.105730	S5 Final Machining - Complete Sector 5	Q3 2020	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.3037900	S9 PS2 1st sub-assembly	Q3 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.3037920	S9 PS1 1st sub-assembly	Q3 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.80360	S9 PS4 1st sub-assembly	Q3 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum

				Vessel – Main Vessel

EXPECTED RESULTS AND TARGET
The main expected results for this action are: 1. Start of D-Shape of Sector 5. 2. Completion of Sector 4 Final Machining. 3. Completion of Segments Subassemblies of Sector 3. 4. Completion of Segments Subassemblies of Sector 2. 5. Completion of Segments Subassemblies of Sector 9.

EXPECTED RESULTS AND TARGET
The target of 2020 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	24.614	78.384

Action 3. In Vessel – Blanket

Action 3	**In Vessel - Blanket**

Blanket First Wall

Progress of Work

In 2020 the manufacturing of the Full Scale Prototypes (Normal Heat Flux first wall design) is foreseen to be completed and High Heat Flux testing will take place, as a part of the Supplier's qualification.

The manufacturing of the Alternative Design Mock-Ups (ADMUs), featuring a cheaper design variant with no steel pipes in the heat sink, will be completed during the year. These mock-ups will be used to verify possible improvements of processes and design from the manufacturing point of view.

Procurement Activities

In 2020 the main activity foreseen, as part of the implementation of the scope of work of PA 1.6.P1A.EU.01 for the procurement of the EU share of the First Wall for ITER, is the signature of the contract(s) for Tasks 1-3 (engineering, set-up of the production line, qualification and pre-series) of the series production of the First Wall Panels.

For the same purpose, it is planned to issue Invitations To Tender for the procurement of the CuCrZr raw material and for the mechanical characterization of samples coming from the qualification of the FW panels production line and of the manufacturing processes for the series production. The corresponding Framework Contracts should also be signed by the end of the year.

Task Orders for the procurement of the first batch of Be semi-finished tiles and for material characterisation will also be signed by the end of the year.

The follow-up of all the design and manufacturing activities will require the support of external resources and inspectors taken in the frame of on-going F4E framework contracts.

Options for Ultrasonic Testing and Final Storage will be released for the Full Sale Prototypes after the completion of the respective High Heat Flux testing campaigns.

Options to perform the factory acceptance tests needed to make the ADMUs suitable for High Heat Flux testing are also planned to be released.

Blanket Cooling Manifolds (BCM)

Progress of Work

The design of the supporting system of the BCM and the overall inboard and outboard configurations will be optimized and finalized based on the analysis of the results of the prototypes' testing. This will allow the Procurement Arrangement (PA) for the supply of the Manifolds to be signed in April 2020.

Procurement Activities

The tendering for the Series production of the Blanket Cooling Manifolds will be launched in Q2 2020.

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU.16.01.100010	Contract signed for Normal Heat Flux First Wall Panels	Q4 2020	Predecessor of GB37	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.201500	Task Order Signed for Procurement of Beryllium (Initial Delivery) (TO#01)	Q3 2020	WP20 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.204250	Published Call for Tender for FwC Procurement of CuCrZr for Series production	Q2 2020	WP20 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU16.1A.11700	PA Signature of 1.5.P1A.EU.02 Blanket Manifold	Q2 2020	WP20 objective	PA 1.5.P1A.EU.02 Blanket Manifolds

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Signature of the contract(s) for Tasks 1-3 (engineering, set-up of the production line, qualification and pre-series) of the series production of the First Wall Panels, as a part of the implementation of the scope of work of PA 1.6.P1A.EU.01, for the procurement of the EU share of the First Wall for ITER.
2. Signature of the first Task Order for the procurement of Beryllium semi-finished tiles for the series production.
3. Launch of Invitation To Tender for the procurement of CuCrZr raw material for the series production.
4. Signature of the Blanket Cooling Manifold PA 1.6.P6.EU.01

EXPECTED RESULTS AND TARGET

The target of 2020 is the achievement of a cumulative value expressed in kIUA (CAS):		
	Yearly value	Cumulative value
PA 1.5.P1A.EU.02 Blanket Manifolds	0.2	0.2
PA 1.6.P1A.EU.01 Blanket First Wall	0.025	0.1

Action 4. In Vessel – Divertor

Action 4	**In Vessel – Divertor**

Inner Vertical Target

Progress of Work

For the divertor inner vertical target (IVT), the manufacture of full-scale prototypes will continue at the three EU additional suppliers. In particular, the fabrication of the IVT plasma facing units, the high heat flux test frame and the steel support structure will be fabricated (OMF-567 Lots 1,2,3).

In parallel after the completion of the IVT prototype, Ansaldo Nucleare will undertake the fabrication of plasma facing units by using the ITER reference tube transition and alternative tungsten grades. All the above activities will require the support of resources and inspectors taken from on-going F4E framework contracts.

The technical specification for IVT series production, to take into account the lessons learnt with the fabrication of full scale prototypes, will be revised.

Procurement Activities

The main activities foreseen concern the HHF testing of IVT prototypes and mock ups (contracts). Task orders will be placed to require the support of external resources and inspectors in the frame of on-going F4E framework contracts.

Cassette Body

Progress of Work

For the divertor cassettes, the work will proceed under the contracts launched for Stage I of the cassette body series production. The main achievement will be the completion of engineering activities and the performance of Manufacturing Readiness Review, the procurement of materials and the start of fabrication of the firsts of a kind (OMF-444 Lots 1 and 3). The follow-up of the above activities will use the support of external resources, e.g. for metrology, non-destructive examination and welding activities, and inspectors taken from on-going F4E framework contracts.

Procurement Activities

The main procurement activity under this subsystem is the signature of a direct contract for the fabrication of the transition pieces for the tokamak cooling water system (TCWS) and the remote handling (RH) flanges for the cassette body series.

Divertor Rails

Progress of Work

Since expected need dates from IO for the divertor rails will not be set before mid-2026, agreement has been reached with IO Internal Component division to postpone the signature of the PA from Q4 2020 to Q1 2021 to reduce the expected workload for the busy period of the end of 2020. The procurement schedule is being re-baselined, jointly with IO.

Procurement Activities (contracts and grants)

N/A

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.100230	Manufacturing Readiness Review for Cassette Body Series - Final Approval - OMF-444-03-01	Q4 2020	Predecessor of GB38	PA 1.7.P1.EU.01 Cassette Body
EU17.03.1040	PA Signature of 1.7.P2E.EU.01 Divertor Rails	Q4 2020	Predecessor of GB49	PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails
EU17.2B.12590	Approved final Technical Specification for Plasma Facing Component Series Production	Q4 2020	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.66620	HP - F4E to send IO Ultrasonic / X-ray examination of steel structures - OPE-567-02-01	Q3 2020	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.84950	ATP - Geometrical shape and tolerances of twisted tapes - OPE-567-03-01	Q3 2020	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Performance of the Manufacturing Readiness Review for the cassette body series procurement for the two concerned suppliers (OMF-444 Lots 1 and 3).
2. Completion of the inner vertical target plasma facing units with reference tube transition and alternative tungsten grades (OPE-138 Lot 1).
3. Completion of the manufacturing and qualification of the inner vertical target steel support structure (OMF 567 Lots 1,2,3).
4. Completion of the inner vertical target plasma facing units and twisted tapes (OMF 567 Lots 1,2,3).

EXPECTED RESULTS AND TARGET

The target of 2020 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
PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails	0	0

Action 5. Remote Handling

Action 5	Remote Handling

Divertor Remote Handling System (DRHS)

Progress of Work

After the successful closure of the Preliminary Design, the focus will be given to the Final Design activities. Two main development lines will run in parallel: one for the Cassette Multifunctional Mover (CMM) and the other one for the Cassette Toroidal Mover (CTM).

Procurement Activities

For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Technical Support Services (TSS) framework contracts.

Cask and Plug Remote Handling System (CPRHS)

Progress of Work

The preliminary design activities continue towards the design review scheduled to be held in 2020. After completing the preliminary design phase, final design development starts gradually. Activities are organized in two parallel development lines. One focuses on the first assembly cask that is first plasma component, the other one focuses on the nuclearized cask variants.

Procurement Activities

For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Technical Support Services (TSS) framework contracts.

Neutral Beam Remote Handling System (NBRHS)

Progress of Work

The preliminary design activities continue towards the design review scheduled to be completed in 2020. After completing the preliminary design phase, final design development starts gradually. 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 a first plasma item.

Procurement Activities

For the different development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Technical Support Services (TSS) framework contracts.

In-vessel viewing system (IVVS)

Progress of Work

The preliminary design activities continue towards the design review scheduled to be completed in 2020. After completing the preliminary design phase, final design development starts gradually.

Procurement Activities

For the different development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Technical Support Services (TSS) 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 procurements and for complementary RH technology related design activities, qualification and prototyping.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.03.14046072	EU CPRHS PDR meeting completed Machine Assembly 1 Items	Q3 2020	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14046592	Task Order Signed for Final Design MA-1 for CPRHS	Q3 2020	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.00440	EU NBRHS Preliminary Design Monorail crane (Incl. other first priority items) Hold Point released	Q4 2020	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System

EU57.01.50120	IVVS Preliminary Design Approved	Q3 2020	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Starting final design of DRHS CTM
2. Completing preliminary design of Monorail crane of NBRHS
3. Completing preliminary design of CPRHS Machine Assembly Phase 1 items
4. Completing preliminary design of IVVS

EXPECTED RESULTS AND TARGET

The target of 2020 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	1.2
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.5	0.8
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.36	0.46
PA 5.7.P1.EU.01 In-Vessel Viewing System	1.28	2.48

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle

Progress of Work

Fuel Cycle

In the frame of the PA for leak detection and localization system, following the PA signature for the first phase (Leak Detection) in 2018, the contract for the procurement of the Leak Detection systems will be signed and, further to the signature of the PA amendment in 2019 the tendering process for localization activities will start.

The negotiation for the transfer to IO of The type A radwaste treatment and storage system will be pursued in 2020.

In the frame of the PA for REMS (Radiological and Environmental Monitoring Systems), the tendering process for 1st plasma activities will be on-going. An expert contract will be signed to support REMS activities.

Vacuum Pumping

The activities in this field will keep growing:

- For the Torus and Cryostat Cryopumping System, after signature of the contract end of 2019, 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. The supply of the expansion profiles (Lot 2) and charcoal coating of the cryopanels (Lot 3) will be completed in 2020. The task order for the MITICA Cryopump Installation tool will be signed.
- For Warm Regeneration Lines, PA closure is expected after delivery of all the lines in 2019
- The work on Front End Cryopump Distribution System (Torus and Cryostat Cold Valve Boxes, Johnston couplings and cryojumpers, I&C) will continue. The manufacturing option for Torus and Cryostat Cold Valve Boxes will be released. The contract for cabling will be signed.

Cryoplant

The commissioning of the MITICA cryoplant in the RFX facilities (Padova, Italy) will be completed in 2020.
For the cryogenic quench line header the scope of work will be focused on installation and testing.
The installation of the LN2 Plant and Auxiliary Systems in the Cryoplant building at Cadarache will be completed in 2020.

Procurement Activities

Fuel Cycle

- Leak Detection and Localization System: Contract signature for Leak Detection (Primary and Cryostat).
- Front-end Cryopump Distribution System: Contract signature for Cabling procurement.
- MITICA Cryopump: Installation tool task order signature.
- Front-end Cryopump Distribution System: Release of the option for manufacturing and factory testing of cold valve boxes and warm regeneration box.
- Front-end Cryopump Distribution System: Signature of task order 3 for I&C.
- Front-end Cryopump Distribution System: Release of the option for platform procurement.

Cryoplant

LN2 Plant and Auxiliary Systems Contract signature for utilities of commissioning phase.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU31.01.11080	Manufacturing Readiness Review Approved for Torus & Cryostat Cryopumps	Q4 2020	Predecessor of GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps
EU31.01.12300	M18 - MRR approval and release of HP for CVBs	Q4 2020	Predecessor of GB28	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes

				and Warm Regeneration Box
EU31.01.31720	M10 - Manufacturing and testing of the PS completed	Q4 2020	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.03.25420	Published Call for Final Tender for Procurement of components for Primary & Cryostat Leak Detection System	Q3 2020	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System
EU31.03.28080	Invitation to submit Tender for Procurement of components for Primary & Cryostat Leak Detection System	Q2 2020	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Torus and Cryostat Cryopumping System: manufacturing design for Torus and cryostat cryopumps completed.
2. Neutral Beam Cryopumps: Completion of expansion profiles and charcoal coating for MITICA Cryopumps
3. Front End Cryopump Distribution System: Final design completed
4. Radiological and Environmental Monitoring Systems: Negotiation closed for Tendering process for 1st plasma activities
5. Leak Detection and Localization System: Evaluation of tenders for Primary and cryostat leak detection system completed.
6. Cryoplant: On-site installation completed.

EXPECTED RESULTS AND TARGET

The target of 2020 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	0.15319	0.22979
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0	0
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II)	0	0
Leak Detection and Localization System Common Activities	0	0
PA 3.2.P3.EU.01 Isotope Separation System	0	0
PA 3.2.P5.EU.01 Water Detritiation System - Tanks	0	3.252

PA 3.2.P5.EU.02 Water Detritiation System - Main System	0	0
PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	1.0475	25.32359985
PA 6.4.P1.EU.01 for Design of REMS	0	0
PA 6.3.P1.EU.01 Type A Radwaste Treatment and Storage System	0	0

Action 7. Antenna & Plasma Engineering

Action 7	Antennas and Plasma Engineering

Ion Cyclotron Antenna

No activities of design foreseen in 2020.

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

Progress of work

In 2020 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 actions are the fabrication of the EC plug BSM (port-mounted Blanket Shield Module) and procurement of semi-finished material for waveguide fabrication. 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 FDR in 2020. Management of changes (requirements, and interfaces) as well as technical complexity and diversity of launcher components will be the main challenges.

Procurement activities

PA activities: in addition to the follow-up activities related to the series fabrication of the diamond disks, two main contracts will be launched in 2020. One is for the fabrication of the 4 port-mounted Blanket Shield Modules. The fabrication of the 4 BSMs follows the successful prototyping work carried out in the last 2 years. The second main contract is the procurement of the semi-finished CuCrZr elements required for the fabrication of the ex-vessel waveguides and mitrebends for the 4 Upper Launchers and for the Equatorial Launcher. 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. Preparation for the Port Plug fabrication and assembly contracts are also foreseen in 2020.

ITA activities: Support for Final and Build-to-print design will be ongoing during 2020, mainly performed through specific contracts as part of an existing framework, related to CHIT resolution of the FDR of the Port Plug and in preparation of the FDR of the ex-vessel waveguide system. On prototyping, mm/wave components prototyping programme will be further developed with the signature of contracts for manufacture of valves, sensors, mirrors amongst

others. Specific contracts under the existing framework contract for setup and operation of the EC components test facility (FALCON) are envisaged in 2020.

Engineering support activities are also foreseen in 2020, to both PA and ITA activities. Most will be implemented with existing framework contracts but new specific contracts are planned as well.

Electron Cyclotron Control System

Progress of Work

The Electron Cyclotron Control System development follows a staged approach. Following the delivery in 2018 of the FAT tools (ECPC Stage 1), the delivery of ECPC Stage 2 (the Gyrotron Commissioning Components (GCC) plant control system) was postponed as building 15 was not ready for installation. To minimize risk and mitigate the delay given by building 15 RFE date, in 2019 a prototype of this system was installed and tested in the FALCON facility. In 2020 the final version of ECPC Stage 2 system will be delivered to ITER-IO and installed in building 15 (RFE date foreseen is June 2020). The ECPC Stage 3 and the Subsystem Control Unit of the Upper Launcher (EC-UL-SCU) Stage 2 for first plasma will both start in 2020 the design phase.

Procurement Activities

Procurement of service contracts for the installation and commissioning of the ECPC Stage 2 .

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 2020 is going to focus on transversal activities in support to F4E procurements. Specific contracts might be necessary, accordingly.

As for 2019, Plasma Engineering Studies and Engineering Support for PE and Antennas will mainly not be credited through PAs.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.422132	GB MS: Manufacturing of 1st batch of Diamond Disks for EC Upper Launcher 1 finished	Q3 2020	GB22	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.602220	Start Call for Tender Series production of EC UL Blanket Shield Module	Q4 2020	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.700120	Task Order Signed for Procurement of semi-finished CuCrZr for the fabrication of EL EW components	Q3 2020	Predecessor of GB29	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.950160	SAT of EC Plant Control Stage 2	Q3 2020	Predecessor of GB44	GB and annual milestones

EXPECTED RESULTS AND TARGET
The main expected results for this action are: 1. ECPC Stage 2 (GCC control system) installed in ITER IO. 2. Testing of 50 mm transmission lines, mitrebends and partial valve component mock ups.

EXPECTED RESULTS AND TARGET

The target of 2020 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.1.P1.EU.01 Ion Cyclotron Antenna	0	0
PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.1241	0.1241
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0.5	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

- Continuation of Manufacturing and Factory Acceptance Tests of the UNITS 4-6 of the European EC Power Supply
- Technical Follow-up of the EC Power Supplies will continue
- Construction Readiness Review for the installation and commissioning of the EC Power Supply system in ITER
- Delivery of the first units of the EC Power Supply system
- Start of installation and commissioning of the EU EC Power Supply system
- The performance of the improved 1MW Continuous Wave Gyrotron prototype will be verified with high power tests
- The 5.2.P3.EU.01 Gyrotron PA will be signed
- The preparation of the tendering procedure for the Gyrotrons in the EU scope of procurement will start.

Procurement Activities

Electron Cyclotron (EC) Gyrotrons:

The EU procurement arrangement for European Gyrotrons will be signed. It 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.

Electron Cyclotron Power Supplies:

Options will be released for the main contract for the procurement of the EC Power Supplies and the follow-up and specific contracts signed for the Auxiliaries and Interfacing systems.

Neutral Beam

Progress of Work

- MITICA Beam Source – completion of the manufacturing readiness review, testing of prototypes and manufacturing of the series production
- MITICA Beam Line Components – manufacturing readiness review and prototyping
- NB Vessels, Drift-Duct and Absolute Valve:
    - PA signature foreseen in September 2020
- Passive Magnetic Shield (PMS) and Active Correction Compensation Coils (ACCC):
    - Final design review by IO foreseen in April 2020
    - PA signature foreseen in March 2021

Procurement Activities (contracts and grants)

Specific contracts/grants will be signed for technical follow-up.

Pressure Vessel and Magnetic Shielding

The components of the HNB1 and 2 NB Injectors are under PA-53-4. The whole scope of supply will be arranged in three parts. The first one (PA-53-4A) for drift duct, NB vessel and absolute valve will be signed in 2020. Therefore, in 2020 only the preliminary procurement activities in preparation of call for tenders will start, depending 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, MITICA diagnostics and PRIMA Assembly, as well as the Release of Options of MITICA Beam Source, specific contracts for services for static tests and Inspection “Collaudo” and site supervision and support. Specific grants/contracts for Technical support in the area of Neutral Beam components will be signed.

Neutral Beam Power Supplies

For Ion Source and Extraction Power Supplies (ISEPS) and Ground Related Power Supplies release of options for spares and technical support for post acceptance activities is scheduled.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.03.10676	PA 5.2.P3.EU.01 EC Gyrotrons Signed by IO to EU-DA	Q3 2020	Predecessor of GB48	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons
EU52.04.13330	52HV05 (AAG Set#1) Commissioning and Acceptance Tests Completed (M3.1.5)	Q4 2020	WP20 objective	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply
EU52.04.22995	Delivery of ECPS 52HV05 (AAG Set #1) to ITER Site by EU-DA	Q1 2020	GB56	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply
EU53.04.40570	PA 5.3.P4A.EU.01 HNB Absolute Valve, Beamline Vessel & Drift Duct Signed by IO	Q3 2020	WP20 objective	PA 5.3.P4A.EU.01 Heating Neutral Beam Drift Duct + NB Vessel + Absolute Valve
EU53.06.08510	NP - Start of Manufacture of EU-HVD1 & EU-Bushing of NBI-1	Q1 2020	Predecessor of GB30	PA 5.3.P6.EU Neutral Beam Power Supply
EU53.TF.14000	Commitment for Specific Contract - MITICA CODAS 1, Interlock (FW Contract NBTF Control, Interlock and Safety)	Q3 2020	WP20 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components
EU53.TF.16150	NP - Contract Signed - MITICA Diagnostics	Q2 2020	WP20 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Procurement Arrangements signatures for Absolute Valve, Beamline Vessel & Drift Duct
2. Procurement Arrangements signatures for the European Gyrotrons
3. Delivery of first electron cyclotron power supply
4. Completion of MITICA beam line vessel (BLV) installation

EXPECTED RESULTS AND TARGET

The target of 2020 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	0	0
PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	3.948	8.491
PA 5.3.P1.EU.01 Neutral Beam Assembly and Testing	0	0
PA 5.3.P2.EU.01 Heating Neutral Beam Beam Source	0	0

PA 5.3.P3.EU.01 Heating Neutral Beam Beamline Components	0	0
PA 5.3.P4A.EU.01 Heating Neutral Beam Drift Duct + NB Vessel + Absolute Valve	0.595	0.595
PA 5.3.P5.EU.01 Heating Neutral Beam Active Correction Coils	0	0
PA 5.3.P6.EU Neutral Beam Power Supply	1.75	15.91
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	1.46	18.23

Action 9. Diagnostics

Action 9	**Diagnostics**

Progress of Work

Diagnostics team will continue during 2020 the manufacturing of several components to be delivered to ITER mainly for first plasma including among others manufacturing of several magnetic sensors and platforms, captive components for the plasma position reflectometry system, the fission chamber for the radial neutron camera diagnostic and the mineral insulated cabling that will provide electrical service to all the diagnostic sensors located in-vessel.

The design of all remaining Diagnostics systems will also progress mainly under the on-going Framework Partnership Agreements as will the integration of the Diagnostics systems in the Ports.

Several diagnostics systems will finalize either the preliminary design phase or the final design phase with the approval of the relevant design review including for the magnetics plant controller, the tokamak electrical feedthroughs and the integration of the European ports among others.

Procurement Activities (contracts and grants)

Procurement activities will mainly be focussed in two different areas: placement of manufacturing contracts for the production of components to be delivered to ITER and procedures for the completion of the design of less mature Diagnostics systems. Those 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 to cover the needs of the team during 2020 is also foreseen as is the use of inspectors for manufacturing contracts and experts on the different areas. Specific contracts/grants will be signed.

Manufacturing contracts

During 2020 the launch and /or signature of contracts for the manufacturing of electrical auxiliary services (including clips, clamps, bosses and critical junction boxes), for the manufacturing of in-port connectors and for marshalling supporting systems is envisaged.

These electrical services will provide the transmission line for all the diagnostic sensors located in-vessel. They have been specifically designed to withstand the radiation inside the vacuum vessel and to be compatible with its ultra-high vacuum environment.

Other manufacturing contracts include captive ex-vessel transmission components for the plasma position reflectometry system and platforms for the bolometer cameras amongst others.

Design contracts

Most of the long term specific grants under the on-going Framework Partnership Agreements are already in place for the design of the Diagnostics systems. Additionally the signature of a task order under an on-going framework contract is envisaged for the qualification of the port integration systems, including the qualification of the diagnostic shield modules; complex metallic structures designed to provide mechanical support and plasma shielding while allowing access to plasma diagnostics.

The signature of a contract for the design of the core plasma Thomson scattering system is also envisaged during 2020, as is the contract for the final design of the remote handling connector for the tokamak electrical services and the plant controller integration for magnetics diagnostic, amongst others.

Those 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.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.203010	Published Call for Tender for Bespoke Instrumentation Hardware	Q4 2020	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.01.203750	Task Order Signed for Plant Controller Integration - System Integration, FAT, Shipping & Support	Q4 2020	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.06.681990	Published Call for Tender for Procurement and Delivery for Feedthroughs	Q3 2020	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Delivery of the outer vessel coils for installation on the vacuum vessel sectors 1, 3, 4 and 9
2. Contract signed for design and manufacturing of vacuum vessel mounting platforms for vacuum vessel mounted bolometer cameras
3. Contract signed for procurement and delivery for plasma position reflectometry captive ex-vessel transmission components
4. Preliminary design review of sensor head & electronics for pressure gauges completed
5. Contract signed for the manufacturing of in-vessel clips, clamps and critical junction boxes for the tokamak electrical services system
6. Contract signed for the manufacturing of chemical vapour deposition (CVD) diamond prototype
7. Contract signed for the preliminary design of the core-plasma Thomson scattering
8. Preliminary design review for low field side collective Thomson scattering completed

9. Preliminary design review for the in-port components of the core-plasma charge exchange recombination spectroscopy completed
10. Preliminary design review for the ex-vessel optical/mechanical components of the wide angle viewing system completed
11. Preliminary design review for equatorial port 1 integration completed

EXPECTED RESULTS AND TARGET

The target of 2020 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	0.14965	0.83762
PA 5.5.P1.EU.03 Diagnostics - Bolometers	0	0
PA 5.5.P1.EU.05 Diagnostics - Plasma Position Reflectometry	0	0.09503
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.19159	0.19159
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00074752	0.00095364
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	0.11264	0.11264
PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.11724	0.23448
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	1.38680998	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 Analyses, the Post Irradiation Examination of EUROFER specimen and the development of preliminary Welding Procedure Specifications (pWPS) needed for the manufacturing of the TBM box.

In addition other relevant activities foreseen this year are:

- the signature of the new FwC for EUROFER Handling and Storage;

- the signature of the FwC for the completion of the pWPS/weldability studies and for the fabrication and testing of TBM box mock-ups;

- the publication of the Call for Tender of the FwC for the Preliminary Design of the WCLL Ancillary Systems.

Procurement Activities

It is planned to sign Task Orders for the following activities:

- the continuation of the Preliminary Design activities of TBM Set , Ancillary Systems and of the related Safety Analysis;

- the support of Agreed Notified Body (consulting role);

- the storage and handling of EUROFER;

- the continuation of the development of welding procedure specifications for the TBM Box and mock-ups.

Activities executed jointly by ITER Members/DAs under the collaborative scheme of the TBM PT will start/continue in 2020.

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU56.01.1242620	Published Call for Tender for the FWC of WCLL AS Preliminary Design	Q3 2020	Linked to TBM04 (see Table 5 in Annex to Project Plan)	NA
EU56.02.1239840	Signature of TO1 for Continuation Handling & Storage of EUROFER97 & P91 materials	Q3 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA
EU56.02.1240400	Published Call for Tender for Continuation of Handling & Storage of EUROFER97 & P91 materials	Q1 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA
EU56.02.130080	Published Call for Tender for FWC of pWPS-Mock-Ups	Q2 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. The completion of the activities planned in the 1st Specific Contract for the Preliminary Design activities of the TBM Set. 2. The completion of the preliminary Welding Procedures Specification for the Manifold area of TBM. 3. The completion of the activities regarding the support of an ANB to EUROFER97 weldability analysis, inventory and optimization of welding qualification and strategy of the TBM Set Conformity Assessment. Target credit NA

Action 11. Site and Buildings and Power Supplies

Action 11	Site and Buildings and Power Supplies

Progress of Work

First phase civil works in the Tokamak Complex will come to a close through 2020, with the delivery of the Tokamak Crane Hall, and Tokamak and Diagnostic buildings made available to IO contractors systematically by level and area (TB03 Civil Works /TB11 Finishing Works /TB19 Painting and Coating works).

Key works on the services installation of the auxiliary buildings will also be completed including the Cryoplant Buildings (B51/52) and Site Services Building (61) (TB04 Services Installation), as well as TB04 equipment deliveries for the Tokamak Complex.

The Pulsed Power Electrical Network (PPEN) 66kV distribution installation and energisation (TB06) will progress, and the key Medium Voltage Load Centre 01 for buildings 32, 38, 51 and 52 will also be completed and ready for use.

Procurement Activities

Contracts to be signed by the end of 2020 include:

TB18: Civil Works and Finishing of Tritium Building (B14) Above L2 – planned contract signature Q2 2020

TB13: Design and Build of Emergency Power Supply Buildings (B44-47) with Supply and Installation of Electrical Components - planned contract signature Q3 2020

Specific contracts will be signed under ongoing framework support services and works contracts. This includes, for example, TB11, Facility Management, Site Security and Reception Services, Structural analysis, Building HMI Development, Engineering and Contract Management Consultancy Services (with special respect to cost and schedule assessment) and consultancy for advice on interpretation of French Regulatory Law 2012.

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

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU62.02.607050	HPC - IO approval of Contractor Construction Design (Structure & Finishing Works) for Bldg 71 Non PIC part	Q4 2020	Predecessor of GB34	PA 6.2.P2.EU.02 Services (Architect Engineer)
EU62.05.014	Tokamak Building (11) RFE 1B - Stage 2 (RFE #1)	Q1 2020	GB13	PA 6.2.P2.EU.05 Buildings and Site Infrastructure
EU62.05.20927	NPC - Building 11 totally weathertight (Including Crane Hall)	Q2 2020	WP20 objective	PA 6.2.P2.EU.05 Buildings and Site Infrastructure
EU62.05.460	Construction of Cryoplant Coldbox Building (52) Completed	Q3 2020	GB21	PA 6.2.P2.EU.05 Buildings and Site Infrastructure
EU62.100290	Contract Signed for TB13 Contract	Q3 2020	Predecessor of GB26	PA 6.2.P2.EU.05 Buildings and Site Infrastructure
EU62.620815	Taking-Over of TB02 Cranes Completed (Tokamak Crane Hall part)	Q3 2020	WP20 objective	PA 6.2.P2.EU.05 Buildings and Site Infrastructure

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Completion of RFE1B Stage 2 Milestone allowing limited crane access between Assembly Hall and Tokamak Building to allow transfer of Cryostat Base
2. Building 11 Totally Weathertight – Including Crane Hall
3. Construction of Cryoplant Buildings (B51/52) Completed
4. Construction of Site Services Building (B61) Completed
5. Taking over of TB02 Cranes Completed (Tokamak Crane Hall Part)

EXPECTED RESULTS AND TARGET

The target of 2020 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
COMMON	3.425	57.79865009
TOKAMAK COMPLEX	14.00614889	66.37323295
AUX BUILDINGS TB03/TB04	7.235	70.9536391
AUX BUILDINGS D&B TB05	0	15.15
AUX BUILDINGS D&B TB06	3.47284004	10.95284004
AUX BUILDINGS D&B TB07	0	6.3742002
AUX BUILDINGS TB09/TB10	0	0
AUX BUILDINGS D&B TB12	0	0

AUX BUILDINGS D&B TB13	0	0
LOAD CENTERS	10.932	10.932
INTERCONNECTING ACTIVITIES	0	0.72834998
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

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. In addition, the contribution to the Settlement Agreement EU-JA is foreseen.

ANNUAL OBJECTIVES

Milestone	Scope Description	Forecast achievement date	Type of milestone	PA
Cash to IO	Yearly Commitment [3]	Q4 2020	WP20 objective	NA
Cash to Japan	Commitment Atmospheric Detritiation System	Q4 2020	WP20 objective	PA 3.2.P4.JA.01
	Commitment of Contribution to Settlement Agreement EU-JA	Q4 2020	WP20 objective	NA

EXPECTED RESULTS AND TARGET

[3] 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 2020 is the cash contribution to IO for 2021.

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 2020 is to commit the cash contribution for 2021 according to the decisions due to be taken by the ITER Council in November 2020.

As far as the cash to Japan is concerned, the target for 2020 is to commit the amount agreed in the Annexes C to the Japanese PA 3.2.P4.JA.01 due to be signed during the year and the contribution to the Settlement Agreement.

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

Technical Support Service Unit (TSS) during 2020 will continue supporting the ITER Departments project Teams (and to a limited extend the BA department) by providing them technical expertise in the key domains of engineering and fusion technologies.

The unit will provide technical expertise in the following areas:

Design office activities, 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 2020 the Materials and Fabrication group at the Technical Support Services 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 2020 will be to support the critical component fabrication for Magnets, Vacuum Vessel and In-Vessel.

Assembly Integration and Validation (AIV)

Support to F4E management on review and assessment of proposed AIV policies and plan. Support to Configuration Management in the expected upcoming set of 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); supporting decisions on transfer of F4E AIV responsibilities to IO.

Nuclear Safety

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 and other activities to re-inforce the nuclear safety culture within F4E.

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

Quality Assurance, Quality Control

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.

Task Orders under existing framework contracts will be issued for both the QA and QC activities.

CE Marking

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).

A framework contract will be signed for the continuation of support services in the area of CE marking.

Systems Engineering

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.

Task Orders under existing framework contracts will be issued to continue to support the F4E Project Teams both in Barcelona and in Cadarache.

Office of the Chief Engineer

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.

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

A dedicated contract in the area of technical integration will also be signed.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.ES.01.60080	Published Call for Tender for Provision of CAD Design Support	Q1 2020	WP20 objective	All
EU.ES.01.60200	Contract Signed for Provision of CAD Design Support	Q3 2020	WP20 objective	All
EU.ES.03.23220	Contract Signed for Provision of System and Instrumentation Engineering Support	Q2 2020	WP20 objective	All
EU.ES.03.60200	Contract Signed for I &C integration services	Q1 2020	WP20 objective	All
EU.MF.01.20220	Contract Signed for Provision of material characterization at cryogenic temperatures	Q4 2020	WP20 objective	All
EU.NS.01.33100	Signature of TO XY OFC-0735-01 for Nuclear Safety support (cont. TO 01)	Q1 2020	WP20 objective	All
EU.PM.3026560	Contract Signed for Support in the area of Technical Integration for 2020	Q2 2020	WP20 objective	All
EU.PM.3035340	Task Order Signed for TO 2020/01 for QA Support to Project Teams	Q2 2020	WP20 objective	All
EU.PM.43280	Task Order Signed for TO24 Lot 1 in Support of CM & SE - Senior #2	Q2 2020	WP20 objective	All

EXPECTED RESULTS AND TARGET

Signature of new framework contracts to continue to provide support services in the area of nuclear safety compliance and CE marking.

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.

The expected result for the activities performed by the Office of the Chief Engineer is to provide the requested support to all Project Teams on all matters described in the Scope of Work.

Implementation of framework contracts in the field of CAD Support, System and Instrumentation support, material characterization at cryogenic temperatures, Seismic analysis and design of building and mechanical components.

The target for 2020 is to contribute in achieving the cumulative credit forecasted for each action in this WP2020 thanks to the support granted to the work under each specific action.

Transportation

During 2020, TSS/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 2020, 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 2020 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.

Transportation will sign multiple Task Orders in 2020 for HEL (Highly Exceptional Loads), CEL, Gendarmerie contracts to escort the convoys and Management fees Task Order.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3027240	Task Order Signed for TO 12 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2020	WP20 objective	All
EU.PM.3027410	Task Order Signed for TO 13 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2020	WP20 objective	All

EXPECTED RESULTS AND TARGET

1. Transportation of Highly Exceptional Loads amongst others, first JA-DA TF coils and KO-DA first VV-sector between Maritime Port of Marseille and ITER site.

2. Gendarmerie contracts to escort the convoys and
3. Management fees Task Order for Transportation contractor Daher will be signed.

Target Credit NA

Other Technical Support Activities

Programme Management

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.

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

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

The above scope will be implemented mainly by issuing Task Orders under existing framework contracts.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3060650	Task Order Signed for TO 04 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q2 2020	WP20 objective	All
EU.PM.3061100	Task Order Signed for TO 04 for OMF-0831-Lot 2 - PMS for Support for SAP Business Objects	Q4 2020	WP20 objective	All
EU.PM.3074360	Task Order Signed (firm part) for TO XY for OMF-0895 PMS Lot 1: PPM Support 2020	Q3 2020	WP20 objective	All
EU.PM.3062450	Task Order Signed for TO04 for OMF-0895 PMS Lot 3: Planning Support 2020/01	Q2 2020	WP20 objective	All

EXPECTED RESULTS AND TARGET
The expected result for this Action is to provide the requested support to all Project Teams on matters concerning Programme management and additional services (i.e. risk, cost, planning, reporting, logistics, ICT, legal, etc.). The target for 2020 is to contribute in achieving the cumulative credit forecasted for each action in this WP2020 thanks to the support granted to the work under each action.

Action 14. Broader Approach

Action 14	Broader Approach

JT-60SA

Progress of Work

While the delivery and installation of the large majority of the remaining parts of EU contribution for the basic machine infrastructure is expected to be completed in 2019, some activities of transport, repair, enhancement as required from the ensuing machine integrated commissioning, will be executed in 2020. In addition, preliminary/preparatory activities for the Operation/Enhancement phase of the project (BA Phase II) will also continue.

Procurement Activities

The activities under the responsibility of F4E are carried out through grants, specific contracts under existing/new framework contracts or existing/new supply and service contracts. On the basis of risk assessment, it is also identified the possible need to perform actions in the area of re-machining of components, replacement of parts and systems on short notice, execution of on-site repairs and re-tests. F4E on site presence for the follow-up of the activities of installation of systems and components will continue to be supported by experts and health and safety services to ensure safe operations. Engineering and other auxiliary activities in support of the integrated assembly and commissioning are also planned. Contracts in support of the BA Phase II preliminary activities will be placed in 2020. Specific contracts/grants will be signed.

IFMIF/EVEDA

Progress of Work

In 2020, 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 reliability of the subsystems required for subsequent beam operations. For LIPAc preliminary/preparatory activities, for the later operation phases starting in 2021 (BA Phase II), will also continue, towards reaching the target accelerator performance and availability.

Procurement Activities

The work described above falls under the responsibility of F4E and will be carried out through 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. Additional contracts will have to be placed for demonstrating beam operation, implementing maintenance policy and consolidating beam

performance. Contracts in support of the BA Phase II preliminary activities will be placed in 2020. Specific contracts/grants will be signed.

IFERC

Progress of Work

The IFERC project comprises three activities, DEMO design and R&D, CSC (Computer Simulation Centre), and REC (Remote experimentation Centre). In 2020, the final reports of all research activities in BA phase I for DEMO Design, DEMO materials and the REC activities will be completed.In addition, the collaboration in High Performance computers will continue until March 2020, and beyond in BA phase II.

Procurement Activities

The REC activities are mostly under the financial responsibility of F4E, and are performed under F4E contracts or agreements of collaboration with EUROfusion, to provide software and services. Specific contracts/grants will be signed.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.BA.01.12760	Contract completion REC adaptation as multiple purpose control room	Q4 2020	WP20 objective	Remote Experimentation Centre
EU.BA.01.13060	Production lines ready - Thomson scattering completed	Q1 2020	WP20 objective	Thomson Scattering
EU.BA.01.13440	Final acceptance on site and transfer of ownership for ECH completed	Q1 2020	WP20 objective	ECH Power Supply
EU.BA.01.13480	Spare parts for cryoplant delivered	Q2 2020	WP20 objective	CON Cryoplant spare/replacement parts
EU.BA.01.13520	LIPAC Injector Spare parts completed	Q4 2020	WP20 objective	LIPAc Activities
EU.BA.01.6460	Delivery of Cryomodule assembly (IFMIF)	Q1 2020	WP20 objective	LIPAc Activities

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. The final acceptance test of the electron cyclotron range of frequency (ECRF) system for JT-60SA is completed, and the ownership is transferred.
2. Qualification trials for optical fibres production for Thomson scattering is completed.
3. The cryomodule of the Linear IFMIF Prototype Accelerator (LIPAc) is assembled.
4. The beam transmission into the beam dump is demonstrated.
5. The REC adaptation as multiple purpose control room is completed.
6. DEMO final report and planning for Phase 2 is completed.

EXPECTED RESULTS AND TARGET

The target of 2020 is the achievement of a cumulative value expressed in kBAUA (CAS):

	Yearly value	Cumulative value
Supply of the Resistive Wall Mode Control Coil Power Supply system (EU-RWMPS)	0.575	1.15
Supply of the ECRF Power Supply system (EU-ECRFPS)	0.746	3.73
AF04 First Cryomodule of SRF LINAC (EU)	0.3	6.11
AF08 Auxiliary Systems (Control Systems and support) (EU)	0.32	1.60
AF10 Installation, Checkout, Start-up and Commissioning (EU)	6.72	11.85
IFERC-DPA01-JA.EU (Phase Two DEMO Design Activities (DDA) for the IFERC Project)	0.61	6.04
IFERC-T2PA01-JA.EU (R&D on Tritium Technology in phase 2-3 part 2 for the DEMO R&D for IFERC)	0.055	0.55
IFERC-CSCPA01-JA.EU (Supply of Computer Resources)	0.025	0.025
IFERC-RECPA01-EU (Supply Remote Data Access Software Framework & Integrated Software Platform)	0.225	0.975

TABLE 1 WORK PROGRAMME 2020 BUDGET SUMMARY

Budget Summary of the 2020 Work Programme

Budget article		2020 Work Programme Commitment appropriations (EUR)
3 1	ITER construction including site preparation	640,213,356.54
3 2	Technology for ITER	3,110,000.00
3 3	Technology for Broader Approach & DEMO	17,401,158.88
3 4	Other expenditure	13,995,490.50
3 5	Appropriations from the ITER Host State contribution	78,945,115.00
Total Title III of the Budget		**753,665,120.92**
3 1 to 3 4	Additional non-budgeted revenue and forecast of transfer	0.00
3 5	Host State contribution carried over from previous year	0.00
3 6	Additional revenue from the Reserve Fund Allocation scheme with ITER Organization	59,812,315.32
Total amount available for the operational expenditure		**813,477,436.24**

Work Programme		2020 Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1+3 5+3.6	Expenditure in support of ITER Construction	1,950,000.00	519,800,694.86	257,220,092.00
	Sub total ITER construction + RF	**778,970,786.86**		
3 2	Design and R&D in support of ITER, not credited	0.00	2,810,000.00	300,000.00
	Sub total technology for ITER	**3,110,000.00**		
3 3	Expenditure in support of Broader Approach	760,000.00	16,321,158.88	320,000.00
	Sub total Technology for Broader Approach and DEMO	**17,401,158.88**		
3 4	Other Expenditure (EU.PM.PM)	0.00	13,995,490.50	0.00
	Sub total Other Expenditure	**13,995,490.50**		
Totals Operational Expenditure		***2,710,000.00***	***552,927,344.24***	***257,840,092.00***
		813,477,436.24		

Table 1 . Work Programme Budget Summary

TABLE 2 INDICATIVE VALUE OF FINANCIAL RESOURCES FOR THE ACTIONS IN WP2020

The WP2020 represents the financial decision to be adopted by the Governing Board in order to allow F4E to commit budget for the listed activities.
The table below shows the commitment forecast for the projects/actions in 2020 by taking into account the progress and the available manpower.
This value is the goal of the organisation.
If necessary, F4E will submit an amending budget to the Governing Board during 2020, recalling unused appropriations that can be adjusted to match the final needs.
In any case, the GB will be kept informed on the evolution of the budget implementation (both in commitments and payments) through the monthly report that F4E delivers to its Governance bodies. This report will also provide a timely indication in the case that additional budget needs to be recalled from the unused appropriations.

Action #	Action	Budget WP2020
1	Magnets	17,926,453
2,3,4,10	Main Vessel	155,343,633
5	Remote Handling	20,526,679
6	Cryoplant & Fuel Cycle	19,352,948
7	Antennas and Plasma Engineering	18,858,502
8	Neutral Beam and EC Power Supplies and Sources	13,931,211
9	Diagnostics	34,431,140
11	Site and Buildings and Power Supplies	240,113,070
12	Cash Contributions	250,000,000
13	Technical Support Activities	25,046,893
14	Broader Approach	17,946,909
	Total	**813,477,436**

Table 2 . Financial Resources per action

NB: 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.

TABLE 3 - 2020 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

Action	Signature	Type of contract
Magnets		
TO XY under OMF-0937 for Inspection Services for PF Coils 2-5 Mfr. cont. 557-01-01-53	Q4	SC-PServ
TO XY under OMF-0937 for Inspection Services for TF Coils Cold Test Insertion cont.557-01-01-44	Q1	SC-PServ
TO XY under OMF-0937 for Inspection Services for TF Coils Cold Test Insertion cont.557-01-01-58	Q1	SC-PServ
Option for TF Coil items Storage in 2020	Q3	Option
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Vacuum Vessel		
Commitment and Task Order Signed - for VV Resident Inspector at Chieti	Q1	SC-PServ
Commitment and Task Order Signed for VV Resident Inspector at Monfalcone	Q1-Q6	SC-PServ
Commitment and Task Order Signed - of VV Resident Inspector at Santander	Q1	SC-PServ
Commitment for Free issue Transportation Frame Assembly Sector 3	Q2	PSupply
Commitment for Free issue Transportation Frame Assembly Sector 5	Q2	PServ
Commitment for Sectors Transportation	Q4	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Blanket		
High Heat Flux Test Facility (OPE-319) Flat Rate Commitment for 2020	Q1	PSupply
Tasks 1-3 (engineering, set-up of the production line, qualification and pre-series) for series production of First Wall Panels.	Q4	PSupply
Task Order Signed for Resources 2020 – Blanket First Wall	Q2	SC-PServ
TO 01 Material Characterization Series	Q4	SC-PServ
TO 01 Procurement of Beryllium Series	Q1	SC-PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Divertor		
Contract for High Heat Flux Testing for Stage 2 OPE-567 Prototypes	Q2	PServ
Contract for Tokamak cooling water system Transition Pieces and Remote handling flanges of CB series	Q2	PSupply
Task Order for Inspectors 2020 – Cassette	Q2	SC-PServ
Task Order Signed for Resources 2020 – Inner Vertical Target	Q1	SC-PServ
TO 01 OFC-732 for High Heat Flux Testing of Tungsten mock-up	Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Remote Handling		
Task Order for Final Design CDS + CES	Q2	PSupply

Task Order for Preliminary Design MA-2 & LTM for CPRHS	Q2	SC-PServ
Task Order Signed for Final Design Phase 1 CTM for DRHS	Q2	SC-PSupply
Task Order Signed for Final Design Phase 1 for IVVS	Q2	SC-PSupply
Task Order Signed for Final Design Phase 2 CMM for DRHS	Q2	SC-PSupply
Task Order Signed for Final Design Phase 2 for IVVS	Q4	SC-PSupply
Task Order Signed for Integration of the Rad Hard Camera	Q3	SC-PSupply
Task Order TO#07 signed for Final Design Mono Rail Crane (MRC), Preliminary Design of Vessel Opening System (VOS) for NBRHS	Q2	SC-PSupply
Task Order TO#08 signed for Final Design MRC, Preliminary Design of remaining systems	Q2	SC-PSupply
TO for Engineering Insourcing Contract #06,07,08,09,10	Q1-Q2	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Cryoplant and Fuel Cycle		
Contract Signed for Cabling Manufacturing	Q2	PSupply
Contract Signed for Leak Detection Primary and Cryostat	Q4	PSupply
Contract signed for Leak Detection Primary- under RF PCR 834	Q4	PSupply
Contract signed for Manufacturing and Factory Testing of Torus and cryostat Front End Cryodistribution (FECD) Option 1	Q2	Option
Contract signed for Platform of Torus and cryostat Front End Cryodistribution (FECD) Option 2	Q2	Option
FECDS- I&C T03 Manufacturing	Q3	SC-PSupply
MITICA Cryopump Installation tool	Q1	SC-PSupply
Cryoplant Utilities of Commissioning Phase	Q1	PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Antenna and Plasma Engineering		
Contract for Industrial Inspection N1 Signed	Q3	PServ
Contract Signed for Manufacturing and vacuum qualification of EC Isolation Valve prototype	Q1	PSupply
Contract Signed for Procurement of GCC Waveguides for ITER	Q1	PSupply
Contract Signed for Series production of EC UL Blanket Shield Module	Q4	PSupply
Contract Signed for Support to IO for EC Plant Control System Stage 2	Q3	PServ
Task Order Signed for Procurement of semi-finished CuCrZr for the fabrication of EL EW components	Q2	PSupply
Task Order Signed for Testing of Diamond Disks for EC Windows	Q1	SC-PServ
Task Order Signed for Testing of Window and Valve prototypes	Q1	SC-PServ
Task Order signed for In-sourcing Support to EC UL Series production	Q2	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Neutral Beam and EC Power Supplies and Sources		

EC Power Supplies-Commitment for Auxiliaries and Interfacing Systems	Q3	PSupply
Commitment for Specific Contract - TO#05 MITICA CODAS, Interlock and Safety	Q3	SC-PSupply
Contract Signed - MITICA Diagnostics	Q2	PServ
Contract Signed - PRIMA#3 Assembly	Q2	SC-PSupply
Release of Option H - SC#1 MITICA Beam Source	Q2	SC-PSupply
Contract Signed - PRIMA#4 Assembly	Q2	SC-PSupply
Task Order Signed for Services for NBTF Site Supervision and Support - 07	Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Diagnostics		
Baseline Signed for Preliminary Design CPTS	Q2	SC-PServ
Commitment for Contract for Procurement and Delivery for in-vessel clips, clamps, bosses and critical junction boxes	Q2	PSupply
Contract Signed for Design and Manufacturing of VV-Mounting Platforms for VV-Mounted Bolometer Cameras	Q3	PSupply
Contract Signed for Irradiation testing of prototypes/materials	Q3	PServ
Contract Signed for Procurement and Delivery for COTS Hardware for Magnetics	Q3	PSupply
Contract Signed for Procurement and Delivery for PPR Captive Ex-Vessel Transmission Components	Q4	PSupply
Contract Signed for Procurement and Delivery for UP&LP Connectors, UP&LP Marshalling Clamps and LP Clamps	Q1	PSupply
Contract Signed for Procurement and In-Cryo Feedthroughs	Q4	PSupply
Contract signed for Purchase order CXRS prototypes shutter, FM and calibration	Q2	PSupply
Contract signed for Supplies and Support of CTS Critical Prototypes	Q1	PSupply
Procurement and Delivery of CVD Diamond prototype	Q1	SC-PSupply
Task Order Signed for Design and Analysis for Ex-vessel non-captive	Q1	SC-PServ
Task Order Signed for Development of Mfg Specs for Ex-Vessel Optical/Mechanical	Q4	SC-PServ
Task Order Signed for Development of Mfg Specs for Port Plug Components	Q2	SC-PServ
Task Order Signed for Plant Controller Integration - System Integration, FAT, Shipping & Support	Q3	SC-PServ
Task Order Signed for Port Plug design, testing and diagnostic integration TO5	Q1	SC-PServ
Task Order signed for TO04 for In-source personnel under OMF-0871	Q3	SC-PServ
TO signed for Engineering Analysis Thermo hydraulic FDR of CTS	Q1	SC-PServ
Contract Signed for Final Design of RH Connector and Ancillary Components	Q1	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Test Blanket Module		
Task Order Signed for Preliminary Design of Ancillary Systems phase II	Q4	SC-PServ
Task Order Signed for Preliminary Design of TBMs set phase II	Q3	SC-PServ

Task Order Signed for Safety Analyses for TBS PD phase II	Q3	SC-PServ
TO 02 signed for FWC ANB Consultancy TBM Qual	Q2	SC-PServ
TO 03 signed for FWC ANB Consultancy AS + TBM Set	Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Site and Buildings and Power Supplies		
Site Security and Reception Services for the ITER Site 2021 signed from 12/20 to 12/21	Q4	SC-PServ
TB11 - Commitment for Completion works Contract - TO#03 - 2020	Q1	SC-PSupply
TB11 - Commitment for Option for FM scope - TO 2021	Q4	Option
TB12 - Commitment for Option 3 - Design and Build of Bldg 75 PIC Part and Bridges	Q1	Option
TB12 - Commitment for Option 5.2 - Supply and Inst. PBS44 cable trays BLDG.75 - PIC	Q3	Option
TB12 - Commitment for Option 5.3 - Supply and Inst. PBS44 cable trays BLDG.71 North - Non PIC	Q3	Option
TB12 - Commitment for Option 5.5 - Supply and Inst. PBS44 cable trays for Plant Bridges	Q3	Option
TB13 - Commitment for Contract for Design & Construction of Bldgs 44, 45, 46 & 47	Q2	PSupply
TB18 - Contract Signature	Q1	PSupply
TB19 - Commitment for Option 3: Tokamak Crane Hall + South Wall + Sump Bldg 14	Q2	Option
TO#02 for FWC-OFC-1006 for Eng, Contract & Claim Management consultancy services	Q3	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Supporting Activities		
Commitment 2020 - Global transportation of CEL-CL ITER components	Q4	SC-PServ
Option release for extension of TO 02 under OMF-0895 PMS Lot 1: PPC Support	Q1	Option
Option release for extension of TO 03 under OMF-0895 PMS Lot 1: PPM Support NB 2020	Q1	Option
Option release for extension of TO 07 under OMF-0895 PMS Lot 1: PPM Support ANT 2020	Q1	Option
Option release for extension of TO XY under OMF-0895 PMS Lot 1: PPM Support 2020	Q3	Option
Task Order Signed for TO03 Lot 2 in Support of the MIR layer - DXL Senior/Junior	Q2	SC-PServ
Task Order Signed for TO 12 for Convention 4 for Real Convoys	Q2	PServ
Task Order Signed for TO 13 for Convention 4 for Real Convoys	Q4	PServ
Task Order Signed for TO26.2 for QA Support Staff QAG	Q3	SC-PServ
Task Order Signed for TO31.2 for QA Support Staff QAG	Q2	SC-PServ
Task Order Signed for TO32.2 for QA Support Staff QAG	Q2	SC-PServ
Task Order Signed for TO36.2 for QA Support Staff QAG	Q3	SC-PServ
TO 01.2 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q2	SC-PServ
TO 02.1 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q2	SC-PServ
TO 02.2 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q3	SC-PServ

TO03.1 for OMF-0895 PMS Lot 3: Planning Support VV 2020	Q2	SC-PServ
TO04 for OMF-0895 PMS Lot 3: Planning Support NB 2020	Q2	SC-PServ
TO05 for OMF-0895 PMS Lot 3: Planning Support BIPS 2020	Q2	SC-PServ
TO06 for OMF-0895 PMS Lot 3: Planning Support Configuration 2020	Q2	SC-PServ
TO for Transportation Management fees 2021	Q4	SC-PServ
TO XY for OMF-0895 PMS Lot 1: PPM Support 2020	Q2	SC-PServ
TO XY for OMF-0895 PMS Lot 1: PPM Support 2020	Q3	SC-PServ
TO XY for OMF-0895 PMS Lot 1: PPM Support 2021	Q4	SC-PServ
TO XY for OMF-0895 PMS Lot 1: PPM Support BIPS 2020	Q2	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Broader Approach		
Architecture of integration platform for BA Phase II	Q2	PServ
Beam loss detection with high sensitivity	Q3	PServ
Contract signed for Enhancements for injector components	Q2	PSupply
Contract signed for Enhancements of LIPAc RF PS	Q1	PSupply
Contract signed for Enhancements of LIPAc RFQ	Q1	PSupply
Contract signed for Health and safety for operations on site JT-60SA	Q1	PServ
Contract signed for JT-60SA Cryopump Design and Manufacturing	Q1	PSupply
Contract signed for JT-60SA Engineering support for diagnostics 2020	Q1	PServ
Contract signed for JT-60SA Pellet Injector Design and Manufacturing part 1	Q1	PSupply
Contract signed for JT-60SA Pellet Injector Design and Manufacturing part 2	Q4	PSupply
Contract signed for JT-60SA Remote Handling Studies and Prototypes	Q2	PServ
Contract signed for JT-60SA Support for integrated commissioning 2020	Q1	PServ
Contract signed for JT-60SA YAG Thomson scattering system part 2	Q1	PSupply
TO 02 for Engineering and research and development support for commissioning	Q2	SC-PServ
TO 03 for Engineering and research and development support for commissioning	Q3	SC-PServ
TO 04 for Engineering and research and development support for commissioning	Q4	SC-PServ
TO 05 for Engineering and research and development support for commissioning	Q4	SC-PServ

Table 3 . Main Procurement Activities per action

TABLE 4 - LIST OF 2020 GRANTS PER ACTION

Action	Value (Euros)	Time of call	Budget line
Specific Grant Signed for Design and R&D for Radial Neutron Camera/Gamma Spectrometer - Phase 1 SG7	1,950,000	2020 Q4	3.1+3.5
Grant for the setup of a cryogenic test facility and performance of tests of TF coils	760,000	2020 Q4	3.3

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.

TABLE 5 TIME OF CALL FOR THE PROCUREMENT PLAN

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

Procurement Procedures	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020
P Serv - Contract	1	10	7	5	5	3
P Supply - Contract	7	7	12	5	2	8
Pserv - Specific Contracts	50	29	24	36	20	17
PSupply - Specific Contracts	16	1	5	7	6	1

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 WP2020.
- 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