FUSION FOR ENERGY

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

THE GOVERNING BOARD

DECISION OF THE GOVERNING BOARD ADOPTING THE THIRD AMENDED 2019 WORK PROGRAMME OF FUSION FOR 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 the Technical Advisory Panel;

WHEREAS:

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.

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;

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;

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;

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

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

3 OJ L 349, 21.12.2013 p100-102.

4 F4E(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.

Has adopted this decision:

Article 1

The 3rd Amended 2019 Work Programme 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 Annex IV of the 3rd Amended 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 3rd Amended 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 at 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

FUSION FOR ENERGY

3rd Amendment Work Programme 2019

Fusion for Energy

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

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

fusionforenergy.europa.eu

INTRODUCTORY MEMORANDUM

CHANGES TO THE WP2019

The Work Programme 2019 reference, as adopted at GB42, was based on the F4E set of schedules at the end of April 2018. Amendment 1, adopted at GB43, was limited to the implementation of the new Magnets PF Coils Contract Structure. Amendment 2 was based on the F4E set of schedules at the end of April 2019.
Since that time, the F4E schedule baseline has been regularly modified following the outcome of the Baseline Change Control Board at F4E. The annual objectives and call for tenders/proposals have been amended consequently.

With the continuous evolution of the project, F4E activities are also subject to modifications. Such changes are captured in the monthly update of the schedule, which is also distributed to the ITER IO for the project monthly update.
Because of this continuous evolution, the work programme, that provides a snapshot of the schedule of the activities at a given time of the year, is prone to significant modifications between submissions to the F4E Governance.
While the work breakdown per year is a meaningful time interval from the budgetary point of view and for the WP that represents its financial decision, it is not for the long-term project that F4E has to implement. Therefore, it is normal that activities spanning over many years, the majority in the case of the F4E projects, may require adjustments in the specific year. Such modifications may be due to many reasons, as delays in the provision of input data for launching the contract, negative results from previous activities, need of modification of procurement strategy following a market analysis, delays in the delivery of hardware from other Domestic Agencies, addition of activities as a consequence of approved PCRs and risk mitigation actions, etc. In such a large high-technology project requiring in most of the cases the use of new technologies and manufacturing paths, it is therefore highly possible that the forecast of activities will vary during the year.
The main responsibility for the project managers at F4E is to avoid that these modifications affect the schedule of the delivery of the components to be assembled into the tokamak and, consequently, the creation of the first plasma.
The changes included in this document do not affect the 2025 First Plasma date. In addition, they do not modify the overall cost of the EU contribution represented by the Estimate at Completion (EAC).

The available budget (see 2nd Amendment to the 2019 Budget) was allocated to the various Actions identified in this document. The budget breakdown between Actions is shown in Annex IV to this 3rd Amendment to WP2019.

The Actions in the Work Programme represent the tasks planned in 2019 to contribute to the overall EU obligations to ITER.

The summary of the most substantial changes by WBS L2 is provided in the table below and doesn't include minor modifications. It is noted that the original Work Programme as amended by 1st Amendment, 2nd Amendment and this 3rd Amendment reflect the full planned scope of activities for the year.

The F4E schedule used for the preparation of this document is the version from End September 2019 submitted to IO at the beginning of October.

Action	Comment
Magnets	Completion of two activities concerning TF coils (Annual Objectives) has moved to the next quarter without impacting the final delivery date. PF6 final assembly has been completed in September but activities took longer than expected due to first of a kind process. Therefore the Coil will be shipped to Cadarache later, but before the end of 2019. Budgetary Changes Only minor budgetary changes.
Main Vessel (Vacuum Vessel, Blanket, Divertor and TBM)	Vacuum Vessel: Modifications have affected the Annual Objectives. Completion of two of them moved to 2020 due to several severe NCRs that were encountered in 2019 during manufacturing. This also affected the forecasted achieved CAS value by the end of 2019. In-Vessel (Blanket): Two expected results will not be achieved in 2019, due to delays in the manufacturing of the Full Scale Prototypes. In-Vessel (Divertor): Modifications have affected the Annual Objectives. In one case, the completion of an activity moved to a later quarter, still within the year. Two other Annual Objectives were postponed to 2020, in one case (activity not on the critical path) due to lack of internal F4E resources and in the second one due to delays in the finalization of the CAD models and drawings. TBM: Delays have affected the Annual Objectives with completion date moved to later quarters, still within the year. The reason is that the evaluation procedures of the 3 Framework Contracts took longer than expected. The first activities executed jointly by ITER Members/DAs under the collaborative scheme of the TBM PT will start in 2019 (or 2020). Budgetary Changes Only minor budgetary changes.
Remote Handling	Modifications have affected the Annual Objectives. In the case of the CPRHS, the completion of the activity moved to 2020 as the change of supplier from the first to the second one in cascade (of the framework contract) required longer time. Two Annual Objectives (for IVVS and NBRHS) were re-adjusted by identifying a better milestone (i.e. date of Preliminary Design Review meetings) for the same activity. In another case

	(also for IVVS), the Annual Objective definition changed following the amendment of the related contract. Budgetary Changes Only minor budgetary changes.
Cryoplant & Fuel Cycle	Each of the contracts for I&C were split in two, to be signed in 2019 and 2020. An Annual Objective (also Expected Result) was delayed to 2020 due to the additional requirements requested by IO. The lower value of the cryoplant CAS forecast at end 2019is due to the delays accumulated in the year because of the internal difficulties of the contractor. Budgetary Changes The reduction is mainly due to savings on the procurement of the Torus and Cryostat Cryopumping System and to a lesser extent a change in the procurement strategy of the I&C components of that System which postpones part of the planned commitments for I&C.
RF Heating & Current Drive	Electron Cyclotron: In 2019 priority has been given to the preparation of the final design review (FDR) of the EC Launcher Port Plug. The resources available have been directed to that and supporting prototype activity. Therefore, some prototypes not required for the Port Plug FDR have been rescheduled to 2020. The installation of the Gyrotrons Commissioning Components control system at IO was delayed to 2020 due to the change of IO need dates linked to the postponement of the Ready For Equipment (RFE) date of building 15. One Annual Objectives was delayed due to a fault in the power supply at the FALCON facility and the time of repair. The second one was delayed due to the change, agreed with IO, of the final design review date for the UL Port Plug. Plasma Engineering The BREXIT situation has also required the conversion of a grant for the analysis of the ITER scenarios into a contract at the same cost. Budgetary Changes Minor budgetary changes.
Neutral Beam Heating & CD	The forecast of achievement of three Annual Objectives moved to the next quarter due to the rearrangement of activities. The lower value of the CAS forecast at end 2019 is due to the delay/postponement of activities to 2020. Budgetary Changes Lower commitment expected for the MITICA Beam Line Components contract (ca. 1.5 MEuro) Some postponement of not critical activities (ca 700 kEuro) Reduced allocation for activity with low probability of implementation.

	Reduction mainly due to reorganization and postponement of activities for NBTF (assembly, diagnostics, CODAS).
Diagnostics	The modifications in the progress of work during the year were due to delays in the relevant PAs signature or to de-scoping of the system by the ITER project or by delays triggered by the change of requirements requested by IO. Two Annual Objectives were removed due to delays in the PA signature and the same happened for two expected results. The lower value of the CAS forecast at end 2019 is also due to the same reason. Budgetary Changes Change mainly caused by postponment of some contracts to 2020 to accommodate the new planned date for PAs signature.
Buildings and Civil Infrastructures	Delays in the TB04 progress of work were triggered by the delayed approval of the TB04 construction design mainly due to the Holistic Integration Team (HIT) cycle taking longer than expected and a slow learning curve for the TB04 contractor with changes introduced late into the MRR. The one month delay in placing the TB12 contract was caused by work with IO on requirements and optimisations to contain the cost and to a longer tender process to answer questions and provide clarifications. Consequently, construction design will be ready for submission to IO in 2020 and not in 2019. As for the expected results, RFIOC schedule for TOK Building levels has been reviewed and updated in line with IO need dates. Delays in TB04 design and procurement were due to issues between steel structure and loads, contractor delays and rephasing of sequence of activities. Delays in the RF Heating Building were instead due to TB04 contractor delays and coactivity introduced by IO captive components requiring reorganization. Decrease to the value of the CAS forecast were due to delays in TB04 affecting the completion dates of some auxiliary buildings. Budgetary Changes The main changes are related to anticipations (AE extension 2020-2023: anticipation of 28 MEuro initially planned in 2020). Additional works for completion contract TB11 due to IO PCRs and cost estimate re-evaluation 8 MEuro, regularisations of indexations from past years (AE 10 MEuro, SO 1.5 MEuro). Additional Regularisations for Reserve Fund (6 MEuro).
Cash Contributions	Budgetary Changes Adjustment of 2020 Cash contribution to IO triggered by IO request presented to the MAC/IC. Cash contribution to Japan removed due to information provided by JA DA on the postponement of signature of PA 3.2.P4.JA.01 (Atmospheric Detritiation System) to 2020.
Supporting Activities	Description adapted to the new organization in the ITER D Department.

	Some Annual Objectives went through refinements of milestone codes to correct some inaccuracies. The signature of a task order to provide support to the Nuclear Safety unit was moved to 2020 due to delays in the Nuclear Safety inspection programme. The Annual Objectives show also a delay in the signature of the QA framework contract (due to a longer evaluation phase), the move of two System Engineering task orders (TO) to 2020 (one as current needs are still covered by existing TO and the second one due to financial issues with the consortium leader of the FWC) and the cancellation of a TO for planning support (the resource quit), The transportation to Cadarache of the 1st VV sector from Korea and the 1st TF Coil from Japan were removed as they will take place in 2020. Budgetary Changes The reduction is mainly due to the reduction in the forecast for the transportation activities due to delays in the delivery of the Non-EU components
Broader Approach	Completion date of one Annual Objectives has moved to the next quarter due to a delay from the side of the supplier. The tests have been performed, but the preparation of the report takes longer than expected. The decrease of the value of the CAS forecast was due to not delivering, as part of the assembly cryomodule, the 8 solenoids and associated current leads due to technical problems with inner surface of the solenoids and the welds. Budgetary Changes For JT-60SA all activities in BA1 have been implemented. For the remaining activities related to BA Phase 2 early implementation (lacking a timely signature between the parties for a new Joint Declaration), administrative and legal basis had to be, and to some extent still have to be established, thus inducing delays beyond direct control. Moreover on the technical side the design and interface agreement on diagnostics and enhancements took more time than expected, pushing the tendering of most contracts in the last quarter of 2019, and so the commitment and contract signature to beginning of 2020. For IFMIF-EVEDA the people, in charge of the definition of technical specifications of some structuring contracts for the maintenance and refurbishment of the system of the LIPAc, had to spend more time on the accelerator operation than expected. It was also more time consuming to work out the detailed requirements of these contracts, which are mostly based on the operational feedback in order to optimise their efficiency. This all resulted in delay of launching the related call for tenders.

Budget modifications in the actions, reflected in the Table in Annex IV, may have also been triggered by a modification of the level of confidence assigned to the 2019 commitments. The cut-off level of confidence used in the tables is 75%.
As for Table in Annex VII (Human Resources per Action for WP2019), the methodology to compute the Human Resources numbers per action changed since the Amendment 2 WP2019 was prepared. This explains the noticeable changes between WP2019 Amendment 2 and Amendment 3.

3rd Amendment to Work Programme Year 2019

1 Annual Programme

1.1 Executive summary for the annual Work Programme 2019 3rd Amendment

This Work Programme 2019 (WP19) 3rd Amendment offers an overview of the objectives of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E) for 2019 and also identifies the financial decisions for the actions that are planned to be carried out in 2019 with the available budget.
It covers the work on both ITER and Broader Approach (BA) according to the tasks entrusted to the organization.

Concerning ITER, the task of F4E is to discharge EU 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. This work is carried out under the coordination of the ITER Organization (IO) and it creates many challenges both from the technical and from an organizational point of view. The priority is on the activities required to achieve First Plasma (FP) in 2025 resulting in slowing down other projects until after 2020. A suitable scenario was selected for the other, non-FP systems, in order to minimize delays to the later machine phases and minimize costs associated with the slowdown.

The 2019 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.

2019 is mostly focused on the following activities (FP-relevant areas are shown):

- Magnets (FP): All major contracts have already been signed. For the pre-compression rings the series production will be based on the Pultrusion Technology. Work will progress in order to complete the first EU TF Coil in 2020. As for the PF coils, winding pack assembly will be completed for PF Coil #5 and PF Coil #6 final assembly will be completed. The production of the Double Pancakes for PF #2 will also progress through their winding and impregnation stages.
- Main Vacuum Vessel (FP): Full production will be in progress for all 20 segments of the 5 sectors, heading towards completion of five poloidal segments for sectors 5 and 4. 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.
- Blanket System (non-FP): The manufacturing of First Wall (FW) Full Scale Prototypes will be completed. The tendering phase for the series production and the negotiations with the potential manufacturers will be started, too.
- Divertor (non-FP): for the divertor inner vertical target (IVT), the manufacture of full-scale prototypes will continue. Main procurement activities will concern the development of plasma-facing units by using an alternative tube transition and using alternative tungsten grades. For the divertor cassette, the work will proceed under the contracts launched for

the manufacturing of the cassette body pre-series. The main activities will concern the follow-up of the contract(s) for the cassette body production.

- 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. The procurement activities aim at supporting the preliminary design activities and starting in some areas the final design activities.
- Vacuum Pumping (Partly FP): The tendering process for the procurement of Leak Detection systems will be started. MITICA and NB Cryopumps contracts will focus on manufacturing and assembly. As for the Front End Cryopump Distribution, activities will focus on design and start of manufacturing. As for the Warm Regeneration lines, the contract will be completed.
- Fuel Cycle (non-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 activities for the final design and procurement contract for the Beryllium monitors will start.
- Cryoplant (FP): installation and most of site acceptance test 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, the upper launcher will be in its final design phase. Prototypes will be manufactured in different areas as well as testing will be carried out in the FALCON test facility. Contracts will be placed for the series production and testing of the Diamond Disks. The first part of the EC Control System will be delivered to IO in 2020. Other units will enter into the design phase.
- Neutral Beam Heating and Current Drive (non-FP): As for the NB Test Facility, the SPIDER experiments will continue, while the MITICA activities will progress with commissioning and testing of vessel and power supplies and with the assembly of the auxiliaries. As for the NB at Cadarache, the procurement of Ion Source Extraction PS (ISEPS) will progress with design finalization and with design finalization for the Accelerator Ground Power Supplies.
- Diagnostics (partly FP): Manufacturing activities for several Diagnostic components and systems most of them essential for First Plasma will continue. Design of all remaining diagnostics systems will progress as well as the integration of diagnostics into the ports. Several diagnostics systems will finalize the preliminary design phase or the final design phase with the approval of the relevant design review. Procurement activities will be focused on two different areas: placement of manufacturing contracts for the production of components to be delivered to ITER for First Plasma and contract/grants for the completion of the design of less mature Diagnostics systems.
- Test Blanket Systems (TBM – non-FP): The overall focus of the activities in the development of the TBM project will be devoted to the Preliminary Design Phase. The post irradiation examination of EUROFER sample will continue. The Framework Contracts for the Preliminary Design of the TBM Set of the Ancillary Systems and of the related Safety and Accidental Analyses will be signed and its first specific contract released.
- Site, Buildings and Power supply: The focus will be on the progress of works of the Tokamak Complex with the first phase concrete works nearing completion and the finishing works progressing. The prefabrication of the steel structure of the Crane Hall will be progressing with cladding installation to start. TB04 procurement activities will continue for the Tokamak Complex and construction design will progress with IO approval of all levels (services) foreseen mid 2021. TB19 painting and coating works will commence in the Tokamak Complex. TB06 works on High Voltage buildings, areas and power supplies

equipment will be near completion. The TB12 contract for the construction of B34 (NB Power Supply Building), B37 (NB HVPS Building), B71 (Control building – non PIC part), B75 (Fast Discharge Unit Building) will be signed. The tender process for TB18 (Tritium building civil works and finishing above L2) and for TB13 (Design and Build of Emergency Power Supply Buildings) will be commenced. Specific contracts will be signed under ongoing framework support services and works contracts. Changes and exercise of options to the ongoing services and construction contracts in relation with Project Changes Requests (PCRs), input data delays, and re-allocation of scope between contracts will be implemented through amendments to the ongoing contracts in line with the provisions of the Financial Regulations.

Concerning BA, the EU activities are carried out in the frame of the agreement, concluded with Japan, consisting in activities, which complement the ITER project and accelerate the realization of fusion energy. Both parties contribute equally financially. The European resources for the implementation of the BA are largely volunteered by several participating European countries. 2019 is mostly focused on the following activities:

- Satellite Tokamak (JT-60SA): In 2019, the remaining parts of EU contribution will be delivered to the JT-60SA site. The actions will focus on the completion of fabrication, testing, transportation and on-site installation. Preliminary activities for BA Phase II will be initiated. The activities under the responsibility of F4E are carried out through grants, task orders of existing/new framework contracts or existing/new supply and service contracts.
- IFMIF/EVEDA: In 2019 the LIPAc (Linear IFMIF Prototype Accelerator) operation at Rokkasho will undergo a transition phase from testing the subsystem at 5 MeV at low power to commissioning the full accelerator with a drift line at 5 MeV and higher duty cycle. Additional contracts will have to be placed for these continued testing activities. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts and specific contracts. Cash contributions will be made to maintain project team common expenses (e.g. missions) and common funds (e.g. repairs and spare parts).
- IFERC: The IFERC project comprises three activities, DEMO design and R&D activities, CSC (Computational Simulation Centre) and REC (Remote experimentation Centre). 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. Integrated tests (participation in the operation of a European Tokamak from Rokkasho) will take place in 2018/2019.

1.2 Introduction to the Annual Work Programme 2019 3rd Amendment

The 2019 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 procurement activities that will be committed during 2019, detailed objectives, expected results and target for each WP Action.

1.2.1 Main assumptions

The following assumptions are considered as the basis of the Work Programme 2019 3rd amendment:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of September 2019.
- The F4E schedule supporting FP 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 Annex V 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 WP2019 3rd Amendment 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 ANNEX II.

1.2.2 Definitions and supporting information

1. "Action" for the purposes of Work Programme means “a coherent area of action with objectives and resources”.

2. Each Action of WP2019 3rd Amendment 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 2019 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 2019. 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, 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[7]. 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 2019;

ii. Milestones that will lead to the achievement of the future IC/GB milestones from the following years (defined as predecessor of future IC/GB milestones (if applicable).

iii. Key milestones marking significant schedule progress (only in the event that none of the above are applicable).

iv. Link with the ITER Project multi-annual objectives (defined as the whole set of IC/GB milestones): when a WP annual objective is a predecessor of a multi-annual objective (IC/GB milestones), it is clearly identified to which milestone is linked in the column “type of milestone”.

(c) The **expected results** define the main outcomes of the Actions.

(d) The **target** is defined, when applicable, as the cumulative CAS foreseen to be achieved by the end of 2019 per PA (PAs associated with each Action are listed in Table 2 of the MAP document).The value is according to the CAS profile proposed by F4E to IO and implemented in the F4E DWS.

(e) **Human resources** (see ANNEX VII). 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 during 2019. 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 Annex V): these are, per Action, the list of the foreseen main contracts with value higher than 144,000 Euros[8]. 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 3rd amendment. 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

[7] 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

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

in any case be performed preserving the scope and objective presented in WP2019 3rd amendment. 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 2019 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: ANNEX IV presents an indicative value of financial resources corresponding to each Action. F4E has evaluated the level of commitments planned for the Actions in 2019 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. 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 ANNEX III. 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 WP2019 3rd Amendment due to changes in the overall planning and priorities.

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

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

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.

1.2.3 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.

Non-technical: F4E defines as its non-technical objective the implementation of the budget allocated to each Action (see ANNEX IV). As this definition is applicable to all the Actions, this objective is not repeated in the description of each Action.

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

1.3 Actions

1.3.1 Action 1. Magnets

Action 1	Magnets

Pre-Compression Rings

Progress of Work
The Pre-Compression Rings (PCR) will be finally produced with the Pultrusion Technology. This decision is based on the successful qualification of this technology compared to the quality and schedule issues encountered in the Automated Filament Placement technology.

Procurement Activities
The contracts to provide inspection services during manufacturing will continue.

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, while the second one, (10 Winding Packs) series manufacture will run all the year. The manufacturing planning may be adjusted to suit the delivery rate of the Coil Cases from the Japanese Domestic Agency.
The third major contract (WP cold test and Insertion) will be at full speed during 2019, depending also on the delivery dates of the TF Coil Cases from Japan. The first EU TF Coil is planned to be delivered early 2020.

Procurement Activities (contracts and grants)
The TF Coils transportation contract from the Insertion supplier to Cadarache shall be awarded in 2019. Throughout 2019, some inspector contracts will be renewed for Magnet activities.

Poloidal Field Coils

Progress of Work
In 2019 the series manufacturing of the Double Pancakes (DP) along with the winding pack assembly of Poloidal Field (PF) Coil #5 and PF Coil #6 (by ASIPP in China) should be completed.
The impregnation of the winding pack assembly of PF5 will start and the one for PF6 will be finished. The final assembly of PF Coil #6 will also be completed and the coil will be shipped from China to Cadarache. The production of the DPs for PF Coil #2 should also progress through to their winding and impregnation stages. Reconfiguration of most of the coil tooling to adapt to the larger PF Coil #3 and PF Coil # 4 will also start in the year.

Procurement Activities (contracts and grants)
A new contract “PF Coils Magnet Supply Contract (MSC)” will be signed. At the same time, “Manufacturing” Contract will be partially de-scoped and “Engineering Integrator” Contract will be terminated. Specific contracts for further tests and contract extensions for inspection services and/or other external resources may also be required in 2019. A new procedure might be launched in order to upgrade the PF Coils Building in Cadarache to adjust it to the production needs.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU11.1A.19546	IO Approval for Assemble cooling pipe and instrumentation (8.4.4) TFWP01	Q3 2019	GB23 Predecessor	1.1.P1A.EU.01
EU11.1A.21823	Completion of Ground Insulation / TFWP14	Q3 2019	IC67/GB54 Predecessor	1.1.P1A.EU.01
EU11.1A.22866	Completion of TF-EU01 Gap Filling	Q4 2019	IC53/GB15 Predecessor	1.1.P1A.EU.01
EU11.3B.554730	PF5 DP1 completed. Last PF5 DP	Q2 2019	IC42/GB12 Predecessor	1.1.P3A-B.EU.01

EXPECTED RESULTS AND TARGET	
The main expected results for this action are: 1. Completion of the 7th WP. 2. PCRs all spare and lower PCRs completed. 3. PF5 Winding Pack assembly completed. 4. PF6 Coil shipped to Cadarache. The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)	
PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	46.0
PA 1.1.P2A.EU.01 Pre Compression Rings	0.3
PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	13.22
PA 1.1.P6A.EU.01 Toroidal Field Conductors	43.39
PA 1.1.P6C.EU.01 Poloidal Field Conductor	11.22880977

1.3.2 Action 2. Vacuum Vessel

Action 2	Vacuum Vessel

Progress of Work

During 2019, the European Vacuum Vessel (VV) will continue to be in full production for all 20 segments of the 5 sectors, heading towards completion of five poloidal segments for the sectors 5 and 4. This assumes the successful execution of the outer shell welding at HHI (KO DA), enabling the European VV supplier to replicate the Korean manufacturing approach.

FREE-ISSUED ITEMS

The following free-issued items shall be delivered during 2019 by other DAs for assembly by the European supplier during segments and sectors fabrication:

- In-Wall Shielding parts from IN-DA
- Upper Port Stub Extensions from RF-DA
- Equatorial and lower Port Stub Extensions from KO-DA

SUPPORTING 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 free-issued items received from the other DAs (i.e. additional tests at acceptance stage, if required), for the 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 may be requested for the follow-up of the main vacuum vessel contract.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU15.1A.3037140	S5 PS1_Inner Assembly part with T-Rib at the back of Divertor Rail Machining	Q1 2019	IC58/GB16 Predecessor	1.5.P1A.EU.01
EU15.1A.3037380	S5 PS2-A2_RH Global Sub-Assy - Dim. Check and final Bevelling after FSHs EB Welding on inner shell	Q2 2019	IC58/GB16 Predecessor	1.5.P1A.EU.01
EU15.1A.109090	S9 PS1_EBW Welding Repair (17th step)	Q4 2019	GB25 Predecessor	1.5.P1A.EU.01

EXPECTED RESULTS AND TARGET

1. Completion of machining of sector 5 poloidal segment 1 Inner Assembly part with T-Rib at the back of Divertor Rail, under control plan 37;
2. Completion of Dimensional check and final bevelling after flexible housings electron-beam welded on inner shell for sector 5 poloidal segment 2, under control plan 224;
3. Completion of welding of sector 5 poloidal segment 2 Assembly, before IWS support ribs reverse, under control plan 276;
4. Completion of electron beam welding of flexible housings on inner shell of sector 9 poloidal segment 1, under control plan 35;
5. Completion of electron beam welding of all sub-sub-assemblies of central subassembly of sector 9 poloidal segment 2, under control plan 131.

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	48.316

1.3.3 Action 3. In Vessel – Blanket

Action 3	In Vessel - Blanket

Blanket First Wall

Progress of Work

By 2019 the manufacturing of blanket First Wall (FW) Full Scale Prototypes is planned to have been completed along with the preparatory activities launched on design improvement, fabrication automation and new material grades qualification.

Procurement Activities

The above manufacturing activities will require the support of external resources and inspectors taken in the frame of on-going F4E framework contracts. Task orders will be signed to perform the High Heat Flux testing of Full Scale Prototypes. Two options are currently considered to complete the Alternative Design Mock-Ups with a Be armour made of a new Be grade recently formally qualified for use on the

First Wall.

In 2019 the main activity foreseen is the launch of the Call for Tender for the Series production of the First Wall panels.
A call has been launched for the procurement of Beryllium as raw material for the series production of the First Wall panels.
A contract is planned to be signed to obtain an independent cost assessment for the whole Series production of First Wall panels.
Experts will be hired to address automation and lay-out optimization of the production lines and to support the team on the preparation of the independent cost estimate and during the negotiation with the candidate manufacturers.
A Task Order is foreseen in order to perform advanced mechanical analyses on the First Wall panels with the new design configuration without steel pipes in the heat sink.

Some options related to the manufacturing design of minor variants will be converted into additional manufacturing development activities, more urgent and important for the success of the negotiations for the series production contracts. These manufacturing development activities will be implemented through amendment to the OPE-443 contracts.

Blanket Cooling Manifolds

Progress of Work
Once the feasibility studies of alternative Blanket Cooling Manifold (BCM) pipe supports will have been carried out, the procurement strategy for the supply of the Manifolds will be finalised.
An external expert will be hired to provide an independent assessment of the procurement strategy.

ANNUAL OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU.16.01.20870	Delivery of Full Scale Prototype to Plzen, Czech republic - OPE-443 Lot 1	Q4 2019	GB37 Predecessor	1.6.P1A.EU.01
EU.16.01.21470	Final Non Destructive Examination (NDE) for Full Scale Prototype - OPE-443 Lot 2	Q3 2019	WP2019 Objective	1.6.P1A.EU.01
EU.16.01.21550	Delivery of Full Scale Prototype to Plzen, Czech republic - OPE-443 Lot 2	Q4 2019	GB37 Predecessor	1.6.P1A.EU.01

EXPECTED RESULTS AND TARGET	
1. End of the manufacturing of all the Full Scale Prototypes; 2. Launch of the Call for Tender for the series production of the FW panels; The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)	
PA 1.5.P1A.EU.02 Blanket Manifolds	0
PA 1.6.P1A.EU.01 Blanket First Wall	0.075

1.3.4 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 four EU companies. In particular ,after the completion of the high heat flux testing of Ansaldo Nucleare plasma facing units at Efremov Institute (Russia), the assembly of the final Inner Vertical Target prototype will start (contract OPE-138-01). The qualification of tube transition will be completed and the fabrication of the full size plasma facing units will start under the contracts for the qualification of additional suppliers (OMF-567 Lots 1,2,3).

Procurement Activities

The main activities foreseen concern the development of plasma facing units by using an alternative tube transition and using alternative tungsten grades. All the above activities will require the support of external resources and inspectors taken in the frame of on-going F4E framework contracts. It is foreseen to implement a F4E-CEA agreement on the exchange of experience gained during the WEST program, in particular with the procurement of WEST divertor.

Cassette Body

Progress of Work

For the divertor cassette, the work will proceed under the contracts launched for the manufacturing of the cassette body pre-series. The main part of the work will consist in the engineering phase and launch of material procurement.

Procurement Activities

The main activities to be launched under this subsystem concern the follow-up of the contract(s) for the cassette body production. In fact, all the above manufacturing activities will require the support of external resources and inspectors taken in the frame of on-going F4E framework contracts. A minor procurement activity concerns the fabrication of ultrasonic test specimens to be used for the checking of testing equipment.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU17.01.100140	Cassette Body Series Quality Plan approved	Q2 2019	GB38 Predecessor	1.7.P1.EU.01
EU17.2B.92950	F4E to send IO the Qualification of the CuCrZr/316L tube-to-tube joint - OPE-567-01-01	Q4 2019	GB45 Predecessor	1.7.P2B.EU.01
EU17.2B.83150	Qualification of the load carrying capability of W attachment – OPE-567-03-01	Q4 2019	Predecessor of GB45	1.7.P2B.EU.01

EXPECTED RESULTS AND TARGET

1. Approval of the cassette body series quality documentation;
2. Signature of the contract for the ultrasonic test blind specimens;
3. Completion of the qualification of the tube transition at the additional suppliers;
4. Start of the fabrication of the plasma facing units at the additional suppliers;

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

PA 1.7.P1.EU.01 Cassette Body	0.54
PA 1.7.P2B.EU.01 Inner Vertical Target	2.39
PA 1.7.P2E.EU.01 Divertor Toroidal and Radial Rails	0

1.3.5 Action 5. Remote Handling

Action 5	Remote Handling

Progress of Work
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.

Procurement Activities
The activities to be launched under this action will aim at supporting the preliminary design activities and starting in some areas the final design activities. Specific contracts under the on-going framework of the main operational activities and grants will be foreseen, to cover the different needs. Expert contracts will be considered to support main activities, if needed.

Divertor Remote Handling System (DRHS)
Progress of Work
After closing the preliminary design phase with a successful design review, activities of DRHS will focus on the final design.

Procurement Activities
Specific contracts under the on-going framework contract will be signed in order to carry out final design activities.

Neutral Beam Remote Handling System (NBRHS)
Progress of Work
Activities will be covering preliminary design related activities of first and second priority items and starting gradually with the final design phase of the first priority items.

Procurement Activities
Specific contracts under the on-going framework contract will be signed in order to carry out preliminary design related activities of first and second priority items and starting gradually with the final design phase of the first priority items.

Cask and Plug Remote Handling System (CPRHS)
Progress of Work
It is foreseen to focus further on the preliminary design of different cask variants and gradually move towards the final design phase by preparing the design activity for one cask typology.

Procurement Activities
Specific contracts under the on-going framework contract will be signed in order to carry out the preliminary design of different cask variants and gradually move towards the final design phase by preparing the design activity for one cask typology.
A change of strategy was necessary thus moving from the first to the second contractor in cascade.

In-vessel Viewing System (IVVS)
Progress of Work
The activities will be dedicated to the finishing of preliminary design activities and gradually moving towards the final design phase.

Procurement Activities

Specific contracts under the on-going framework contract will be signed in order to carry out the finishing of preliminary design activities and gradually moving towards the final design phase.

Common activities

Progress of Work

Engineering support 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 under the on-going framework contract will be signed in order to carry out engineering support activities for the four main operational activities and for complementary RH technology related design activities, qualification and prototyping.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.01.900820	ADP approved for Manufacturing of Rad Hard BiSS ASICs Front End Electronics	Q4 2019	GB42 Predecessor	Transversal (2.3.P2,2.3.P3, 2.3.P5,5.7.P1)
EU23.05.02020	NBRHS Monorail crane (Incl. other first priority items) PDR Meeting	Q4 2019	GB42 Predecessor	2.3.P5.EU.01
EU57.01.14047300	M12 – Acceptance Data Package #2 Approved by F4E	Q4 2019	GB47 Predecessor	5.7.P1.EU.01
EU57.01.52460	EU IVVS PDR Meeting Complete	Q4 2019	GB47 Predecessor	5.7.P1.EU.01

EXPECTED RESULTS AND TARGET

1. Solving open issues of preliminary design review of Divertor Remote Handling System and starting the final design phase;
2. Advance with the preliminary design of one cask variant that is needed for the first assembly phase;
3. Preliminary design review of the monorail crane of Neutral Beam Remote Handling system that is a first plasma component and will be installed during the first assembly phase;
4. Preliminary design review of the In-Vessel Viewing System;
5. Advanced design of the radiation hard electronics and GENROBOT tool to support the four main procurements.

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

PA 2.3.P2.EU.01 Divertor Remote Handling System	1.2
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.3
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.1
PA 5.7.P1.EU.01 In-Vessel Viewing System	0.8

1.3.6 Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle

Fuel Cycle

Progress of Work

In the frame of the PA for leak detection and localization system, following the PA signature for the first

phase (Primary), the tendering process for the procurement of the Leak Detection systems will be started. The amendment of the second phase will be signed.
First Pre-PA activities in support of Hydrogen Isotope Separation system are expected in 2019. No F4E involvement is expected for WDS (Water Detritiation System), as contract for tanks should be finished in 2018 and first Pre-PA activities for WDS Main will be scheduled in 2020.
The type A radwaste treatment and storage system should be transferred to IO in 2019.
In the frame of the design PA for REMS (Radiological and Environmental Monitoring Systems), the tendering activities for the contract for Final Design and Procurement of Beryllium Monitors will be started.
The activities in the field of vacuum pumping will grow significantly:

- For the Torus and Cryostat Cryopumps, after PA signature in 2018, the tendering for procurement of Torus and cryostat Cryopumps will be started in 2019 with expected contract signature by the end of the year.
- For MITICA and Neutral beam cryopumps, the contract execution for MITICA cryopump Lot1, Lot2 and Lot3 will continue focusing on activities for manufacturing and assembly.
- For Warm regeneration lines, last activities will be performed to achieve the contract completion in 2019.
- The activities for Front End Cryodistribution system will continue: the contract for procurement of Torus and Cryostat Cold Valve Boxes will focus activities on design and start of manufacturing; the contract for final design, manufacturing and delivery of the Johnston coupling and cryojumpers signed end 2018 will focus on design and manufacturing; contract I&C software design will be signed and tendering process for contract for cabling manufacturing will start.

Procurement Activities

- Contract supply signature for Torus and Cryostat Cryopumps
- TO to be signed under a Framework contract for the I&C of Front end cryodistribution system
- TO#1 to be signed for I&C Torus and Cryostat Cryopumps
- Expert for REMS 2019
- Experts for LDLS 2019

Cryoplant

Progress of Work

Installation and most of site acceptance test for LN2 Plant and Auxiliary Systems components will take place in 2019. The contract for MITICA Cryoplant (NBTF in Padua) is expected to finish in 2019 with the on-site assembly and testing activities.

Procurement Activities

NA

ANNUAL OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU31.03.29300	Individual Procurement Strategy for Procurement of components for Primary and Cryostat Leak Detection System Approved	Q4 2019	GB18/IC76 Predecessor	3.1.P3.EU.01

EU31.01.104400	Published call for tender for procurement Torus and cryostat cryopumps	Q4 2019	GB33 Predecessor	3.1.P1.EU.03
EU31.03.28000	Published call for expression of interest for procurement of components for Primary- Leak Detection and localization system	Q4 2019	GB35 Predecessor	3.1.P3.EU.01

EXPECTED RESULTS AND TARGET

1. Published call for tender for procurement Torus and Cryostat cryopumps
2. Published call for Expression of Interest for procurement of components for LDLS- Primary
3. Submission of Acceptance Data Package for Mechanical Acceptance Test of Equipment Inside Area 53 – LN2

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	0
PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.18
PA 3.1.P1.EU.01 Warm Regeneration Lines	0.16
PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.0766
PA 3.1.P3.EU.01 Primary Leak Detection and Localization System	0
PA 3.1.P3.EU.01 Cryostat Leak Detection and Localization System (phase II)	0
PA 3.2.P3.EU.01 Isotope Separation System	0
PA 3.2.P5.EU.01 Water Detritiation System - Tanks	3.252
PA 3.2.P5.EU.02 Water Detritiation System - Main System	0
PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	22.98293982
PA 6.4.P1.EU.01 for Design of REMS	0
PA 6.4.P1.EU.01 Amendment for REMS Design to procure Be-EN monitors	0
PA 6.3.P1.EU.01 Type A Radwaste Treatment and Storage System	0

1.3.7 Action 7. Antennas and Plasma Engineering

Action 7	Antennas and Plasma Engineering

Ion Cyclotron Antenna

Progress of work

The specific contract for the analysis of the connection of the IC antenna with the Transmission Lines pre-matching system (ATLIS component located into the port interspace) is being completed.

Procurement activities

Procurement activities will start after signature of the PA currently planned in 2023 (after IO will have completed the design).

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

Progress of work

The EC Upper Launcher project is in the final design phase. Main on-going activities will be related to design, prototype fabrication and testing as well as qualification and requirements identification & verification. Management of changes (requirements, and interfaces) as well as technical complexity and

diversity of launcher components will be the main challenges.

Procurement activities

Support for Final and Build-to-print design will be ongoing during 2019, mainly performed through specific contract as part of an existing framework, in preparation of some of the Final Design Reviews. In addition, specific contracts for cooling plant design, analyses for Final Design Review and other support activities will be implemented. On prototyping, mm/wave components prototyping programme will be further developed with the signature of contracts for manufacture of disks and the completion of the BSM prototype. Specific contracts under the existing framework contract for setup and operation of the EC components test facility (FALCON) are envisaged in 2019, including mm-wave testing of window and waveguide. On engineering support, specific contracts for nuclear safety, analysis and engineering verification will be signed. Launcher procurement phase will start with contracts for series production and testing of the Diamond Disks, as well as some initial inspection and procurement support contracts as needed.

Electron Cyclotron Control System

Progress of work

The Electron Cyclotron Control System development follows a staged approach. In 2020 the first system will be delivered to ITER-IO: the EC Plant Control system (ECPC) Stage 2, which allows to operate the Gyrotron Commissioning Components (GCC) plant. 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 2019 the design phase.

Procurement activities

The activities for 2019 will mainly regard the placement of contracts for the procurement of hardware and the installation of the ECPC Stage 2 and the conceptual design of EC-UL SCU Stage 2.

Plasma Engineering (PE)

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 2019 is going to focus on transversal activities in support to F4E procurements, as well as in providing in-sourcing for Engineering Support in this action.

As for 2019, Plasma Engineering Studies and Engineering Support for PE and Antennas will mainly not be credited through PAs. Due to Brexit risk, the scope of GRT-869 for the analysis of ITER scenarios is converted into a contract, at the same cost.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.950110	Full prototype of GCC Plant Control System implemented in FALCON	Q4 2019	GB44 Predecessor	5.2.P1B.EU.01
EU52.01.950120	Testing of TL prototypes: 63.5mm window mock testing completed	Q4 2019	GB46 Predecessor	C52TD52FE
EU52.01.950130	Manufacturability study of UL Port Plug completed	Q3 2019	GB46 Predecessor	C52TD43FE
EU52.01.950140	UL Port Plug Final Design Review	Q4 2019	GB46 Predecessor	C52TD39FE, C52TD55FE

EXPECTED RESULTS AND TARGET	
Full prototype of GCC Plant Control System implemented in FALCON Testing of TL prototypes: 63.5mm window mock testing Manufacturability study of UL Port Plug completed UL Port Plug Final Design Review The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)	
PA 5.1.P1.EU.01 Ion Cyclotron Antenna	0
PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0.5

1.3.8 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 Suppliers (PS)

Progress of Work

For the EC Power Supplies, the manufacturing and testing of the MHVPS & BPS units will continue in accordance with the contractual plan. The built units will be delivered and stored in Cadarache until the RF building will be available to start for installation. The technical support to the EC Power Supplies activities will continue.

Procurement Activities

Options for the contract Procurement of Body PS & MHVPS will be released.

Neutral Beam (NB)

Progress of Work

NB Test Facility (NBTF) at RFX-Padua:

The experiments of SPIDER will continue in accordance with the applicable roadmap towards development of the Heating NBs for ITER. For MITICA, the activities will progress with commissioning and testing of vessel and power supplies (ISEPS, GRPS, HVD1), and with assembly of auxiliaries (Cooling, Cryoplant,GVS, CODAS, Interlock, and Safety) and progress of the MITICA Beam Source contract.

NB at ITER-Cadarache:

Subject to the negotiation to adapt the contractual schedule with the readiness of buildings, presently it is foreseen that in 2019, the procurement for the ITER NBIs will progress with design finalization of Ion Source Extraction PS (ISEPS) and with design finalization for AGPS/GRPS.

Procurement Activities

A Framework Contract will be signed with Consorzio RFX for technical support.
Specific contracts/grants will be signed in support of NBTF activities, namely for NBTF Control, Interlock and Safety, MITICA Beam Line Components, Option for Vacuum and Gas Injection Plant, services for Static Tests and Inspection “Collaudo”, site supervision and support, NBTF technical support follow-up and Spot Inspectors.

As far as cash contribution is concerned, during 2019 it may be necessary to amend the NBTF Agreement 2019 with RFX, to cover activities for the exploitation of SPIDER and construction and preparation for the exploitation of MITICA.

ANNUAL OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU53.06.06970	Start of Commissioning of ISEPS of MITICA	Q4 2019	Execution Milestone	5.3.P6.EU.01
EU53.06.07920[9]	Stage # 2 of Contract for EU-HVD1 & EU-Bushing - Start of Performance for NBI-1 (target date) (2.CM.0)	Q4 2019	GB30 Predecessor	5.3.P6.EU.01
EU53.TF.08700	Task Order Signed for SC#1 (Stage 2) MITICA Beam Line Components	Q4 2019	Contract Signature	5.3.P9.EU.01
EU53.TF.40710	"Task Order #4 Signed for NBTF MITICA CODAS and Interlock"	Q3 2019	Contract Signature	5.3.P9.EU.01

EXPECTED RESULTS AND TARGET	
1 Commitment for Specific Contract - MITICA CODAS 1, Interlock (FW Contract NBTF Control, Interlock and Safety) 2 Task Order Signed for SC#1 (Stage 2) MITICA Beam Line Components The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)	
PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	0
PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	3.556
PA 5.3.P1.EU.01 Neutral Beam Assembly and Testing (OPTION A: ASSY + TOOLING)	0
PA 5.3.P2.EU.01 Heating Neutral Beam Beam Source	0
PA 5.3.P3.EU.01 Heating Neutral Beam Beamline Components	0
PA 5.3.P4A.EU.01 Heating Neutral Beam Vacuum Vessel & Drift Duct	0
PA 5.3.P4D.EU.01 Heating Neutral Beam Absolute Valve (BtP)	0
PA 5.3.P5.EU.01 Heating Neutral Beam Active Correction Coils	0
PA 5.3.P6.EU Neutral Beam Power Supply	14.16
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	15.75

1.3.9 Action 9. Diagnostics

Action 9	Diagnostics

Progress of Work

The Diagnostics team will continue the manufacturing of several components to be delivered to ITER for first plasma during 2019 including, among others, manufacturing of several magnetic sensors, 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 the preliminary design phase with the approval of the relevant

[9] Depending on availability of Building B37 in Cadarache.

design review including for: electrical Tokamak services (in-divertor components), the integration designs of the equatorial port 01 and upper ports 01 and 03 and the port plug components of the equatorial visible/infrared wide-angle viewing system.

Procurement Activities

Procurement activities will be focussed in two different areas: placement of manufacturing contracts for the production of components to be delivered to ITER mainly for First Plasma and contract/grants 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 for the production of manufacturing specifications. In-sourcing of personnel and experts to cover the needs of the team during 2019 is also foreseen.

Manufacturing contracts:

During 2019 the launch and/or signature of contracts for the manufacturing of electrical cabling is envisaged.

The 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.

A contract will also be signed for the manufacturing of three distinct types of in-vessel magnetic sensors.

Design contracts:

Although most of the long term specific grants under the on-going Framework Partnership Agreements will already be in place for the design of the Diagnostics systems, new specific grants are foreseen and amendments to the signed specific grants may be needed.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.203550	Contract Signed for Procurement and Delivery for Inner-Vessel Coils - Sensor Heads (LTCC) - Lot 1	Q2 2019	Contract Milestone	5.5.P1.EU.01-02-16-17-19
EU55.06.681710	Receipt of Approval of Preliminary Design Review for Feedthroughs components from IO to EU-DA	Q2 2019	GB36 Predecessor	5.5.P1.EU.18
EU55.14.632140	Preliminary Design Review Meeting for EQ01 - T04	Q4 2019	Annual Objective	5.5.P1.EU.10-11-12-13-14

EXPECTED RESULTS AND TARGET

1. Delivery of remote handling platforms baseplates & bosses for the Inner Vessel magnetic sensors;
2. Contract signed for the procurement and delivery for Inner-Vessel Coils - Sensor Heads (Lot 1 - LTCC);
3. Preliminary design review meeting for the equatorial port -01.

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics	0.51239
PA 5.5.P1.EU.03 Diagnostics - Bolometers	0.0
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00020612

PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0
PA 5.5.P1.EU.01 Diagnostics - CPTS 55.C1	0
PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0
PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0
PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	0

1.3.10 Action 10. Test Blanket Module

Action 10	Test Blanket Module

Progress of Work

The overall focus of the activities in the development of the TBM project will be devoted to the Preliminary Design Phase of the Helium-cooled Pebble-Bed (HCPB) TBM System and Conceptual Design of the Water-Cooled Lead-Lithium (WCLL) TBM System (in collaboration with EUROfusion).

R&D activities will continue to define the Preliminary Welding Procedures Specifications needed for the manufacturing of the TBM box.

The post-irradiation examination of EUROFER samples started in 2015 and needed for its qualification will continue with the contract already placed.

A new FwC for the consultancy of an Agreed Notified Body (ANB) will be signed

Procurement Activities

The first specific contract of the Framework Contracts for the Preliminary Design of the HCPB TBM Set of the Ancillary Systems and of the related Safety and Accidental Analyses will be signed.
The 1st specific contract for the consultancy of an ANB shall be signed.
The first activities executed jointly by ITER Members/DAs under the collaborative scheme of the TBM PT will start in 2019 (or 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
EU56.01.130320	FwC signed for Preliminary Design of TBM Set	Q4 2019	Contract Milestone	TBMAs
EU56.01.1226780	TO signed for Preliminary Design of TBM Set Phase I	Q4 2019	Contract Milestone	TBMAs
EU56.01.1230420	FwC signed for Preliminary Design of Ancillary Systems	Q4 2019	Contract Milestone	TBMAs
EU56.01.1232800	FwC signed for Safety Analysis for TBS Preliminary Design	Q4 2019	Contract Milestone	TBMAs

EU56.01.1244180	FwC signed for ANB Consultancy	Q4 2019	Contract Milestone	TBMAs

EXPECTED RESULTS AND TARGET

1. The start of the Preliminary Design Activities for the HCPB TBM Set, the Ancillary Systems and the Safety Analysis with the signature of the 1st Task Orders;
2. The start of the activities of the EUROfusion-F4E TBM coordinated programs.

Target credit NA

1.3.11 Action 11. Site and Buildings and Power Supplies

Action 11	Site and Buildings and Power Supplies

Progress of Work

The focus for 2019 will be on the completion works of the Tokamak Complex with the first stage concrete works coming to completion and the finishing works progressing. The prefabrication of the steel structure of the Crane Hall will be progressing with cladding installation to start.

Overview on TB03

The concrete Civil Works of Buildings 74 (Diagnostic Building) is foreseen to be completed with B74 (Diagnostic Building) foreseen to be weather-tight. And the first stage concrete Civil Works for Building 11 (Tokamak Building) is foreseen to be completed.

The installation of the Cargo Lift lobby doors, Port Cell doors and other shielding / confinement doors will continue.

Overview on TB04

Following novation of TB04 installation scope to IO, TB04 procurement activities will be started for the Tokamak Complex and construction design will progress with IO approval of all levels (services) foreseen mid 2021. The TB04 installation works in Auxiliary buildings will largely be complete by end 2019.

Overview on Remaining TBs

TB06: Electrical distribution Load Centres and Building 36 will be near completion.

TB11: The finishing works (metal works) will progress in B74 (Diagnostic Building) and will continue in B11 (painting and metal works) and auxiliary buildings.

TB12: After contract signature, the Final Design will be produced for Buildings 34 / 37 to allow design to progress to the Construction Design phase. The Final Design of building 71 and Construction Design of Building 75 will be undertaken in preparation for submission to IO for Approval.

TB16: The infrastructure works will continue on zone by zone basis with design and construction works of PBS65 drainage, shallow trenches and completion of Hot Cell retaining wall.

TB19: Painting and coating works will commence in the Tokamak Complex

Procurement Activities[10]

[10] TB12, TB13 & TB19 contracts were initially part of WP2018. After the cut-off date of April 2018, their foreseen signature date was postponed from 2018 to 2019.
TB12 option 1 was foreseen to be part of WP2020. After the cut-off date of April 2018, the foreseen signature date was brought forward to Q1 2019.

TB12 contract and options will be signed covering B34 (NB Power Supply Building), B37 (NB high Voltage Power Supply Building), B71 (Control building – non PIC part), B75 (Fast Discharge Reactor Building).
TB13 for Design and Build of Buildings 44 (Emergency Power Supply Building Train A), 45 (Emergency Power Supply Building Train B), 46 (Medium Voltage Distribution Building LC/1A), 47(Emergency Power Supply Building Train B), 48 (Medium Voltage Distribution Building LC/2B) : After optimisation of the technical specifications the Call for Tender will be relaunched in Summer 2019.
The TB19 contract will be signed to cover painting and coating in the Tokamak Complex.The call for tender for TB18 (Tritium building civil works and finishing above L2) will be launched with a contract to be signed in 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
EU62.05.20916	RFOC Tokamak Building (11) Central Pit	Q2 2019	GB13/IC50 Predecessor	6.2.P2.EU.05
EU62.05.060	Construction of Assembly Building (13) Completed	Q4 2019	GB51/IC43	6.2.P2.EU.05
EU62.05.273130	Contract Signed for TB12 Contract	Q3 2019	Predecessor of GB34	6.2.P2.EU.02 6.2.P2.EU.05
EU62.05.20929	Ready for TB02 Crane rails installation in the Crane Hall area	Q4 2019	GB13/IC50 Predecessor	6.2.P2.EU.05

EXPECTED RESULTS AND TARGET

1. In 2019, the first stage Civil work construction of the B11 (Tokamak Building) will be completed and Crane Hall Steel Structure, Cladding & roofing ongoing. The B74 (Diagnostic Building) civil work construction, Cladding & roofing will be completed as well.
2. RFIOC Tokamak Levels B2 & B1 achieved.
3. Building services Construction Design of the Tokamak Complex Building 74 and Building 11 approved for levels B2 to L2.
4. The Building services installation are due to be completed and Tests & Commissioning ongoing in the B13 (Assembly Hall Building) , B17 (Cleaning Facility Building).
5. B15 (RF Heating Building) TB04 works started
6. TB12: Tender Batch for B34 (NB Power Supply Building), B37 (NB high Voltage Power Supply Building), B71 (Control building – non PIC part), B75 (Fast Discharge Reactor Building – non PIC part): Design works ongoing.
7. TB13: Tender Batch for B44 (Emergency Power Supply Building (Train A)), B45 (Emergency Power Supply Building (Train B)), B46 (Medium Voltage Distribution Building LC/1A) and B47 (Medium Voltage Distribution Building LC/2B). Launch of call for tender.
8. Taking Over of LC05/MV02.
9. TB18 (B14 Civil works): Launch of call for tender.
10. TB12: Contract is planned to be signed Q3 2019.
11. TB19: Contract is planned to be signed Q2 2019.

The target of 2019 is the achievement of a cumulative value expressed in kIUA (CAS)

COMMON	54.37365009
TOKAMAK COMPLEX	52.36708406

AUX BUILDINGS TB03/TB04	58.20261914
AUX BUILDINGS D&B TB05	15.15
AUX BUILDINGS D&B TB06	7.48
AUX BUILDINGS D&B TB07	6.3742002
AUX BUILDINGS TB09/TB10	0
AUX BUILDINGS D&B TB12	0
AUX BUILDINGS D&B TB13	0
AUX BUILDINGS D&B TB17	0
LOAD CENTERS	2.5
INTERCONNECTING ACTIVITIES	0.72834998
COMMON CONTRACTUAL ACTIVITIES	41.89
PA 6.2.P2.EU.06 Headquarters Building	13.85

1.3.12 Action 12. Cash Contributions

Action 12	Cash Contributions

Overview

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.

ANNUAL OBJECTIVES

	2019
Cash to IO – Commitment (in MEuros)[11]	230.5[12]

EXPECTED RESULTS AND TARGET

The expected result for this Action is to pay to IO the contribution as agreed by the ITER Council .

As far as the cash to IO is concerned, the target for 2019 is to commit a complementary part of the 2019 cash contribution and the cash contribution for 2020 according to the decisions due to be taken by the ITER Council in November 2019.

1.3.13 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.

[11] 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 2019 is the cash contribution to IO for 2020.

[12] Update from IO April 2019

Technical Support to In-Kind Procurement

Engineering activities

The **Engineering (ENG) Unit** supports the projects (ITER D, ITER P and to a lesser extent BA) by providing technical expertise and highly qualified staff in the key domains of engineering and fusion technologies. The Unit is covering the following areas of expertise (a) System Design and Mechanical Engineering (b) Computer Aided Design and technical Data Management, (c) Analysis and Codes, (d) Materials and Manufacturing Technologies and processes, (e) Instrumentation - Control and CODAC, (f) RAMI & Assembly. (g) Metrology, (h) Transportation.

Beyond the preparation of task orders, the procurement activities in the Engineering Unit will be mainly focused on renewing Framework Contract providers for keeping the same level of support to project teams.

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 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 the various safety analyses, identification of optimum design solutions and review of relevant documentation. Two expert contracts will be signed before the end of the year, one to continue the on-going support on nuclear codes and standards conformity and another one to reinforce the Nuclear Safety support in inspections.

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.

To this aim, a framework contract will be signed during the year.

CE marking

The scope includes the support to the project teams in providing assessments, for each PBS, of the compliance with CE marking directives & regulations (mainly the Construction Product Regulation, the Machinery Directive, the Low Voltage Directive and the Electromagnetic Compatibility Directive).

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 needed across several areas, including Requirements Management and Verification (RMV) with more emphasis on Verification, Configuration Management, Design and Manufacturing Readiness Reviews, Interface Management, and other Systems Engineering topics.

A set of specific contracts will be signed during the year to continue to support the F4E Project Teams

both at Barcelona and Cadarache.

Office of the Chief Engineer

The Office of the Chief Engineer will support the Head of ITER Programme Department respect to the scope of the EU in-kind components for ITER and 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.

The procurement activities of the Office of the Chief Engineer for 2019 are devoted to extend the in-house Configuration Management and Issues Management capabilities with expert support from specialized companies.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.ES.02.51240	Framework Contract Signed for support in the area of thermohydraulic and fluid dynamic analyses	Q4 2019	Contract Signature	All
EU.ES.02.58460	Contract signed for support in the area of structural dynamics for earthquake and dynamic-type transient load	Q4 2019	Contract Signature	All
EU.PM.49340	OMF-937 Task Order signed for QA Support to QA Group	Q3 2019	Contract Signature	All
EU.PM.3033480	Framework Contract signed for Quality & Surveillance Inspection	Q2 2019	FWC Signature	All
EU.PM.3023240	OMF- Lot 5 Task Order signed for CE Marking Support activities	Q1 2019	Contract Signature	All
EU.PM.45380	Task Order Signed for Expert Support in Deviation and PCR control	Q1 2019	Contract Signature	All

EU.PM.3035120	Task Order Signed for Support in Issues Management	Q1 2019	Contract Signature	All

EXPECTED RESULTS AND TARGET

1. Implementation of the framework contract which will provide F4E with framework contracts in the field of Thermo-Hydraulics and Fluid Dynamics and Seismic analysis and design of building and mechanical components of the ITER facility and engineering support in the area of Electromagnetic and Electromechanical Analysis and support in the area of Nuclear Analysis
2. Completion of PLM project Phase I
3. Implementation of the Configuration Management In-depth Independent Reviews (IIR) outcomes
4. PA Applicable Documents Update
5. The expected result for the activities in Nuclear Safety, Quality Assurance & Quality Control, CE Marking, System Engineering is to provide the requested support to all Project Teams on these matters.

The target for 2019 is to contribute in achieving the cumulative credit forecasted for each action in this WP2019 thanks to the support granted to the work under each specific action.

Transportation

During 2019, Engineering Unit /Transportation will be in charge of the management, on the F4E side, of technical aspects of the joint procurement with IO for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of all ITER Components from the port/airport of entry (Fos or Marignane) to ITER site.
During 2019, 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 follows the dedicated ITER itinerary.
In 2019 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.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3004900	Extension of Convention 3 for Gendarmerie for Real Convoys. Period 2020-2024	Q4 2019	Contract Signature	All

EXPECTED RESULTS AND TARGET

1. Transportation of Highly Exceptional Loads amongst others, F4E PF6 from China as well as Sub-Assembly tooling including up-ending tool (2 HEL) between Maritime Port of Marseille and ITER site.
2. Extension of Gendarmerie contract for support on HEL convoys (OPE-597).

Target Credit NA

Other Technical Support Activities

Programme Management
Main focus will be the performance monitoring and reporting, scheduling support, the maintenance and

update of the costing, the further improvement of the risk registers in all project areas, the increase in the number of standard reports available to the organization, the implementation of the Internal Compliance Programme for export control. Overall project management support and support to related tools are included, too.

Specific contracts will be signed during the year to support the F4E Project Teams at Barcelona and Cadarache.

Other Expenditures

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

It 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, in particular renting of additional space to host external experts working on F4E site from operational services contracts, are also included.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3063500	OMF-556 Task Order signed for Planning & Scheduling Support	Q1 2019	Contract Signature	1.5.P1A.EU.01
EU.PM.3063650	OMF-895 Lot 1 Task Order signed for Project Performance Management Support	Q1 2019	Contract Signature	5.3.Px.EU.01
EU.PM.3062150	OMF-895 Lot 3 Task Order signed for Planning Support	Q3 2019	Contract Signature	6.2.P2.EU.05
EU.PM.3060400	OMF-895 Lot 2 Task Order signed for Risk Management Support	Q4 2019	Contract Signature	All
EU.PM.3058900	OMF-831 Lot 2 Task Order signed for SAP Business Objects Support	Q4 2019	Contract Signature	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. experts, logistics, ICT, legal, etc.).

The target for 2019 is to contribute in achieving the cumulative credit forecasted for each action in this

WP2019 thanks to the support granted to the work under each action.

Action 14. Broader Approach

Action 14	Broader Approach

JT-60SA

Progress of work

In 2019 the remaining parts of EU contribution will be delivered to the JT-60SA site. The actions will focus on the completion of fabrication, testing, transportation and on-site installation. Preliminary activities will be initiated in preparation for BA Phase II.

The installation of the Electron Cyclotron Resonance Heating power supplies will be delivered to site, installed and tested.

The fabrication and delivery to Japan of the Spare TF Coil Winding Pack is going to be completed mid 2019 and delivery to the JT-60SA site is foreseen within the third quarter of 2019.

Procurement Activities (contracts and grants)

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 may be placed in 2019.

IFMIF/EVEDA

Progress of work

In 2019 all work will be devoted to the LIPAc (Linear IFMIF Prototype Accelerator) installation and commissioning. The LIPAc operation at Rokkasho will undergo a transition phase from testing the subsystem at 5 MeV to commissioning the full accelerator at 9 MeV. In order to start the final LIPAc commissioning phase, the SRF Linac will be assembled in the clean room facility and completed in the accelerator vault. In addition, it is intended to use the time before its setting-up in early 2019 to extend the testing of subsystems at 5 MeV from pulsed operation to steady state operation.

Procurement Activities (contracts and grants)

The work described above falls under the responsibility of F4E and will be carried out through existing/new supply and service contracts. Additional contracts will have to be placed for services, materials and components to support these continued testing activities. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts and specific contracts. Cash contributions will be made to maintain project team common expenses (e.g. missions) and common funds (e.g. repairs and spare parts). Contracts in support of the BA Phase II preliminary activities may be placed in 2019.

IFERC

Progress of work

The IFERC project comprises two activities, DEMO design and R&D activities, and REC (Remote experimentation Centre). The DEMO design activities are at the pre-conceptual design level and are performed by EUROfusion acting as a Voluntary Contributor. Integrated tests (participation in the

operation of a European Tokamak from Rokkasho) will take place in 2018/2019.

Procurement Activities (contracts and grants)
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.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.BA.01.6520	Approval of Report on Factory Test	Q4 2019	Delivery milestone	STP-EU-ECRHPS
EU.BA.01.6580	Delivery of JT-60SA Toroidal Field Magnet – Spare TF coil 1 and spare winding pack	Q4 2019	Delivery milestone	STP-EU-TFCSP
EU.BA.01.6420	Delivery of Beam Dump Ionization Chambers	Q3 2019	Delivery milestone	IFMIF-EU-PA-07
EU.BA.01.14140	Cryomodule components delivered for its assembly	Q4 2019	WP milestone	IFMIF-EU-PA-04
EU.BA.01.5260	Delivery of software codes and reports on remote participation tests	Q3 2019	Delivery milestone	IFERC-RECPA01-EU

EXPECTED RESULTS AND TARGET

1. The installation of the superconducting magnet power supplies (SCMPS) for JT-60SA is completed.
2. The Report on Factory Test of the electron cyclotron range of frequency (ECRF) system for JT-60SA is approved and the components are delivered to the Naka site.
3. The Beam Dump Ionization Chambers for LIPAc are delivered to the Rokkasho site.
4. Software codes and reports on remote participation tests are delivered.

The target of 2019 is the achievement of a total value of 15.874 kBAUA (CAS)

STP-EU-ECRHPS	1.865
STP-EU-TFCSP	5.197
STP-EU-SCMPS	2.410
STP-EU-EDICAM	0.010
IFMIF-EU-PA-AF04	0
IFMIF-EU-PA-AF07	1.647
IFMIF-EU-PA-AF10	3.670
IFMIF Common Fund	0.26
IFMIF Common Expenses	0.15
IFERC-T2PA01-FR	0.055
IFERC-DDA	0.610

ANNEXES

ANNEX I 2019 Work Programme Budget Summary

Budget Summary of the 2019 Work Programme - Amendment III (Budget Amendment II) for GB December 2019

Budget article		Third amendment to the Work Programme (Budget Amendment II) Commitment appropriations (EUR)
3 1	ITER construction including site preparation	481,261,508
3 2	Technology for ITER	2,000,000
3 3	Technology for Broader Approach & DEMO	5,000,000
3 4	Other expenditure	15,197,794
3 5	Appropriations from the ITER Host State contribution	130,000,000
Total Title III of the Budget		**633,459,302**
3 1 to 3 4	Additional non-budgeted revenue	-1,793,536
3 5	Host State contribution carried over from previous year (Available in September)	8,471,089
3 6	Additional revenue from the Reserve Fund Allocation scheme with ITER Organization	26,000,000
Total amount available for the operational expenditure		**666,136,855**

Work Programme		Third amendment to the Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1+3 5+3 6	Expenditure in support of ITER Construction	985,958	411,693,091	231,231,080
	Sub total ITER construction + RF		**643,910,129**	
3 2	Design and R&D in support of ITER, not credited	0	1,850,000	150,000
	Sub total technology for ITER		**2,000,000**	
3 3	Expenditure in support of Broader Approach	0	4,477,722	522,278
	Sub total Technology for Broader Approach and DEMO		**5,000,000**	
3 4	Other Expenditure (EU.PM.PM)		15,226,726	0
	Sub total Other Expenditure		**15,226,726**	
Totals Operational Expenditure		***985,958***	***433,247,539***	***231,903,358***
		666,136,855.00		

(As of September 2019)

ANNEX II 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%

ANNEX II Time of call for the procurement plan

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

Procurement Procedures	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019
P Serv - Contract	1	2	3	3	8	9	7	15
P Supply - Contract	1	5	6	12	12	11	9	8
Pserv - Specific Contracts	4	14	14	22	40	34	50	71
PSupply - Specific Contracts	0	3	5	4	3	2	4	13

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 WP2019.
- 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.

ANNEX IV Indicative Value of Financial Resources for the actions in the 3rd Amendment of WP2019

The WP2019 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 2019 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 2019, 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 WP2019	Budget WP2019 Amendment 1	Δ (Am.1-Original)	Budget WP2019 Amendment 2	Δ (Am.2-Am.1)	Budget WP2019 Amendment 3	Δ (Am.3-Am.2)
1	Magnets	16,536,831	58,536,831	42,000,000	72,200,000	13,663,169	70,956,750	-1,243,250
2,3,4,10[13]	Main Vessel	33,040,942	33,040,942	0	15,100,000	-17,940,942	15,756,737	656,737
5	Remote Handling	17,781,559	17,781,559	0	13,000,000	-4,781,559	13,043,414	43,414
6	Cryoplant & Fuel Cycle	8,403,856	8,403,856	0	28,000,000	19,596,144	20,948,633	-7,051,367
7	Antennas and Plasma Engineering	5,329,337	5,329,337	0	5,125,000	-204,337	5,313,343	188,343
8	Neutral Beam and EC Power Supplies and Sources	26,773,199	26,773,199	0	21,900,000	-4,873,199	18,560,211	-3,339,789
9	Diagnostics	16,170,926	16,170,926	0	12,800,000	-3,370,926	8,255,171	-4,544,829
11	Site and Buildings and Power Supplies	169,969,643	169,969,643	0	199,500,000	29,530,357	257,569,507	58,069,507
12	Cash Contributions	293,099,374	251,099,374	-42,000,000	226,374,688	-24,724,686	230,216,338	3,841,650
13	Technical Support Activities	29,963,533	29,963,533	0	28,200,000	-1,763,533	20,323,252	-7,876,748
14	Broader Approach	11,930,000	11,930,000	0	11,000,000	-930,000	5,193,500	-5,806,500
	Total	**628,999,200**	**628,999,200**	**0**	**633,199,688**	**4,200,487**	**666,136,855**	**32,937,167**

(As of September 2019)

NB: Budget shown according to WP action and not budget line

[13] 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.

ANNEX V Main procurement activities per Action

Action	Signature	Type of contract
Magnets		
Contract signature for Transportation of TF Coils from Manufacturer to ITER	Q4	PServ
Task Order Signed for Extension of 2nd Inspector for PF Coils Manufacturing in Cadarache	Q1	SC-PServ
Task Order Signed for Inspection Services for TF Coils Insertion and Cold Test. Resident Inspector for SIMIC	Q1	SC-PServ
Task Order TO29.1 Signed for Inspector to Follow-up the Plan B PC Rings Manufacturing Contract	Q2	SC-PServ
Contract signature for PF Coils Magnet Supply Contract (MSC)	Q2	SC-PSupply
Option release for second batch of 3 additional pultruded Pre-Compression Rings	Q1	PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Vacuum Vessel		
Commitment and Task Order Signed - TO #21 for 1 VV Resident Inspectors	Q2	SC-PServ
Commitment and Task Order Signed - TO #22 for 1 VV Resident Inspectors	Q3	SC-PServ
Commitment and Task Order Signed - TO #23 for 1 VV Resident Inspectors	Q3	SC-PServ
Commitment and Task Order Signed - TO #25 for 1 VV Resident Inspectors	Q1	SC-PServ
Commitment and Task Order Signed - TO #29 for 1 VV Resident Inspectors	Q4	SC-PServ
Commitment and Task Order Signed - TO #31 for 1 VV Resident Inspectors	Q1	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Blanket		
OPE-443-01 Option I Be armour for manufacturing of mock-ups without SS pipes	Q2	Option
OPE-443-03 Option I Be armour for manufacturing of mock-ups without SS pipes	Q2	Option
TO 02 OPE-319-01 High Heat Flux Testing of FW full scale-prototype n.2	Q1	SC-PServ
TO 03 OPE-319-01 High Heat Flux Testing of FW full scale-prototype n.3	Q1	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Divertor		
OPE-138-01 Amendment for Fabrication of PFU with New W Grade and qualified Tube to Tube Transition	Q4	PServ
Task Order for Inspectors 2019 – Inner Vertical Target	Q3	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Remote Handling		
Task Order signed for GENROBOT Update Phase 2	Q4	SC-PServ
Task Order Signed for Final Design Phase 1 for DRHS	Q3	SC-PSupply

Task Order Signed for Final Design Preparatory Activities for In Vessel Viewing System	Q2	SC-PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Cryoplant and Fuel Cycle		
Contract Signed for Call for tender for Torus and Cryostat Cryopumps	Q4	PSupply
Contract Signed for I&C and software design	Q2	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Antenna and Plasma Engineering		
Task Order signed for Series production of EC Window Diamond Disks	Q2	SC PSupply
Option 2 released for 2nd additional year for TO2 OFC-800	Q3	SC-PServ
Task Order Signed for Testing of 63.5 mm Window and facility documentation at ECT-FALCON	Q3	SC-PServ
Contract Signed for Hardware procurement for EC Plant Control System Stage 2	Q4	PSupply
Contract Signed for Procurement of GCC Waveguides for ITER	Q4	PSupply
TO signed for CAD Design Support for the Antennas & Plasma Engineering Unit	Q4	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		
Task Order Signed for SC#1 Stage 2 MITICA Beam Line Components	Q4	SC-PSupply
NBTF: Release of Option A4: Additional work and services - MITICA Vessel	Q4	Option
NBTF: Contract Amendment No1 for NBTF SPIDER Control 3	Q4	PSupply
Amendment Budget for NBTF Agreement 2019 NOT Credited part	Q3	Cash
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Diagnostics		
Contract Signed for Procurement and Delivery for Inner-Vessel Coils - Sensor Heads LTCC - Lot 1	Q1	PSupply
Contract Signed for Procurement and Delivery of In-vessel cabling	Q4	PSupply
Commitment for Future Activities for in-source personnel under OMF-0871	Q2	SC-PServ
Task Order Signed for Irradiation Testing for Feedthroughs	Q3	SC-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 I	Q4	SC-PServ
Task Order Signed for Preliminary Design of TBMs set phase I	Q3	SC-PServ
Task Order Signed for Safety Analyses for TBS PD phase I	Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Site and Buildings and Power Supplies		

Commitment for TB11 - Completion works Contract - 2019	Q1	SC-PSupply
Site Security and Reception Services for the ITER Site 2019 signed	Q1	SC-PServ
TB12 - Commitment for Contract for Design & Build of Bldgs 34, 37, 71 non PIC, 75 non PIC	Q2	SC-PSupply
TB19 - Commitment for Contract for Painting and Coating for Buildings Tokamak Complex	Q2	SC-PSupply
TB12 - Commitment for Option 1 - Building 71 North part (CODAS) - Non PIC	Q2	Option
TB12 - Commitment for Option 5.1 - Supply and Inst. PBS44 cable trays BLDG in the Baseline	Q3	Option
ITER Site Cooperation Agreement for 2019	Q4	Cash
ITER Site Host Agreement for 2019	Q2	Cash
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Technical Support Activities		
Commitment 2019 for Corporate services Unit	Q4	PServ
Commitment 2019 for Operational Missions	Q1	PServ
Commitments 2019 for ICT	Q4	PSupply
Task Order signed for Convention 4 for Real Convoys	Q2	SC-PServ
Convention Signed for Gendarmerie Services Real Convoys Escort of Convoys	Q4	SC-PServ
SLA OPE-XXX Service Level agreement in the area of Support in the area of Structural Dynamics	Q4	PServ
Framework Contract for Engineering Support services in Thermo Hydraulics and Fluid Dynamics	Q3	FWC
Framework Contract for Seismic analysis and design of building and mechanical components of the ITER facility	Q1	FWC
Framework Contract for Provision of System, Instrumentation and Control Engineering - support for conventional I&C systems	Q4	FWC
Task Order Signed for TO26.1 for QA Support Staff QAG	Q3	SC-PServ
Task Order Signed for TO31.1 for QA Support Staff QAG	Q2	SC-PServ
Task Order Signed for TO32.1 for QA Support Staff QAG	Q2	SC-PServ
Task Order Signed for TO36.1 for QA Support Staff QAG	Q3	SC-PServ
TO 01 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q1	SC-PServ
TO 02 for FwC F4E-OMF-0895 Lot 2: Risk Management Support	Q4	SC-PServ
TO 03 for OMF-0895 Lot 1: Project Performance Management Support - Diagnostics	Q3	SC-PServ
TO 04 for OMF-0895 Lot 1: Project Performance Management Support-Technical Support Systems	Q3	SC-PServ
TO 05 for OMF-0895 Lot 1: Project Performance Management Support - Antennas	Q4	SC-PServ
TO03 for OMF-0895 Lot 3: Planning Support Vacuum Vessel	Q3	SC-PServ
TO04 for OMF-0895 Lot 3: Planning Support Neutral Beams	Q3	SC-PServ
TO05 for OMF-0895 Lot 3: Planning Support BIPS	Q4	SC-PServ
TO06 for OMF-0895 Lot 3: Planning Support Configuration	Q3	SC-PServ
TO for Transportation Management fees 2020	Q4	SC-PServ

Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Broader Approach		
Contract signed for Engineering support for installation in Rokkasho 2019	Q4	PServ
Future contract for Materials and components for LIPAC installation 2019	Q4	PSupply
Contractual activities for On-site assistance from PS suppliers	Q1	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A

ANNEX VI Grants per Action

Action	CA Type Code	Value (Euros)	Time of Call	Budget Lines
Diagnostics				
Commitment for SG for Design and R&D and eng. design of In-vessel components. SG06	SG	375,566	Q1 2019	3.1+3.5
Amendment 1 for SG for Design and R&D for Core-Plasma Charge Exch. Recombination Spectr- Phase 1 SG4	G/SG Amend	12,583	Q2 2019	3.1+3.5
Amendment 2 for SG for Design and R&D for Core-Plasma Charge Exch. Recombination Spectr- Phase 1 SG4	G/SG Amend	56,500	Q2 2019	3.1+3.5
Amendment 3 for SG for Design and R&D for Core-Plasma Charge Exch. Recombination Spectr- Phase 1 SG4 - shutter and HPW	G/SG Amend	113,359	Q2 2019	3.1+3.5
Amendment 1 Signed for Design and R&D for PPR SG06 - Include gap 4 and specific testing	G/SG Amend	53,796	Q2 2019	3.1+3.5
Amendment 1 signed for Equatorial Visible/IR Wide-Angle Viewing System FPA 1 SG4 Shutter Prototype	G/SG Amend	264,930	Q4 2019	3.1+3.5
Amendment 2 for FPA-327-SG06 - DR: Time Extend to cover PDR	G/SG Amend	69,023	Q3 2019	3.1+3.5
Amendment 5 Signed for Design and R&D for PPR SG5 - Increase scope FDR + PA situation	G/SG Amend	40,200	Q3 2019	3.1+3.5

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

ANNEX VII Human resources per action for WP2019

	Core Staff	Assigned (Matrixed) Staff	Total Project Staff	Pro-Rata Support Staff	Support Staff	Grand Total
Magnets	26.28	9.19	35.46	10.4%	12.82	48.28
Vacuum Vessel	22.81	6.61	29.43	8.6%	10.64	40.06
In-Vessel Blanket	9.23	3.52	12.75	3.7%	4.61	17.36
In-Vessel Divertor	9.23	3.52	12.75	3.7%	4.61	17.36
Remote Handling	16.08	6.94	23.02	6.8%	8.32	31.34
Cryoplant & Fuel Cycle	15.25	4.66	19.92	5.8%	7.20	27.12
Antennas & Plasma Engineering	12.52	4.64	17.16	5.0%	6.20	23.36
Neutral Beam & EC Power Supplies and Sources	20.06	7.02	27.08	7.9%	9.79	36.87
Diagnostics	16.33	8.63	24.96	7.3%	9.02	33.98
Test Blanket Modules	8.87	5.96	14.83	4.4%	5.36	20.19
Site and Buildings and Power Supplies	29.17	22.63	51.80	15.2%	18.73	70.52
Supporting Activities	27.20	12.74	39.94	11.7%	14.44	54.38
Broader Approach	30.16	1.55	31.71	9.3%	11.46	43.18
Total	241.20	97.60	338.80	100.0%	125.20	464.00

NB: The methodology to compute the Human Resources numbers per action changed since the Amendment 2 WP2019 was prepared. This explains the noticeable changes between WP2019 Amendment 2 and Amendment 3.

It should be noted that the staff costs represent a very small part of the total investment.
The numbers provided in the table above show just a snapshot of the situation. Assigned staff includes the persons working in a matrix structure within the teams (i.e. Project Performance Management, QA/QC, Contract & Procurement, Legal, Finance). The support value instead 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.

List of Acronyms

AGPS	Accelerator Ground Power Supplies
ASN	Autorité de Sûreté Nucléaire
ATS	Air Transfer System
BA	Broader Approach
BAUA[14]	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
EBBTF	European Breeding Blanket Test Facilities
EC	Electron Cyclotron
EC UL	Electron Cyclotron Upper Launcher
ECH	Electron Cyclotron Heating
ELM	Edge Localized Mode
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

[14] 1,000 BAUA equal to 678,000 EUR (value 5 May 2005).

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
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[15]	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

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

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
SiC-Dual	SiC/SiC composite material for electrical and thermal Insulation
SR2FP	Straight Road to First Plasma
SS	Steady State
STP	Satellite Tokamak Programme
TBM	Test Blanket Module
TF	Toroidal Field
TFC	Toroidal Field Coils
TFWP	Toroidal Field Winding Pack
TO	Technical Officer
VAR	Variation
VC	Voluntarily Contribution
VCDIS	Voluntarily Contribution Design Institutions
Vis	Visible
VS	Vertical Stability
VV	Vacuum Vessel
WAVS	Wide Angle Viewing System
WBS	Work Breakdown Structure
WDS	Water Detritiation System
WP	Work Programme