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 SECOND AMENDED 2020 ANNUAL WORK PROGRAMME OF THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY

THE GOVERNING BOARD OF FUSION FOR ENERGY,

HAVING REGARD to the Statutes annexed to Council Decision (Euratom) No 198/2007 of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy (hereinafter "Fusion for Energy") and conferring advantages upon it[1] (hereinafter "the Statutes") and in particular Article 6(3)(e) thereof, last amended on 10 February 2015 by Council Decision Euratom 2015/224[2];

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

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

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

HAVING REGARD to the comments and recommendations of the Joint Undertaking's Administration and Management Committee and of the Technical Advisory Panel on the second Amended 2020 Annual Work Programme;

WHEREAS:

(1) The Director shall, in accordance with Article 11 of the Statutes, prepare each year the submission of the project plan to the Governing Board, the resource estimates plan and the detailed annual work programme, now merged in the Annual and Multi Annual Programme.

(2) The Administration and Management Committee shall, in accordance with Article 8a (2) of the Statutes, comment on and make recommendations to the Governing Board on the proposal for the project plan, the work programme, the resource estimates plan, the staff establishment plan, the staff policy plan and other related matters, now part of the Annual and Multi Annual Programme drawn up by the Director;

(3) The Technical Advisory Panel, in accordance with Article 6 (1) of the Statutes, shall advise the Governing Board on the adoption and implementation of the project plan and work programme, now part of the Annual and Multi Annual Programme;

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

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

3 OJ L 349, 21.12.2013 p100-102.

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

5 OJ L 122, 10.5.2019, p. 1–38.

(4) The Governing Board, in accordance with Article 6 (3) (d) of the Statutes, shall adopt the project plan, work programme, resource estimates plan, the staff establishment plan and the staff policy plan, now part of the Annual and Multi Annual Programme;

HAS ADOPTED THIS DECISION:

Article 1

The 2nd Amended 2020 Annual 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 2020 annual Work Programme approved by the Governing Board.

Amendments to the 2020 annual Work Programme are considered to be non-substantial if they do not cause the financial resources allocated to the Action concerned in Table 2 of the annual Work Programme to increase by more than EUR 10 million or 20%, whichever is higher.

If the amendment exceeds the threshold, the Director shall obtain prior authorisation by the Bureau, at an extraordinary meeting or teleconference of the Bureau to be convened at the earliest convenience.

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

In addition, any related changes to the scope of the annual 2020 Work Programme shall not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.

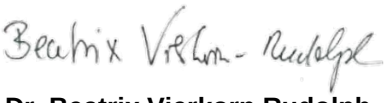
Non-substantial amendments shall not lead to any increase in the total operational expenditure for Title 3 of the annual Budget approved by the Governing Board.

Article 3

This Decision shall have immediate effect.

Done in Barcelona, 10 December 2020.

For the Governing Board



Dr. Beatrix Vierkorn Rudolph
Chair of the Governing Board

For the Secretariat

Romina Bemelmans
Secretary of the Governing Board

Annex: Second Amended 2020 Annual Work Programme

MAP2020_ANNEXES WORK PROGRAMME 2020 - Amendment 2

INTRODUCTORY MEMORANDUM

Changes to the Work Programme 2020

The Work Programme 2020 reference, as adopted at GB45, was based on the F4E set of schedules at the end of March 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.

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 have a significant impact on the overall cost.

The available budget (see 2nd Amendment to the 2020 Budget) was allocated to the various Actions identified in this document. The budget breakdown between Actions is shown table 2 to this 2nd Amendment to WP2020.

The Actions in the Work Programme represent the tasks planned in 2020 to contribute to the overall EU obligations to ITER.

The summary of the most substantial changes is provided in the table below. It is noted that the original Work Programme as amended by 2nd Amendment reflect the full planned scope of activities for the year.

The F4E schedule used for the preparation of WP2020 Amendment 2 is the version from end September 2020.

The below table recaps the main changes per action brought by WP2020 Amendment 2. The budgetary changes are listed when the variation in value is more than 2M€ or more than 10% of the original budgetary allocation. For convenience, the total budgetary variations per action as described in table 2 are also provided in the below table.

Action	Changes
Magnets	Total budgetary variation compared to WP Amendment 1: - 2,499,804€ No significant budgetary changes Annual objective changes: The annual objective "Delivery of TFWP01 to Cold Test and Coil Insertion site" is moved from Q3 to Q4 2020 because of COVID-19 impact and adjustment to the TFC Cases delivered from JADA. The annual objective "GB12 - PF Coil: EU PF 5 coil ready for cold test" is moved from Q3 to Q4 2020 because of COVID-19 impact, Non-Conformities on PF5 and PF6 during assembly (i.e. broken High Voltage wires after transportation for PF6, etc.), issues experienced in the Cryoplant and decision to carry out a more thorough and time consuming pre-testing campaign as a mitigation action for the risks of Coil failure during final testing. Current forecasted delivery date is still not in the First Plasma critical path. The annual objective "GB14 - PF Coil: Manufacturing Complete for EU PF 6 Coil and Delivery to Site" is moved from Q3 to Q2 2020 since this milestone's scope was re-aligned to "Delivery from China to PF Building" and achieved within the target date. Change in targets (kIUA): The delay in CAS achievement of the Toroidal Field Magnets is due to the postponement to early 2021 of documentation approval by IO for the last Winding Pack Final Tests. The delay in CAS achievement of the Poloidal Field Magnets is due to the delivery of PF5 & PF6 and some documentation approval of PF2 moved to early 2021.

Main Vessel[1] (Vacuum Vessel, Blanket, Divertor and TBM)	**Main Vessel** Total budgetary variation compared to WP Amendment 1: - 54,439,631€ Annual instalments may be used under Main Vessel (Vacuum Vessel, Blanket, Divertor and TBM) and these annual instalments are the main reason justifying this decrease in budget. **Vacuum Vessel:** Budgetary changes: No significant budgetary changes Annual objective changes: Annual objective "PS1 VV5 Fabrication Complete" is moved from Q3 2020 to Q4 2020. Except for repair works related to one NCR, the Outer Shell welding was completed in Q3. In order to complete this milestone, only the welding of the manifold rails is missing. Milestone "S9 PS4 ASSEMBLING T RIB LATERAL" has been removed since Poloidal Segment 4 is in delay and the milestone will not be achieved within 2020. ENSA has incurred delays on the PS4, partly because lessons learned have not been properly transferred between Mangiarotti and ENSA. F4E is pushing for a more fluid knowledge transfer between both workshops and for a recovery plan to make up for the time lost. This annual objective is replaced by milestone "S9 PS3 Final Assembly – OUTER SHELL …" since Poloidal Segment 3 advances at a much better rate and will therefore achieve its 2020 target. Change in targets (kIUA): Yearly target of CAS credits has been reduced from 13.878 to 9.094 kIUA since the manufacturing is in delay with respect with the latest plan, partly because of the Covid lockdown. **In-Vessel (Blanket):** Budgetary changes: (+) For OPE-319 it has been introduced a different scheme of commitment implementation. Previously the scheme foresaw an optional renewal of one year at a time. later it was decided to make the whole commitment for the 8 years. The scope of the FW Series Fabrication has been split in two lots Annual objective changes: The annual objective "Task Order Signed for Procurement of Beryllium (Initial Delivery) (TO#01)" is moved from Q3 2020 to Q4 2020 since IO announced the possibility to have to tighten the requirement on the uranium content of Beryllium. For this reason, the deadline for the tenderers to submit the binding offers was extended. This resulted in an extension of the tendering period of the FWC contract and, correspondingly, a postponement of the signature of the first Task Order.

[1] The budgetary changes of Vacuum Vessel, In-Vessel Blanket, In-Vessel Divertor and Test Blanket Module actions are presented merged in one single line due to commercial sensitive information.

	Change in targets (kIUA): The CAS target for Blanket Cooling Manifolds is added following signature of PA.1.6.P6.EU.01 Blanket Cooling Manifolds in May 2020. **In-Vessel (Divertor):** Budgetary changes: (+) Additional support needed to further manage metrology documentation due to an unbalance between the increased workload in Cassette Body management documentation and available resources. (-) A task order under framework contract OMF-0937-01 for Resident Inspector CSC-NDE has been postponed to next year. For optimization of external resources, the supervision of activities performed at the supplier's premises have been reorganized and they are not needed anymore in 2020 as initially planned. Annual objective changes: NA Change in targets (kIUA): NA **TBM:** Budgetary changes: (-) The scope for the Task Order for the Preliminary Design HCPB TBS Ancillary Systems has been reduced because the foreseen activities could be transferred to Korea as part of the EU-KO agreement, currently under discussion, on sharing the development of Helium Cooled Solid Breeder TBM Annual objective changes: NA Change in targets (kIUA): NA
Remote Handling	Total budgetary variation compared to WP Amendment 1: - 3,912,786€ (-) For the Cask and Plug RH system, the scope of the task order for Final design of Machine Assembly Phase 1 in 2020 has been reduced to the preparatory work together with the supplier under the new framework contract (OMF-1034). The complementary scope has been moved to Q1 2021 Annual objective changes: "IVVS Preliminary Design Approved" is postponed from Q3 to Q4 2020 since PDR closure requires all the Chit Class1 to be closed. Some are still pending on IO side, therefore this Annual Objective is delayed. Change in targets (kIUA): Change in CAS for PA 5.7.P1.EU.01 In-Vessel Viewing System from 1.68 to 1.2. Chit Class 1 are still pending closure from IO and this is preventing the PDR closure and associated release of the Hold point. As Final design can only be started after PDR closure, the Final design phase 1 and 2 contracts are postponed as well as the associated credits (0.48). As mitigation measures, Prototyping and testing contract is starting in 2020 to provide vital inputs to the Final design.

Cryoplant & Fuel Cycle	Total budgetary variation compared to WP Amendment 1: + 3,090,477€ No significant budgetary changes Annual objective changes: " M18 - MRR approval and release of HP for CVBs" is deleted due to technical difficulties during the design. "Hydro-formed components qualification completed " is postponed from Q3 to Q4 2020 due to an update of the requirements from IO and COVID-19 related impacts. "MRR for Assembly of first pumping section" is postponed from Q3 to Q4 2020 due to commercial issues with the supplier and COVID-19 related impacts. Change in targets (kIUA): NA
Antennas and Plasma Engineering	Total budgetary variation compared to WP Amendment 1: - 56,831€ (+) A new TO has been introduced for the design finalization of the ECH waveguide components and M4 mirrors. The contract was added for getting the continuous support from Swiss Plasma Center for R&D. This is part of the new procurement strategy defined for the ECH. Annual objective changes: Annual objective "Manufacturing of 1st batch of Diamond Disks for EC Upper Launcher 1 finished" is postponed from Q3 to Q4 2020 since the start of manufacturing has been delayed due F4E/IO review cycle of the documents. Annual objective "Acceptance Test of EC Plant Control Stage 2" is renamed "EC Control integration" and moved to Q4 2020. To partially recuperate the delay due to the unavailability of building 15, the cubicles will be shipped and tested in a temporary location available in Q4 2020. "Task Order Signed for Development of EC Instrumentation for ITER" is postponed from Q3 to Q4 2020 due to the delay in the testing of the present prototype due to COVID 19 and the temporary shutdown of the FALCON facility. Change in targets (kIUA): NA
Neutral Beam Heating & Current Drive	Total budgetary variation compared to WP Amendment 1: - 146,246€ (-) The reduction of the commitment forecats PRIMA#3 Assembly is due to a change of strategy for Mitica integrated schedule for which about the 50% of the activities have been postponed under Prima#4 Assembly, expected to be signed in 2021. The contract Prima#3 Assembly actually covering cryopumps installation has been moved to the Cryoplant and Fuel Cycle Programme. Annual objective changes: The annual objective "C Site Acceptance Testing of ISEPS of MITICA Completed" is moved to Q4 2020 due to delays in the documentation preparation.

	Change in targets (kIUA): The minor change in CAS from 1 to 0.8 under “PA 5.3.P6.EU Neutral Beam Power Supply” is linked to CAS milestone rescheduling.
Diagnostics	Total budgetary variation compared to WP Amendment 1: - 1,922,851€ (-) GRT-1103 Completion of the design of Equatorial Wide Angle Viewing System (EP-WAVS) and Support has been moved to 2021 to finalise the preparation. (+) The commitment for the Port Plug structures have been anticipated based on the request of IO. Annual objective changes: Annual objective “Published Call for Tender for Bespoke Instrumentation Hardware” is deleted since according to new procurement strategy this will be performed in 2021 through a task order under a new framework contract. A new annual objective predecessor of GB39 is added “Approval of Final Design Review for Plant Controller Design” Change in targets (kIUA): PA 5.5.P1.EU.02-16-17 Diagnostics – Magnetics: Change in CAS value since “Sensors” are now split from “Electronics & Software”. PA 5.5.P1.EU.18 Diagnostics - Tokamak Services : Decrease of CAS due to the need to resolve complex chits identified in the Joint Preliminary Design Review for In-Divertor Components PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software: New PA following split of “Sensors” from “Electronics & Software”.
Buildings and Civil Infrastructures	Total budgetary variation compared to WP Amendment 1: - 27,871,726€ (+) COVID: On the TB03 and TB06 new commitments have been introduced in the forecast due to the implementation of COVID-19 measures. (=)TB04: The commitment associated previously to contingency has been split in new commitments. (TB04 - Increase of Contingency for Design bonus (NB); TB04 - Increase of Contingency for B15 steel structure (NNB);TB04 - Increase of Contingency for open topics with IO (change of reqs. for cable-trays);TB11 - Commitment for Completion works Contract - TO#07 - 2021 (+) TB04: In relation to the postponement of option 4, planned in early 2021 due to evolution of strategy, it is necessary to exercise a commitment for the part of option 4 related to General Items for the Tokamak Complex scope needed this year (+) TB06 new commitment added for the increase of re measurable quantities to finalise TB06 contract in regards of the Cable Trays (CT) and cables (+) An additional forecast has been included for the budget line B3-6.to allow the reallocation of commitments previously included under the B3-1. (-) TB13: A new commitment has been introduced for the implementation of PCR-1043, to move the Control system Train and back-up server room from building 24 to B44 For BIPS Instalments have been implemented Annual objective changes: NA

	Change in targets (kIUA): Reduction in CAS due to impact of Covid-19 on construction site
Cash Contributions	Total budgetary variation compared to WP Amendment 1: + 69,100,000€ (+) In the previous versions of the Work Programme the Additional Cash contribution to Japan was included with low probability of implementation. Now the contribution is forecasted for this year and the budget has been allocated. (-) The forecast of the Cash Contribution to IO has been updated with the last information available in the IO Budget documents and the reconciliation tables accompanying the debit notes.
Supporting Activities	Total budgetary variation compared to WP Amendment 1: + 7,579,187€ (+) For the New Insurance Scheme commitment, the variance is due to change of strategy in procuring the insurance, which lead to a different total value, duration and yearly profile. The initial figure was considering the scenario of extending the previous Insurance while the current value corresponds to the scenario of F4E joining the IO New Insurance Scheme (approved by July 2020 GB) (-) The reduction in the forecast for the transportation is due to the delays of the Domestic Agencies in manufacturing the components, resulting in less components transported then scheduled during this period. Annual objective changes: Annual objective “Task Order under FwC F4E-OMF-0895 LOT 1 signed for Project Cost Control Support to BIPS” appears delayed by one quarter this is due to the difficulties faced during the lockdown (COVID-19) to find a suitable candidate for the cost control support needed for TB04. Annual objective “Contract Signed for Provision of CAD Design Support” moved from Q3 to Q4 since the deadline for the submission and the evaluation of the offers was extended due to Covid-19.
Broader Approach	Total budgetary variation compared to WP Amendment 1: - 260,787€ (+) Although the total budget is reduced it is to be noted that for the Satellite Tokamak Programme (JT-60SA) an additional cash contribution was added. The Satellite Tokamak Programme (JT-60SA) Work Programme 2020 specified a cash contribution consisting of a fixed part (already transferred on 7 August 2020) plus an optional part. The BA Steering Committee has approved the WP2020 with the precision that the optional part cannot exceed the EU released credit commitment for the BA. The amount indicated in the F4E WP2020 2nd amendment respects the above condition. The EU cash fund is regulated by specific rules in the JT-60SA CQMS which guarantee to F4E the full control on the actual use of this fund and its accounting. The availability of readily available financial resources is in the interest of risk management of the machine commissioning and first operation.

	Annual objective changes: " Production lines ready - Thomson scattering completed"– moved to Q3➔ The delay was essentially due to a substantial administrative delay in the awarding of the contract (5 months). The company was very slow to resolve the necessary commercial clarifications relating to their offer and to provide the administrative documents needed to award the contract. Nevertheless the delay to the start of production is not expected to cause any delay to the delivery of the first fibre to Japan, (300km due by the end of the year). Change in targets (kIUA): Due to the delay in the signature of some PAs and onsite activities the accrual of several credits are delayed. ➔ Several BA Phase II credits foreseen for 2020 are moved to 2021.

Budget modifications in the actions, reflected in the Table in Annex 2, may have also been triggered by a modification of the level of confidence assigned to the 2020 commitments.

Executive summary for the annual Work Programme 2020

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

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

- Main Vacuum Vessel (FP): During 2020, the European Vacuum Vessel (VV) will continue to be in full production for all sectors, heading towards final assembly of sectors 5 and 4. This assumes the successful execution the final assembly strategy at HHI (KO DA), enabling the European VV supplier to implement lessons learned from the Korean manufacturing. Inspectors task orders will be placed according to the manufacturing rate as well as support tasks for the resolution of design changes and non-conformities. Preparatory activities for the final acceptance and the transportation of the Sectors to Cadarache will start in 2020.
- Blanket System (non-FP): The most important activity in 2020 will be the negotiation with the candidate manufacturers for the series manufacturing of the EU share of First Wall panels (Normal Heat Flux first wall design) for ITER. After the end of the negotiation, still in the course of 2020, there will be the award and signature of the contract(s). In parallel, there will be negotiations for the adjudication of a Task Order for the manufacturing of the first batch of Beryllium tiles to be used during the preliminary phases of preparation of the series production line(s). On a similar topic, an Invitation To Tender will be launched for the procurement of the CuCrZr raw material. For the Blanket Cooling Manifold, after completion of the on-going design activities for the alternative support design, a decision will be met with IO for the final configuration of the manifold and the PA will be signed (Q2 2020).
- Divertor (non-FP): For the divertor inner vertical target (IVT), the main activities will be devoted to the follow-up of the on-going manufacture of the full-scale prototypes by the additional suppliers. For the divertor cassette, the main activities will consist in the follow-up of the on-going manufacture of the two contracts for Stage I of the cassette body (CB) series production. All manufacturing activities will be supported by inspectors through the on-going framework contracts.
- Remote Handling (partly FP): The procurement of the Remote Handling Systems (RHS) will mainly focus on the continuation of preliminary design activities and starting, in some areas, the final design activities. Complementary RH technology-related design activities, prototyping and qualification will be performed together with engineering support related activities and expert contracts to complement the main procurement contracts.
- Vacuum Pumping (Partly FP): The contract for Leak Detection systems will be signed. Manufacturing of the Torus and Cryostat Cryopumping System will be initiated. MITICA contracts will focus on manufacturing and assembly. As for the Front-end Cryopump Distribution System, final design will be completed and all components will be in the manufacturing stage. As for the Warm Regeneration lines, the work will be completed and the PA closed.
- Tritium Plant and REMS (Partly FP): First pre-PA activities will start in support of the Hydrogen Isotope Separation system. As for REMS (Radiation and Environmental Monitoring Systems), the tendering process for 1st plasma activities will be on-going.
- Cryoplant (FP): End of installation for LN2 Plant and Auxiliary Systems components will take place. The contract for MITICA Cryoplant will be completed.
- RF Heating & Current-Drive (partly FP): The Electron Cyclotron (EC) system (Upper Launchers and ex-vessel waveguide systems) procurement activities will continue in 2020 (staged PA signed in 2019) with contracts for the fabrication of the blanket shield module and material procurement,

in parallel to final design/prototype and testing activities related to the ex-vessel systems. For the EC Plant Control (ECPC) system, the main activity will be the delivery, installation and commissioning of the ECPC Stage 2 in ITER-IO.
Electron Cyclotron (EC) Gyrotrons, Power Sources and Power Supplies (PS): the manufacturing and testing of the last units of the Main and Body HV Power Supplies will continue, the first sets will be delivered to ITER Cadarache, and the installation and commissioning will start. The EU Gyrotrons PA will be signed and the preparation of the EU Gyrotrons tendering procedure will be initiated.

- Neutral Beam (NB) Heating & Current Drive (non FP): As for the NB Test Facility at RFX-Padua, for MITICA, the activities in the test bed will continue with commissioning and testing of vessel and power supplies, including assembling of auxiliaries (CODAS, Interlock, and Safety). The contracts for MITICA diagnostics, MITICA Beam Source, MITICA Beam line components will proceed as planned. As for the NB at ITER-Cadarache, detailed design and manufacturing design consolidation for Neutral Beam power supplies systems of the ITER units will be developed, subject to the negotiation to adapt the contractual schedule with the readiness of buildings. The PA (53-4) - Confinement and Shield, for the NB-Vessels, Drift-Duct and Absolute Valve is foreseen to be signed in 2020, subject to timely preparation of technical documentation by IO.
- Diagnostics (partly FP): The work in the Diagnostics team will focus in two different areas: manufacturing of several components to be delivered to ITER mainly for first plasma and the design of all remaining Diagnostics. Several diagnostics systems will finalize either the preliminary design phase or the final design phase with the approval of the relevant design review. Procurement activities will encompass manufacturing contracts- as for the electrical auxiliary components (including clips, clamps, bosses and critical junction boxes) and the captive ex-vessel transmission components for the plasma position reflectometry- and design contracts as for the core plasma Thomson scattering system.
- Test Blanket Systems (TBS – non-FP): The activities will be mainly focused on the Preliminary Design and Safety Analyses. In addition, framework contract tendering activities for the welding procedures qualification of the TBM Box and for the storage of EUROFER will be carried on as planned. The collaboration with EUROfusion and the EU Fusion Laboratories will continue for the finalization of the Water Cooled Lead-Lithium Test Blanket System conceptual design and R&D in support of TBS design (including EUROFER qualification).
- Site, Buildings and Power supply: The focus of the Buildings works will be on the completion of the civil works in the Tokamak Complex and erection of the Tokamak Building steel structure in order to fulfil key milestone Q1 2020 granting crane access from the Assembly Building to the Tokamak Pit to allow installation of the Cryostat Base by IO. Alongside this there will be deliveries of building services equipment for the Tokamak Complex, deliveries related to electrical networks and load centres and the completion of the Cryoplant and Building Services auxiliary buildings.
- Broader Approach: The activities in 2020 will focus on the delivery of the remaining EU contributions within the frame of BA Phase I, and the preparation for BA Phase II.

1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2020 AMENDMENT 2

The 2020 Work Programme as amended by amendment 2 takes into account to the extent possible the EU Commission guidelines for the Programming document as requested by the Financial Regulation. It comprises a general overview of the progress of work and the procurement activities that will be committed during 2020, detailed objectives, expected results and target for each WP Action.

Main assumptions

The following assumptions are considered as the basis of the Work Programme 2020 as amended by amendment 2:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of September 2020.
- The F4E schedule supporting a First Plasma by the end of 2025 takes into account:
  - ✓ The latest input and developments of the schedules from the F4E suppliers, taking into account the agreed fabrication routes and showing the real development of the work.
  - ✓ The most realistic assumption of Procurement Arrangement (PA) signature dates based on the current status of the design of components and on the forecasted dates of the required design reviews prior to the PA signature.
  - ✓ The available manpower in F4E, taking into account bottlenecks in specific areas where staffing is not sufficient to grant a prompt process of the work. In specific cases, F4E foresees to satisfy its manpower needs by using external contractors.
  - ✓ The available yearly commitment and payment budgets for the work on the EU in-kind procurements until end 2020. It should be borne in mind that the current F4E budget is assigned only until the end of 2020 and therefore the achievement and completion of activities beyond this date depend on the availability of the required budget after 2020.
  - ✓ The most realistic assumptions on the input data availability from IO to take into account the existing delays and the agreed dates of data delivery.
  - ✓ The information provided by the other DAs through their monthly Detailed Work Schedule to take into account any possible delay in the delivery of items to F4E that can cause delays to the EU in-kind procurements.
- In order to achieve an improvement of the quality of the PAs that need still to be signed, a common F4E/IO effort is still in progress to better identify the requirements that are linked to the specific procurement.
- Technically and commercially complex procurements will be implemented whenever appropriate through the competitive dialogue procedure or through the negotiated procedure, in order to improve the alignment of supply chain response to F4E needs and to proactively adopt cost containment measures. This will be done in compliance with F4E Financial Regulations.
- Grants related to recurring and sequential R&D activities, with a well-defined development path eventually leading to an EU procurement package, will be implemented whenever appropriate, through Framework Partnership Agreements (FPA), in order to streamline and channel R&D funding, improve its effectiveness and decrease the administrative burden to beneficiaries and F4E alike.
- Procurements which require a very close coordination between F4E and other entities will be implemented, whenever appropriate, through the Joint Procurement procedure.
- All the activities described in the overview of each Action and the list of contracts in table 3 is intended as credited by PA or ITA. If an Action is not credited, then it is explicitly mentioned in the overview. This is not applicable for the Action “Broader Approach” (i.e. not credited).
- F4E endorsement of the Japanese Procurement Arrangement that foresees an EU financial contribution will be preceded by a budgetary commitment for the entire amount of the F4E contribution.
- Changes originated by IO, or other DA’s, will be fully compensated by the IO Reserve Fund.
- Regarding the WP2020 Amendment 2 for Broader Approach, the main assumptions are that this is to be coherent with the individual BA Projects' Work Programmes and Project Plans as approved by the Broader Approach Steering Committee.
- The Art. 5 of the F4E Statutes states that the Joint Undertaking may award grants and prizes in accordance with the rules of its financial regulation. In this regard, Essential selection, award criteria and Upper funding limits are defined in these annexes.
- Article 74 (2) of the F4E financial regulation in conjunction with Article 1(5) of Annex III to the F4E Statutes provides for the possibility to make use of annual instalments for actions extending over more than one financial year. An annual instalment consists in breaking down

a budgetary commitment into annual instalments. Annual instalments can be implemented according to forecast of annual payment due, forecast of progress in the implementation of the contract, or annual budget availability. The instalments proposed for 2020 correspond to the latter case. Instalments may be used under the following actions:

- ✓ Main Vessel (Vacuum Vessel, Blanket, Divertor and TBM)
- ✓ Site Buildings and Power Supplies.

Definitions and supporting information

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

2. Each Action of WP2020 Amendment 2 comprises:

(a) **General overview** that is split into two parts. The “Progress of Work” part aims at providing the information concerning the activities foreseen during 2020 in that area. The “Procurement Activities” part instead focuses on the legal commitments foreseen during the year and to be covered by the financial decision and to be financed under the budget 2020. Furthermore, it includes (even if not explicitly mentioned):

i. Provisions for urgent general support tasks as cost/risk analysis, engineering support/analysis, I&C develop and support, experts, quality assurance and quality control, nuclear safety, CE marking analysis, transportation, storage, material characterization and qualification activities, resolution of non-conformities (in line with the mechanism agreed at ITER level), metrology and external legal support, cost of legal proceedings and alternative dispute settlement, including arbitration, as needed[2]. These tasks will be mainly implemented through specific contracts under existing framework contracts.

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

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.

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

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

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

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

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

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

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

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

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

(e) **Human resources** (see tables 8 of HR REP annexes). The table shows an indicative estimate of the Full Time Equivalent (FTE) staff assigned to the specific Action to cover all the activities carried out in 2020. Per each Action it is identified the "core" team and the additional staff (i.e. legal, financial, contractual, project management) assigned to the action according to the F4E matrix structure. Remaining staff from the Commercial Dept., Admin. Dept. and Office of the Director is instead allocated per action on a pro-rata basis.

(f) **Procurement plan**:

i. Main Procurement Initiatives (see table 3 of these annexes): these are, per Action, the list of the foreseen main contracts with value higher than 144,000 Euros[3]. Amendments, claims, reimbursement, indexation, late interest and budget reserve are grouped together due to the sensitivity of this information. The list is based on the current information at the time of writing the Work Programme. During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2020 Amendment 2. Contracts that do not fulfill the Work Programme Amendment 2 scope identified for each Action are not covered by this financial decision and therefore will not be authorized. A change to this list shall be considered as a non-substantial for the purposes of the Article 32 point 4 of the F4E Financial Regulations if not affecting the available budget for 2020 within the limit of the flexibility rule and if any related changes to the scope of the annual Work Programme do not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.

ii. Value per Action: table 2 presents an indicative value of financial resources corresponding to each Action. F4E has evaluated the level of commitments planned for the Actions in 2020 by taking into account the progress of the project and the available manpower. A good implementation of the annual commitment is one of the objectives for F4E (see table 9 in Annexes of Project Plan). Any additional budget required and exceeding the currently available one will consist of unused appropriations adjusted to match the final needs.

iii. Indicative timeframe for launching the procurement and type of procedure/contract: the foreseen time of publication of calls and type of contracts is shown in table 5 of these annexes. The dates are indicative only and based on the present understanding of the project development. For specific contracts and specific grants or use of Joint Procurements the foreseen time of publication of calls is not included as no formal publication will take place (the signature date is used to give anyway an indication of time). Publication of the call for tender is intended as the date of publication on the Industry Portal (for open procedures/call for proposals) and the date of the Invitation letter to be sent out to the Suppliers (for negotiated procedures). For restricted procedures and competitive dialogues this milestone refers to the date of the call for expression of interest (first phase of the procedure).

iv. The plan may cover some activities moved from previous years into WP2020 due to changes in the overall planning and priorities.

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

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

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

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

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

2. OBJECTIVES AND KEY PERFORMANCE INDICATORS

The objectives for the WP are:

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

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

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

3. LIST OF WP2020 AMENDMENT 2 ACTIONS

Action 1. Magnets

Action 1	Magnets

TF & PF Conductors

Progress of Work

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

Procurement Activities

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

Pre-Compression Rings

Progress of Work

The manufacturing of all 9 Pre-Compression Rings will be completed in 2020. From the new IO Task agreement to be signed, the additional PCR10, the samples and the additional pultruded length should be completed in 2020.

Procurement Activities

Task orders related to Quality Inspection services will be renewed to follow up the manufacturing of the Pre-Compression Rings.

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

An amendment to implement the new IO Task Agreement will be signed for extra scope: Additional PCR#10, eight 1/5 scale rings, 3 set of samples and additional pultruded length.

Toroidal Field Coils

Progress of Work

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

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

The third major contract (Winding Pack Cold Test and Insertion into Coil Case) will continue at full manufacturing speed during 2020. The 1st,2nd and possibly 3rd TF Coils will be completed and delivered to the ITER IO site in Cadarache.

Procurement Activities (contracts and grants)

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

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

Poloidal Field Coils

Progress of Work

The first two PF Coils, PF5 and PF6, will be under final testing and close to be completed by the end of the year or early 2021, depending on the outcome of the tests. Thus, all manufacturing activities at the ASIPP site in China will be finished. In Cadarache, the manufacturing of PF2 will be well advanced and all 6 Double Pancakes will be completed and ready for stacking.

Procurement Activities

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

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

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

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

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

A task order will be launched in order to upgrade the PF Coils Building in Cadarache to adjust it to the production needs for PF4 and PF3 coils

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.1A.23000	HPC- Approval by IO for Document CFAD (HP 9.1.6) /TF-EU01	Q1 2020	GB15	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.21882	ATPC - IO Approval for Insulate, impregnate and Cure (8.3.5) TFWP14	Q3 2020	Predecessor of GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets

EU11.1A.22600	Delivery of TFWP01 to Cold Test and Coil Insertion site	Q4 2020	Predecessor of GB23	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.3B.527810	GB12 - PF Coil: EU PF 5 coil ready for cold test	Q4 2020	GB12	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
EU11.3B.527830	GB14 - PF Coil: Manufacturing Complete for EU PF 6 Coil and Delivery to Site	Q2 2020	GB14	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. All 9 Pre-Compression Rings completed.

2. All 10 TF Coil Winding Packs completed.

3. 1st, 2nd and possibly 3rd TF Coils completed.

4. PF5 and PF6 under final testing and close to be completed.

5. All 6 Double Pancakes of PF2 completed.

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	18.862	61.262
PA 1.1.P2A.EU.01 Pre Compression Rings	0.6	0.6
PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	6.00	18.22
PA 1.1.P6A.EU.01 Toroidal Field Conductors	0	43.39
PA 1.1.P6C.EU.01 Poloidal Field Conductors	0	11.22881

Action 2. Vacuum Vessel

Action 2	Vacuum Vessel

Progress of Work

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

Free-issued Items

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

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

At the time of writing, a PCR has been approved for de-scoping of the VV splice plates and another one is under discussion for the overall sharing of the transportation frames, which could lead to additional Cash Contribution or PA credits amendment in favor of IO.

Final Assembly Activities

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

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

The restrictions and lockdowns caused by Covid-19 will for sure disrupt the project performance during 2020. The full impact on the schedule is being reported through the established reporting channels.

Procurement Activities

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

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

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU15.1A.104860	PS1 VV5 Fabrication Complete	Q4 2020	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.105060	PS2 VV5 Fabrication Complete - Start of Segment Machining	Q4 2020	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.3037900	S9 PS2 1st sub-assembly	Q4 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.3037920	S9 PS1 1st sub-assembly	Q4 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel
EU15.1A.3085720	9 PS3_Final Assembly - OUTER SHELL FIT-UP AND WELDING 1st batch	Q4 2020	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel – Main Vessel

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Start of machining of segments of Sector 5.
2. Completion of Sector 4 PS1 Segment Assembly.
3. Completion of Segments Subassemblies of Sector 3.
4. Completion of PS2 Segment Subassemblies of Sector 2.
5. Completion of Segments Subassemblies of Sector 9.

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel	9.094	56.898

Action 3. In Vessel – Blanket

Action 3	In Vessel - Blanket

Blanket First Wall

Progress of Work

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

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

Procurement Activities

In 2020 the main activity foreseen, as part of the implementation of the scope of work of PA 1.6.P1A.EU.01 for the procurement of the EU share of the First Wall for ITER, is the signature of the contract(s) OMF-900 for Tasks 1,2 and 3.1/3.2 (engineering, set-up of the production line, qualification pre-series and manufacturing of the first batch of panels) of the series production of the First Wall Panels. In order to provide support during the negotiations to prepare the cost reimbursement contract, a framework contract will be signed (OFC-1054).

For the same purpose, it is planned to issue Invitations To Tender for the procurement of the CuCrZr raw material. The corresponding Framework Contract should also be signed by the end of the year.

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

A Task Order for High Heat Flux Testing of FW full-scale prototypes will be signed by the end of the year.

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

Option for Final Storage will be released for the Full Sale Prototypes. In addition, task order for FSP metrology will be signed.

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

Blanket Cooling Manifolds (BCM)

Progress of Work

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

Procurement Activities

The pre-tendering for the Series production of the Blanket Cooling Manifolds will be launched in Q4 2020. Moreover, other tasks concerning the welded support to make a decision for design configuration will be signed by the end of the year.

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU.16.01.100010	Contract signed for Normal Heat Flux First Wall Panels	Q4 2020	Predecessor of GB37	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.201500	Task Order Signed for Procurement of Beryllium (Initial Delivery) (TO#01)	Q4 2020	WP20 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.204250	Published Call for Tender for FwC Procurement of CuCrZr for Series production	Q2 2020	WP20 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU16.1A.11700	PA Signature of 1.6.P6A.EU.01 Blanket Manifold	Q2 2020	WP20 objective	PA 1.6.P6A.EU.01 Blanket Manifolds

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Signature of the contract(s) OMF-900 for Tasks 1, 2 and 3.1/3.2 (engineering, set-up of the production line, qualification pre-series and manufacturing of first 54 panels) of the series production of the First Wall Panels, as a part of the implementation of the scope of work of PA 1.6.P1A.EU.01, for the procurement of the EU share of the First Wall for ITER.
2. Signature of the first Task Order for the procurement of Beryllium semi-finished tiles for the series production.
3. Launch of Invitation To Tender for the procurement of CuCrZr raw material for the series production.
4. Signature of the Blanket Cooling Manifold PA 1.6.P6.EU.01

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 1.6.P1A.EU.01 Blanket First Wall	0.025	0.1
PA 1.6.P6.EU.01 Blanket Manifolds	0.2	0.2

Action 4. In Vessel – Divertor

Action 4	In Vessel – Divertor

Inner Vertical Target

Progress of Work

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

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

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

Procurement Activities

The main activities foreseen concern the HHF testing of IVT prototypes (contracts), and cost estimate and industrialization studies for Divertor IVT. Task orders will be placed to require the support of inspectors in the frame of on-going F4E framework contracts. Moreover, a contract with CEA on lessons learnt on the manufacture of the WEST divertor to support the preparation of the specification for the IVT series production will start.

Cassette Body

Progress of Work

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

Procurement Activities

The main procurement activity under this subsystem is the signature of a direct contract for the fabrication of the transition pieces for the tokamak cooling water system (TCWS) and the remote handling (RH) flanges for the cassette body series. Task orders will be placed to require the support of inspectors.

Divertor Rails

Progress of Work

Since expected need dates from IO for the divertor rails will not be set before mid-2026, agreement has been reached with IO Internal Component division to postpone the signature of

the PA from Q4 2020 to Q2 2021 to reduce the expected workload for the busy period of the end of 2020. The procurement schedule is being re-baselined, jointly with IO.

Procurement Activities (contracts and grants)

N/A

ANNUAL OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.100230	Manufacturing Readiness Review for Cassette Body Series - Final Approval - OMF-444-03-01	Q4 2020	Predecessor of GB38	PA 1.7.P1.EU.01 Cassette Body
EU17.01.559435	Manufacturing Readiness Review for Cassette Body Series - Final Approval - OMF-444-01-01	Q4 2020	Predecessor of GB38	PA 1.7.P1.EU.01 Cassette Body
EU17.01.1053200	Start Manufacturing CB#01 (First of a kind) OMF-444-03-01	Q4 2020	Predecessor of GB38	PA 1.7.P1.EU.01 Cassette Body
EU17.2B.93750	Acceptance of the report on Non-Destructive Testing of the steel support structure – OPE-567-01-01	Q4 2020	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.84950	ATP - Geometrical shape and tolerances of twisted tapes - OPE-567-03-01	Q4 2020	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Performance of the Manufacturing Readiness Review for the cassette body series procurement for the two concerned suppliers (OMF-444 Lots 1 and 3).
2. Start manufacturing CB#01 (First-of-a-kind CB) for one of the concerned suppliers (OMF-444, Lot 3)
3. Acceptance of the report on Non-Destructive Testing of the steel support structure (OPE-567, Lot 1)

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 1.7.P1.EU.01 Cassette Body	0.02	0.56
PA 1.7.P2B.EU.01 Inner Vertical Target	0	2.390

Action 5. Remote Handling

Action 5	Remote Handling

Divertor Remote Handling System (DRHS)

Progress of Work

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

Procurement Activities

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

Cask and Plug Remote Handling System (CPRHS)

Progress of Work

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

Procurement Activities

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

Neutral Beam Remote Handling System (NBRHS)

Progress of Work

The preliminary design activities continue towards the design review scheduled to be completed in 2020. After completing the preliminary design phase, final design development starts gradually. Activities are organized by subsystems and prioritized by their delivery needs for the different assembly stages. Main focus is given to the Monorail crane system that is a first plasma item.

Procurement Activities

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

In-vessel viewing system (IVVS)

Progress of Work

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

Procurement Activities

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

Common activities (transversal)

Progress of Work

Engineering support and expert activities will be performed for the four main operational activities, where needed. Complementary RH technology related design activities, qualification and prototyping will be carried out with a great focus on the field of control system, radiation hard technologies like electronics, camera.

Procurement Activities

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

Note: A detailed assessment and cost re-iteration (value engineering step) of DRHS and NBRHS looking at basic requirements, functionality and solutions selected to find possible mitigation measures may lead to changes to be reflected in the next WP amendment.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.03.14046072	EU CPRHS PDR meeting completed Machine Assembly 1 Items	Q3 2020	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14051770	Task Order (OMF-1034) Signed for Final Design MA-1 for CPRHS	Q4 2020	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.00440	EU NBRHS Preliminary Design Monorail crane (Incl. other first priority items) Hold Point released	Q4 2020	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System
EU57.01.50120	IVVS Preliminary Design Approved	Q4 2020	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

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

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 2.3.P2.EU.01 Divertor Remote Handling System	0	1.2
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.5	0.8
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.36	0.46
PA 5.7.P1.EU.01 In-Vessel Viewing System	1.2	2.0

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle

Progress of Work

Fuel Cycle

In the frame of the PA for leak detection and localization system, following the PA signature for the first phase (Leak Detection) in 2018, the contract for the procurement of the Leak Detection systems will be signed and, further to the signature of the PA amendment in 2019 the tendering process for localization activities will start. At the time of writing the Work Programme amendment 2, there is still a possibility that the contract signature for Cryostat (Helium) Localization system is anticipated from 2021 to 2020.

A task order for technical support will be signed. Negotiations for the transfer to IO of the Water leak localization system will start.

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

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

Vacuum Pumping

The activities in this field will keep growing:

- For the Torus and Cryostat Cryopumping System, after signature of the contract end of 2019, manufacturing will start. A task order for technical support will be signed.
- For MITICA and Neutral beam Cryopumps, the contract execution for MITICA Cryopump manufacturing and assembly (Lot1) will continue focusing on activities for production of the cryopump components and sub-assemblies. The supply of the expansion profiles (Lot 2) and will be completed in 2020. Charcoal coating of the cryopanels (Lot 3) will focus on manufacturing activities.

- For Warm Regeneration Lines, PA closure is expected after delivery of all the lines in 2019

The work on Front End Cryopump Distribution System (Torus and Cryostat Cold Valve Boxes, Johnston couplings and cryojumpers, I&C) will continue. The manufacturing option for Torus and Cryostat Cold Valve Boxes will be released.

Cryoplant

The commissioning of the MITICA cryoplant in the RFX facilities (Padova, Italy) will continue in 2020.
For the cryogenic quench line header the scope of work will be focused on manufacturing and testing.
The installation of the LN2 Plant and Auxiliary Systems in the Cryoplant building at Cadarache will continue. The negotiation for the transfer to IO for the utilities for commissioning phase (Helium and nitrogen) will be completed.

Procurement Activities

Fuel Cycle

- Leak Detection and Localization System: Contract signature for Leak Detection (Primary and Cryostat).
- Leak Detection and Localization System: Task order for Technical support on the Leak Detection system
- Leak Detection and Localization System: Release option 1 and 2 for Leak Detection
- Leak Detection and Localization System: Contract signature of Cryostat (Helium) Localization[4]
- Front-end Cryopump Distribution System: Release of the option for manufacturing and factory testing of cold valve boxes and warm regeneration box.
- Front-end Cryopump Distribution System: Signature of task order 2 for I&C.
- Front-end Cryopump Distribution System: Release of the option for platform procurement.
- Torus and Cryostat Cryopumping System: Task order for Technical support.

Cryoplant

Transfer to IO of utilities for commissioning phase

ANNUAL OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU31.01.40500	Hydro-formed components qualification completed	Q4 2020	Predecessor of GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps

[4] At the time of writing the Work Programme amendment 2, there is still a possibility that the contract signature for Cryostat (Helium) Localization system is anticipated from 2021 to 2020. The activity is therefore added to WP2020 but the budget remains allocated to year 2021 where the probability of implementation is higher at the time of writing the document.

EU31.01.8173820	Final Design Review meetings CVBs	Q4 2020	Predecessor of GB28	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box
EU31.01.8174660	MRR for Assembly of first pumping section	Q4 2020	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.03.25420	Published Call for Final Tender for Procurement of components for Primary & Cryostat Leak Detection System	Q3 2020	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System
EU31.03.28080	Invitation to submit Tender for Procurement of components for Primary & Cryostat Leak Detection System	Q2 2020	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

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

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	0	0
PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0	0.18
PA 3.1.P1.EU.01 Warm Regeneration Lines	0.04	0.2
PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.15319	0.22979
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0	0
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II – 1st Amendment)	0	0
PA 3.1.P3.EU.01 Leak Detection and Localization System Common Activities	0	0
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (2nd Amendment)	0	0
PA 3.2.P5.EU.01 Water Detritiation System - Tanks	0	3.252

PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	0	22.98294
PA 6.4.P1.EU.01 for Design of REMS	0	0

Action 7. Antenna & Plasma Engineering

Action 7	Antennas and Plasma Engineering

Ion Cyclotron Antenna

No activities foreseen in 2020.

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

Progress of work

In 2020 PA procurement activities based on the staged PA signed in March 2019 will proceed in parallel to final design work and procurement contracts for prototypes (under ITA).

For PA based activities, the main action will be the start of the series production of Diamond Disks for EC Windows. On the design front, main on-going activities are related to design, prototype fabrication and testing as well as qualification and requirements identification & verification for the ex-vessel systems, towards Intermediate Design Review (pre-FDR) in 2021. Management of changes (requirements, and interfaces) as well as technical complexity and diversity of launcher components will be the main challenges.

Procurement activities

PA activities: Contracts related to the series production of Diamond Disks (manufacturing contract signed in 2019) will be signed in 2020: a specific contract for optical testing of those disks and another specific contract for storage of the disks at manufacturer's facilities. In view of the next PA Annex B to be signed for the Port Plug, preparation of the first contracts under that PA Annex B, for BSM and other Port Plug subcomponents, will start in 2020. The fabrication of the 4 BSMs follows the successful prototyping work carried out in the last 2 years. Signature of those contracts is planned for 2021.

ITA activities: Support for Final and Build-to-print design will be ongoing during 2020, mainly performed through specific contracts as part of an existing framework, related to CHIT resolution of the FDR of the Port Plug and in preparation of the FDR of the remaining systems (e.g. diamond window, ex-vessel waveguides system, mirrors). Specific contracts under the existing framework contract for setup and operation of the EC components test facility (FALCON) are envisaged in 2020. The waveguides for the Gyrotron Commissioning Components will be procured together with part of the instrumentation needed for the EC plant installation and commissioning.

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

Task orders will be placed for the required support of external resources and inspectors taken in the frame of on-going F4E framework contracts.

Electron Cyclotron Control System

Progress of Work

The Electron Cyclotron Control System development follows a staged approach. The ECPC Stage 2 (the Gyrotron Commissioning Components (GCC) plant control system) will be delivered in 2020 to a temporary location provided by IO as the RFE date of building 15 is delayed to February 2021. The ECPC Stage 3 and the Subsystem Control Unit of the Upper Launcher (EC-UL-SCU) Stage 2 for first plasma will both start in 2020 the design phase.

Procurement Activities

Task orders for the installation of the ECPC Stage 2 and for the design of the EC-UL-SCU.

Plasma Engineering

Procurement Activities

A relevant part of the PE activity responds to (often urgent) requests and hence it is difficult to plan in advance. PE group in 2020 is going to focus on transversal activities in support to F4E procurements. Specific contracts might be necessary, accordingly.

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.422132	Manufacturing of 1st batch of Diamond Disks for EC Upper Launcher 1 finished	Q4 2020	GB22	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.204040	Call for tender of Electron Cyclotron Isolation Valve prototype manufacturing.	Q4 2020	Predecessor of GB46	ITA (C52TD52FE) Prototype, Test and Qualification of Common Components between EC Launchers
EU52.01.111105	Task Order Signed for Development of EC Instrumentation for ITER	Q4 2020	Predecessor of GB46	ITA (C52TD57FE) Procurement of Instrumentation and spare parts for EC Installation & Commissioning
EU52.01.950160	EC Control integration	Q4 2020	Predecessor of GB44	PA 5.2.P1B.EU.01 Electron Cyclotron Control System

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. ECPC Stage 2 (GCC control system) installation in temporary location at ITER. 2. Testing of 50 mm transmission lines, mitrebends and partial valve component mock ups.

EXPECTED RESULTS AND TARGET		
The target of 2020 is the achievement of a cumulative value expressed in kIUA (CAS):		
	Yearly value	Cumulative value
PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.1241	0.1241
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0.5	1

Action 8. Neutral Beam and EC Power Supplies and Sources

Action 8	**Neutral Beam and EC Power Supplies and Sources**

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

Progress of Work

- Continuation of Manufacturing and Factory Acceptance Tests of the UNIT 2 of the European EC Power Supply
- Technical Follow-up of the EC Power Supplies will continue
- Construction Readiness Review for the installation and commissioning of the EC Power Supply system in ITER
- Delivery of the first units of the EC Power Supply system
- The performance of the improved 1MW Continuous Wave Gyrotron prototype will be verified with high power tests
- The 5.2.P3.EU.01 Gyrotron PA will be signed
- The tendering procedure for the Gyrotrons in the EU scope of procurement will start.

Procurement Activities

Electron Cyclotron (EC) Gyrotrons:

The EU procurement arrangement for European Gyrotrons will be signed. It consists in the procurement of 6 units of 1MW Gyrotrons at 170 GHz for the Electron Cyclotron Heating and Current Drive system of ITER. The work scope includes the design, manufacturing, assembly, factory testing, delivery, on-site installation and commissioning of the Gyrotrons.

Electron Cyclotron Power Supplies:

Options will be released for the main contract for the procurement of the EC Power Supplies and the technical follow-up.

Neutral Beam

Progress of Work

- MITICA Beam Source – completion of the manufacturing readiness review, testing of prototypes and manufacturing of the series production
- MITICA Beam Line Components – manufacturing readiness review and prototyping
- NB Vessels, Drift-Duct and Absolute Valve:
    - Final design review by IO, for the Absolute Valve is foreseen to be closed by end of 2020
    - Final design review by IO, for the NB vessel is foreseen to be closed in October 2020
- Passive Magnetic Shield (PMS) and Active Correction Compensation Coils (ACCC):
    - Final design review by IO foreseen in first quarter 2021

Procurement Activities (contracts and grants)

Specific contracts may be signed for technical follow-up.

Pressure Vessel and Magnetic Shielding

The components of the HNB1 and 2 NB Injectors are under PA-53-4. The whole scope of supply will be arranged in four to seven parts, depending also on the availability of the technical build to print documentation from IO.. Therefore, in 2021 only the preliminary procurement activities in preparation of call for tenders will start, depending on timely readiness of PA documentation to be prepared by IO, in particular technical specifications and expert contracts.

Neutral Beam Test Facility (NBTF)

Specific contracts will be signed for MITICA diagnostics and PRIMA Assembly, as well as the Release of Options of MITICA Beam Source and beam line components, specific contracts for services for static tests and Inspection “Collaudo” and site supervision and support. Specific contracts for Technical support in the area of Neutral Beam components will be signed.

Neutral Beam Power Supplies

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.03.10676	PA 5.2.P3.EU.01 EC Gyrotrons Signed by IO to EU-DA	Q3 2020	Predecessor of GB48	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons

EU52.04.22995	Delivery of ECPS 52HV05 (AAG Set #1) to ITER Site by EU-DA	Q1 2020	GB56	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply
EU53.TF.16150	NP - Contract Signed - MITICA Diagnostics	Q2 2020	WP20 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components
EU53.06.06995	Site Acceptance Testing of ISEPS of MITICA Completed (2-MS-08)	Q4 2020	WP20 objective	PA 5.3.P6.EU Neutral Beam Power Supply

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Procurement signatures for the European Gyrotrons
2. Delivery of first electron cyclotron power supply
3. Completion of MITICA beam line vessel (BLV) installation

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	0.987	4.543
PA 5.3.P6.EU Neutral Beam Power Supply	0.8	14.96
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	2.25	17.20

Action 9. Diagnostics

Action 9	**Diagnostics**

Progress of Work

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

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

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

Procurement Activities (contracts and grants)

Procurement activities will mainly be focussed in two different areas: placement of manufacturing contracts and framework contracts for the production of components to be delivered to ITER and procedures for the completion of the design of less mature Diagnostics systems. Those will be complemented with contracts and task orders for the production and testing of prototypes and task orders for the provision of industrial expertise and for engineering analysis. In-sourcing of personnel to cover the needs of the team during 2020 is also foreseen as is the use of inspectors for manufacturing contracts and experts on the different areas. Specific contracts/grants will be signed.

Diagnostics will also perform a commitment for the cash transfer to the IO, on the basis of the F4E-IO arrangement on F4E's payment related to the transfer of Port Plug Structures in-kind contribution back to the IO (arrangement under preparation).

Manufacturing contracts

During 2020 the launch of contracts for the manufacturing of electrical auxiliary services (including clips, clamps, bosses and critical junction boxes), is envisaged.

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

The launch of a framework contract for the manufacturing of Diagnostics subsystems mainly needed for first plasma is envisaged in 2020. Those subsystems include electrical feedthroughs, in-port components for the wide-angle viewing systems, and platforms for the bolometer cameras located in the vessel. Signature of the framework contract and first specific contracts in envisaged in 2021.

Design contracts

Most of the long term specific grants under the on-going Framework Partnership Agreements are already in place for the design of the Diagnostics systems. Further to the SGs under those FPAs, a grant for completing WAVS design will be launched in 2020. Additionally the signature of a task order under an on-going framework contract is envisaged for the qualification of the port integration systems, including the qualification of the diagnostic shield modules; complex metallic structures designed to provide mechanical support and plasma shielding while allowing access to plasma diagnostics and for the integration design of the Equatorial Port 10, formerly under JA-DA scope but which will be transferred to F4E in 2020.

The launch of a framework contract and of its first task order for the design of the core plasma Thomson scattering system, core-plasma charge exchange recombination system and several cameras of the bolometers diagnostics is also envisaged during 2020, as is the contract for the final design and manufacturing of the remote handling connector and manufacturing of in-vessel supports for the tokamak electrical services and the launch and signature of a task order for the plant controller integration for magnetics diagnostic, amongst others.

Those will be complemented with contracts and task orders for the production and testing of prototypes and task orders for the provision of industrial expertise and for engineering analysis.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.203750	Task Order Signed for Plant Controller Integration - System Integration, FAT, Shipping & Support	Q4 2020	Predecessor of GB39	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software
EU55.06.13610	Final Design Review Meeting for Feedthroughs (FDR meeting) finished	Q4 2020	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.06.13790	1st version in IDM of D2.05. Feedouts test hardware	Q4 2020	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.01.0101800	Approval of Final Design Review for Plant Controller Design	Q4 2020	Predecessor of GB39	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Delivery of the outer vessel coils for installation on the vacuum vessel sectors 1, 3, 4 and 9
2. Preliminary design review of sensor head & electronics for pressure gauges completed
3. Contract signed for the manufacturing of chemical vapour deposition (CVD) diamond prototype
4. Preliminary design review for low field side collective Thomson scattering completed
5. Preliminary design review for the ex-vessel optical/mechanical components of the wide angle viewing system completed
6. Preliminary design review for equatorial port 1 integration completed

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
PA 5.5.P1.EU. 02-16-17 Diagnostics - Magnetics	0.18324	0.33286
PA 5.5.P1.EU.03 Diagnostics - Bolometers	0	0
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.19160	0.19160
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.00018	0.00039
PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0.13769	0.13769
PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0	0
PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0.17218	0.17218
PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0	0

PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.11724	0.11724
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	1.38681	1.38681
PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software	0,00000	0,36000

Action 10. Test Blanket Module

Action 10	**Test Blanket Module**

Progress of Work

It is foreseen to continue the Preliminary Design activities and Safety Analyses, the Post Irradiation Examination of EUROFER specimen and the development of preliminary Welding Procedure Specifications (pWPS) needed for the manufacturing of the TBM box.

In addition other relevant activities foreseen this year are:

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

- the signature of the FwC for the proof of the TBM sets fabrication and assembly feasibility;

- the publication of the Call for Tender and, possibly, the signature of the FwC for the Preliminary Design of the WCLL Ancillary Systems.

Procurement Activities

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

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

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

- the storage and handling of EUROFER;

- the proof of the TBM sets fabrication and assembly feasibility.

Moreover, steel materials, already acquired by F4E and temporarily stored, will be transported to the new storage facility;

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

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA

EU56.01.1242620	Published Call for Tender for the FWC of WCLL AS Preliminary Design	Q3 2020	Linked to TBM04 (see Table 5 in Annex to Project Plan)	NA
EU56.02.1239840	TO1 Signed for Handling, Cutting Storage Services for Steel Products related to the EU TBMs	Q3 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA
EU56.02.1240400	Published Call for Tender for Handling, Cutting Storage Serv for Steel Products related to the EU TBMs	Q1 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA
EU56.01.80040	Published Call for Tender for FwC for Proof of the TBM-sets fabrication and assembly processes feasibility	Q2 2020	Linked to TBM09 (see Table 5 in Annex to Project Plan)	NA

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. The completion of the activities planned in 2020 in the 1st Specific Contract for the Preliminary Design activities of the TBM Set.
2. The completion of the preliminary Welding Procedures Specification for the Manifold area of TBM.
3. The completion of the activities regarding the support of an ANB to EUROFER97 weldability analysis, inventory and optimization of welding qualification and strategy of the TBM Set Conformity Assessment.

Target credit NA

Action 11. Site, Buildings and Power Supplies

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

Progress of Work

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

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

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

Procurement Activities

Contracts to be signed by the end of 2020 include:

TB18: Civil Works and Finishing of Tritium Building (B14) Above L2 – planned contract signature Q4 2020.

TB13: Design and Build of Emergency Power Supply Buildings (B44-47) with Supply and Installation of Electrical Components - planned contract signature Q4 2020.

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

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

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

ANNUAL OBJECTIVES

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

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Completion of RFE1B Stage 2 Milestone allowing limited crane access between Assembly Hall and Tokamak Building to allow transfer of Cryostat Base
2. Building 11 Totally Weathertight – Including Crane Hall
3. Construction of Site Services Building (B61) Completed
4. Taking over of TB02 Cranes Completed (Tokamak Crane Hall Part)
5. Load centers necessary for Auxiliary buildings / first plasma ready for use

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
COMMON	1.825	54.77365
TOKAMAK COMPLEX	10.24834	62.61542
AUX BUILDINGS TB03/TB04	6.87740	61.96656
AUX BUILDINGS D&B TB05	0.70156	15.00156
AUX BUILDINGS D&B TB06	1.5	8.48
AUX BUILDINGS D&B TB07	0.34	6.37420
AUX BUILDINGS TB09/TB10	0	0
AUX BUILDINGS D&B TB12	0	0
AUX BUILDINGS D&B TB13	0	0
LOAD CENTERS	3.668	3.668
INTERCONNECTING ACTIVITIES	0	0.72835
AUX BUILDINGS D&B TB17	0	0
COMMON CONTRACTUAL ACTIVITIES	0.9	42.79
PA 6.2.P2.EU.06 Headquarters Building	0	13.85

Action 12. Cash Contributions

Action 12	Cash Contributions

Cash Contribution to IO

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

Cash Contribution to Japan

According to the ITER Agreement, there is a transfer of procurement responsibility from Euratom to Japan under the supervision of the ITER Organization. This is financed through a cash contribution from EU to Japan paid by F4E. An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year. In addition, the contribution to the Settlement Agreement EU-JA is foreseen.

ANNUAL OBJECTIVES

Milestone	Scope Description	Forecast achievement date	Type of milestone	PA
Cash to IO	Yearly Commitment [5]	Q4 2020	WP20 objective	NA
Cash to Japan	Commitment Atmospheric Detritiation System	Q4 2020	WP20 objective	PA 3.2.P4.JA.01
	Commitment of Contribution to Settlement Agreement EU-JA	Q4 2020	WP20 objective	NA

EXPECTED RESULTS AND TARGET

The expected result for this Action is to pay to IO the contribution as agreed by the ITER Council and to Japan as defined in the schedule for the relevant credits assigned to JA DA for those components transferred by the EU to them.

As far as the cash to IO is concerned, the target for 2020 is to commit the cash contribution for 2021 according to the decisions due to be taken by the ITER Council in November 2020, and the contribution to reinforce the commitment for the escalation revision PA 1.1.P1B.JA.01.

As far as the cash to Japan is concerned, the target for 2020 is to commit the amount agreed in the Annexes C to the Japanese PA 3.2.P4.JA.01[6] due to be signed during the year and the contribution to the Settlement Agreement.

Target credit NA

Action 13. Technical Support Activities

Action 13	Technical Support Activities
The procurement of the supporting activities is mainly performed through Framework contracts and specific contracts.	

[5] The cash contribution required by IO for the year N is committed by F4E at the end of the year (N-1). E.g. the commitment shown here in WP 2020 is the cash contribution to IO for 2021.

[6] At the time of writing the Work Programme, there is a risk that the activity corresponding to PA 3.2.P4.JA.01 is postponed from 2020 to 2021. The activity is therefore also included in WP2021 but the budget is nevertheless allocated to year 2020 where the probability of implementation is higher at the time of writing the document.

Technical Support to In-Kind Procurement

Engineering Support activities

The Engineering Unit during 2020 will continue supporting the ITER Departments Programmes (and to a limited extend the BA department) by providing them technical expertise in the key domains of engineering and fusion technologies.

The unit will provide technical expertise in the following areas:

Design office activities, Technical Data Management, System Design, Mechanical Engineering, Analysis: Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism, Nuclear Analyses; Design Codes and Standards; Electrical Engineering : Instrumentation and Control; CODAC; Metrology.

Beyond the preparation of task orders, the procurement activities in the Engineering Unit will be mainly focused on renewing Framework Contracts, for adapting the level of support to the needs of the Programmes.

Material and Fabrication

For 2020 the Materials and Manufacturing Technologies and Processes at the Engineering Unit has the aim to support the ITER Departments Programmes (and to a limited extent the BA department) by providing technical expertise in the domains of Materials Science, Materials Technologies and Manufacturing Technologies and Processes.

The group supervises development and qualification of material and joints. The group also supports material procurement and fabrication follow-up.

The focus for 2020 will be to support the critical component fabrication for Magnets, Vacuum Vessel and In-Vessel.

Assembly Integration and Validation (AIV)

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

Nuclear Safety

The scope includes the oversight of the implementation of all nuclear safety requirements by F4E and its contractors. The Nuclear Safety activities also provides support to the project teams involved in PIC/PIA (Protection Important Components/Activities) to ensure compliance with the necessary regulation. This includes support to nuclear safety management, identification of optimum positions for key nuclear safety issues, review of relevant documentation and nuclear safety inspections in F4E suppliers' premises.

The Nuclear Safety Unit also organizes workshops, seminars and other activities to raise and re-inforce the nuclear safety awareness within F4E.

A contract will be signed for the continuation of the Nuclear Safety support on inspections.

Two experts will be signed before the end of the year to continue the on-going support on nuclear codes and standards conformity and Nuclear Safety inspections.

All other activities will be implemented through Task Orders under existing frameworks.

Quality Assurance, Quality Control

The scope includes the support to project teams to ensure that the F4E quality requirements are correctly implemented and managed for the F4E contribution to ITER. In particular, support is provided in both domains of Quality Assurance (QA) and Quality Control (QC).

As for QA, support aims at ensuring that F4E's QA processes are properly followed in the development of the different ITER projects and in line with the F4E Quality Management Policy. As for QC, the support to the projects will be provided in the follow-up and control of the activities performed by F4E's contractors.

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

CE Marking

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

Systems Engineering

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

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

Office of the Chief Engineer

The Office of the Chief Engineer supports the Head of ITER Programme Department with respect to the scope of the EU in-kind components for ITER and in representing F4E towards the ITER Organisation. Among the main tasks are: the interaction with IO on the project technical baseline, including change control, and participation to the Configuration Control Boards, the management of transversal technical issues impacting several PTs, the coordination of F4E participation to ITER Independent Reviews and working groups focused on technical matters and the assurance of consistency, adequacy and maturity in relevant Design Reviews.

Task Orders under existing framework contracts will be issued to continue to complement the in-house Configuration Management and Issues Management capabilities with expert support from specialized companies

ANNUAL OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU.ES.01.60080	Published Call for Tender for Provision of CAD Design Support	Q1 2020	WP20 objective	All
EU.ES.01.60200	Contract Signed for Provision of CAD Design Support	Q4 2020	WP20 objective	All
EU.ES.03.60200	Contract Signed for I &C integration services	Q2 2020	WP20 objective	All
EU.MF.01.20220	Destructive and Non-Destructive Testing of Materials and Mock-ups	Q4 2020	WP20 objective	All
EU.NS.01.33100	Task Order #05 under FwC F4E-OFC-0735-01 for Nuclear Safety support (cont. TO 01)"	Q1 2020	WP20 objective	All
EU.PM.3026560	Task Order under FwC F4E-OMF-0871-01 signed for Support in the area of Technical Integration 2020	Q3 2020	WP20 objective	All
EU.PM.3035340	Task Order under FwC F4E-OMF-0937-01 signed for Quality Assurance Support Staff CRYO PT (cont. TO 04)	Q3 2020	WP20 objective	All
EU.PM.3030690	Task Order #03 under FwC F4E-OMF-0783 Lot 2 signed for the Support to Project Teams on the MIR layer	Q3 2020	WP20 objective	All

EXPECTED RESULTS AND TARGET

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

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

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

Implementation of framework contracts in the field of CAD Support, Destructive and Non-Destructive Testing of Materials and Mock-ups, Seismic analysis and design of building and mechanical components, I&C integration services and provision of bespoke electronic integration and manufacturing services.

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

Transportation

During 2020, the Engineering Unit/Transportation group will be in charge of the management, on the F4E side, of technical aspects of the joint procurement with IO for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of all ITER Components from the port/airport of entry (Fos or Marignane) to ITER site.

During 2020, this activity will mainly cover transportation of NON EU loads between Fos and Cadarache (EU-leg). The main cost driver is for Highly Exceptional Loads (HEL) that follow the dedicated ITER itinerary.

In 2020 focus will be again put on the optimization of the number of HELs and the related number of convoys, this jointly with IO, all DA's and Daher.

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

ANNUAL OBJECTIVES

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

EXPECTED RESULTS AND TARGET

1. Transportation of Highly Exceptional Loads amongst others, first JA-DA TF coils and KO-DA first VV-sector between Maritime Port of Marseille and ITER site.
2. Gendarmerie contracts to escort the convoys and
3. Management fees Task Order for Transportation contractor Daher will be signed.

Target Credit NA

Other Technical Support Activities

Programme Management

The main focus of Programme Management is on performance monitoring and reporting, scheduling support, the maintenance and update of the cost situation, the continuous improvement of the risk registers in all project areas, increased standardization of reporting within the organization, the implementation of the Internal Compliance Programme for export control. Overall project management support and support to the use and maintenance of specific tools to support project and program management are also included.

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

Other Expenditures

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

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

Logistic and legal support to operational activities is also included.

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

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3060650	Task Order #03 under FwC F4E-OMF-0895 LOT 2 signed for Risk Management Senior Support (cont. TO 01)	Q2 2020	WP20 objective	All
EU.PM.3061700	Task Order #01 under FwC F4E-OMF-0831 LOT 1 signed for PSM Support for Oracle Primavera	Q2 2020	WP20 objective	All
EU.PM.3074370	Task Order under FwC F4E-OMF-0895 LOT 1 signed for Project Cost Control Support to BIPS - 2020/21	Q4 2020	WP20 objective	All
EU.PM.3081460	Option 1 for extension of Task Order #02 under FwC F4E-OMF-895-03 LOT 3 in Support on Planning & Scheduling BIPS	Q3 2020	WP20 objective	All

EXPECTED RESULTS AND TARGET

The expected result for this Action is to provide the requested support to all Project Teams on matters concerning Programme management and additional services (i.e. risk, cost, planning, reporting, logistics, ICT, legal, etc.).

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

Action 14. Broader Approach

Action 14	Broader Approach

JT-60SA

Progress of Work

While the delivery and installation of the large majority of the remaining parts of EU contribution for the basic machine infrastructure is expected to be completed in 2019, some activities of

transport, repair, enhancement as required from the ensuing machine integrated commissioning, will be executed in 2020. In addition, preliminary/preparatory activities for the Operation/Enhancement phase of the project (BA Phase II) will also continue.

Procurement Activities

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

IFMIF/EVEDA

Progress of Work

In 2020, the LIPAc (Linear IFMIF Prototype Accelerator) operation at Rokkasho will focus on attaining firm evidence on the expected performance of the accelerator and on the reliability of the subsystems required for subsequent beam operations. For LIPAc preliminary/preparatory activities, for the later operation phases starting in 2021 (BA Phase II), will also continue, towards reaching the target accelerator performance and availability. Cash contributions as contribution to Common Fund and Common Expenses will also be made.

Procurement Activities

The work described above falls under the responsibility of F4E and will be carried out through existing/new supply and service contracts. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts and specific contracts. Additional contracts will have to be placed for demonstrating beam operation, implementing maintenance policy and consolidating beam performance. Contracts in support of the BA Phase II preliminary activities will be placed in 2020. Specific contracts/grants will be signed.

IFERC

Progress of Work

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

Procurement Activities

The REC activities are mostly under the financial responsibility of F4E, and are performed under F4E contracts or agreements of collaboration with EUROfusion, to provide software and

services. Specific contracts/grants will be signed. Cash contributions as contribution to Common Expenses will also be made.

ANNUAL OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.BA.01.12760	Contract completion REC adaptation as multiple purpose control room	Q4 2020	WP20 objective	Remote Experimentation Centre
EU.BA.01.13060	Production lines ready - Thomson scattering completed	Q3 2020	WP20 objective	Thomson Scattering
EU.BA.01.13480	Spare parts for cryoplant delivered	Q4 2020	WP20 objective	CON Cryoplant spare/replacement parts
EU.BA.01.21200	Delivery of the cryogenic vacuum pumping system of the LIPAc High Energy Beam Transport line (IFMIF)	Q3 2020	WP20 objective	LIPAc Activities

EXPECTED RESULTS AND TARGET

The main expected results for this action are:

1. Final acceptance of power supply and cryoplant spare parts on site is completed.
2. Qualification trials for optical fibres production for Thomson scattering is completed.
3. The REC adaptation as multiple purpose control room is completed.
4. DEMO final report and planning for Phase 2 is completed.

EXPECTED RESULTS AND TARGET

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

	Yearly value	Cumulative value
Supply of the Resistive Wall Mode Control Coil Power Supply system (EU-RWMPS)	0.575	1.150
Supply of the ECRF Power Supply system (EU-ECRFPS)	1.119	2.980
Supply of One Spare Toroidal Field Coil (EU-STFC)	5.197	5.197
Supply of the Displacement and Stresses Monitoring System (EU-TFCDSMS)	0.100	0.100
Supply of the Fast Wide Angle Video Diagnostic System based on the EDICAM intelligent camera (EU-EDICAM)	0.100	0.100
AF08 Auxiliary Systems (Control Systems and support) (EU)	0.320	1.600
AF10 Installation, Checkout, Start-up and Commissioning (EU)	10.620	12.150
Common Fund (IFMIF)	0.200	2.010
IFERC-DPA01-JA.EU (Phase Two DEMO Design Activities (DDA) for the IFERC Project)	0.610	6.040

IFERC-T2PA01-JA.EU (R&D on Tritium Technology in phase 2-3 part 2 for the DEMO R&D for IFERC)	0.055	0.550
IFERC-CSCPA01-JA.EU (Supply of Computer Resources)	0.025	0.025
IFERC-RECPA01-EU (Supply Remote Data Access Software Framework & Integrated Software Platform)	0.225	0.775

The target of 2020 is the achievement of a value expressed in kBAUA for BA Phase II (CAS)[7]:

	Yearly value
JT-60SA Cryoplant spare/replacement parts	1.200
JT-60SA PS system spare/replacement parts	1.200
EU Cash Contribution for Operation/Maintenance (JT-60SA)	4.700
JT-60SA Plasma Diagnostics	0.300
JT-60SA Simulator	0.100
JT-60SA TF Additional Instrumentation and associated and Data Processing and Transmission	0.300
LF06-EU: Target Facility	0.200
AF08-2: Control System	0.200
ED06: Neutron Sourcedesign	0.200
Common Expenses (IFMIF)	0.250
Common Fund (IFMIF)	1.680
IFERC Common expenses	0.05

[7] As stated in the individual project's Work Programmes 2020 approved by the Broader Approach Steering Committee in May 2020. No Procurement Arrangements has been signed yet.

TABLE 1 WORK PROGRAMME 2020 BUDGET SUMMARY

Budget Summary of the 2020 Work Programme - Amendment 2 (Budget Amendment II) for GB December 2020

Budget article		First amendment to the Work Programme Commitment appropriations (EUR)
3 1	ITER construction including site preparation	688,912,186
3 2	Technology for ITER	1,243,862
3 3	Technology for Broader Approach & DEMO	19,491,893
3 4	Other expenditure	18,578,625
3 5	Appropriations from the ITER Host State contribution	80,490,850
Total Title III of the Budget		**808,717,416**
3 1 to 3 4	Additional non-budgeted revenue	199,916
3 5	Host State contribution carried over from previous year (Available in September)	685,975
3 6	Additional revenue from the Reserve Fund Allocation scheme with ITER Organization	13,837,819
Total amount available for the operational expenditure		**823,441,127**

Work Programme		First amendment to the Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1+3 5+3 6	Expenditure in support of ITER Construction	3,059,421	455,456,338	325,610,987
	Sub total ITER construction + RF	**784,126,746**		
3 2	Design and R&D in support of ITER, not credited	0	1,149,418	94,444
	Sub total technology for ITER	**1,243,862**		
3 3	Expenditure in support of Broader Approach	0	8,374,910	11,116,983
	Sub total Technology for Broader Approach and DEMO	**19,491,893**		
3 4	Other Expenditure (EU.PM.PM)	0	15,599,115	0
	Sub total Other Expenditure	**18,578,625**		
Totals Operational Expenditure		***3,059,421***	***480,579,782***	***336,822,414***
		823,441,127		

Table 1 . Work Programme Budget Summary

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

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

Action #	Action	Budget WP2020	Budget WP2020 Amendment 1	Δ (Am.1-Original)	Budget WP2020 Amendment 2	Δ (Am.2-Am.1)
1	Magnets	17,926,453	21,098,398	3,171,945	18,598,594	-2,499,804
2,3,4,10*	Main Vessel	155,343,633	153,861,922	-1,481,710	99,422,292	-54,439,631
5	Remote Handling	20,526,679	20,356,746	-169,933	16,443,960	-3,912,786
6	Cryoplant & Fuel Cycle	19,352,948	22,599,901	3,246,953	25,690,378	3,090,477
7	Antennas and Plasma Engineering	18,858,502	6,353,438	-12,505,064	6,296,607	-56,831
8	Neutral Beam and EC Power Supplies and Sources	13,931,211	6,341,037	-7,590,173	6,194,791	-146,246
9	Diagnostics	34,431,140	21,567,345	-12,863,794	19,644,494	-1,922,851
11	Site and Buildings and Power Supplies	240,113,070	287,095,153	46,982,083	259,223,428	-27,871,726
12	Cash Contributions	250,000,000	250,000,000	0	319,100,000	69,100,000
13	Technical Support Activities	25,046,893	25,523,331	476,439	33,102,518	7,579,187
14	Broader Approach	17,946,909	19,984,852	2,037,943	19,724,065	-260,787
	Total	**813,477,436**	**834,782,125**	**21,304,688**	**823,441,127**	**-11,340,998**

Table 2 . Financial Resources per action

*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.

Note: The total amount of € 823,441,127 includes an estimated amount of € 13,837,819 corresponding to the estimated additional revenue to be received by ITER Organisation from the reserve fund or from the central reserve. This amount is to be revised and updated in the November/December GB according to the updated process of their approval.

TABLE 3 - 2020 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

Action	Signature	Type of contract
Magnets		
TO #27 under OMF-0937 for Inspection Services for PF Coils 2-5 Mfr. cont. 557-01-01-53	Q4	SC-PServ
TO #15 under OMF-0937 for Inspection Services for TF Coils Cold Test Insertion cont.557-01-01-58	Q1	SC-PServ
Option Released for 36 Months Maintenance	Q2	Option/Stage
Task Order Signed for TO #65 Documentation Management Support for the Poloidal Field Coils	Q3	SC-PServ
TB11 – Commitment for Completion of works TO#6 - 2020 (PF Coils Workshop extension)	Q3	SC-PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Vacuum Vessel		
Commitment and Task Order Signed - for VV Resident Inspector at Chieti	Q4	SC-PServ
Commitment and Task Order Signed for VV Resident Inspector at Monfalcone	Q2	SC-PServ
Commitment and Task Order Signed - of VV Resident Inspector at Santander	Q1	SC-PServ
Commitment and Task Order Signed - F4E-OMF-789-01-29 for 1 VV Resident Inspectors (Belleli)	Q2	SC-PServ
Commitment and Task Order Signed - F4E-OMF-789-WT-B20 for 1 VV Resident Inspectors	Q4	SC-PServ
Commitment and Task Order Signed - F4E-OMF-789-EN-A20 for 1 VV Resident Inspectors (ENSA)	Q3	SC-PServ
Commitment and Task Order Signed - F4E-OMF-0871-01-01-78 for Mechanical Engineering Support	Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Blanket		
High Heat Flux Test Facility (OPE-319) Flat Rate Commitment for 2020	Q4	PSupply
TASK 1, TASK 2, TASK 3.1 & 3.2 for FW Series Fabrication – LOT 1	Q4	PSupply
TASK 1, TASK 2, TASK 3.1 & 3.2 for FW Series Fabrication – LOT 2	Q4	PSupply
TO 01 OPE-319-01 High Heat Flux Testing of FW full scale-prototypes	Q4	SC-PServ
TO 01 for HHF (High Heat Flux) testing of In Vessel components (OMF-1033)	Q4	SC-PServ
Task Order Signed for Resources 2020/2021 – Blanket First Wall	Q2	SC-PServ
TO 01 Procurement of Beryllium Series	Q4	SC-PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
In Vessel- Divertor		
Contract for Tokamak cooling water system Transition Pieces and Remote handling flanges of CB series	Q2	PSupply
Task Order for Inspector for CSC_Welding	Q4	SC-PServ
Task Order for Inspector for CSC_NDT	Q4	SC-PServ
Task Order Signed for Inspector for WTO_Welding	Q3	SC-PServ

TO 19 OMF-937-01 for Inspector WTO_NDT	Q3	SC-PServ
TO 08 OMF-937-01 for Inspectors 2020 - IVT	Q1	SC-PServ
Amendment for Cost Estimate & Industralization Studies for Divertor IVT (OPE-138-01)	Q2	PServ
OMF-567-03 Amendment for Cost Estimate & Industrialization Studies for Divertor IVT	Q2	PServ
F4E-OFC-1097 “Lessons Learnt on west series for IVT series”	Q4	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Remote Handling		
Task order for Final design of Machine Assembly Phase 1	Q4	SC-PServ
Amendment (577-02-01) signed for System Engineering for Preliminary Design MA-2 for CPRHS	Q4	Amend
Task Order Signed for Prototyping and testing for IVVS	Q4	SC-PSupply
Task Order Signed for Final Design Phase 1 CMM for DRHS	Q4	SC-PSupply
Task Order (TO#06) signed for Crane prototyping for NBRHS	Q3	SC-PSupply
Task Order TO#07 signed for Preliminary Design of remaining systems & Final Design Mono Rail Crane (MRC) for NBRHS	Q4	SC-PServ
Task Order Signed for 2020 GTD - GENROBOT Consolidation	Q4	SC-PServ
TO for Engineering Insourcing Contract #06,07,DRHS, CPRHS/NBRHS	Q1-Q4	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Cryoplant and Fuel Cycle		
Contract Signed for Leak Detection Primary and Cryostat	Q3	PSupply
Contract signed for Manufacturing and Factory Testing of Torus and cryostat Front End Cryodistribution (FECD) Option 1	Q1	Option
Contract signed for Platform of Torus and cryostat Front End Cryodistribution (FECD) Option 2	Q1	Option
Contract signed for Leak Detection Primary- under RF PCR 834	Q3	PSupply
FECDS I&C TO2 Qualification	Q3	SC-PServ
OPTION 2: Design, Procurement and Integration of the glove box/es for the remote Leak detection systems and Gas Analysis	Q4	Option
Technical support for TCP	Q3	PServ
Technical support LDS	Q2	PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Antenna and Plasma Engineering		
Contract Signed for Procurement of GCC Waveguides for ITER	Q4	PSupply
TO signed for mm-wave testing of RF components	Q4	SC-PServ
Task Order Signed for Integration of ECPC Stage 2	Q4	SC-PServ
Task Order Signed for Optical Testing of Diamond Disks for EC Windows	Q4	SC-PServ
TO4 signed for ECH waveguide components and M4 design finalisation	Q4	SC-PServ
Task Order 09 Signed for Final Structural design of Cooling System	Q4	SC-PServ

Task Order 09 Signed for Final Structural design of Cooling System	Q4	SC-PServ
Task Order 10 Signed for Senior Mechanical Engineer to support ECH project	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		
Contract Signed - MITICA Diagnostics	Q2	PServ
Release of Option 1 - 2nd batch of spares (ITA fund)	Q4	Option/Stage
Commitment for Mechanical Engineering Support for the Neutral Beam BLCs	Q2	SC-PServ
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Diagnostics		
Fission Chamber Prototype & Series Production	Q1	PSupply
TO signed for Engineering Analysis Thermo hydraulic FDR of CTS	Q1	SC-PServ
Amendment 8 50967 Modification of applicable documents, IS versions and performance	Q4	Amend
Task Order signed for UP10	Q4	SC-PServ
Amendment 9 62477 Feasibility and impact assessment of possible new requirement	Q1	Amend
Task Order Signed for In-source personnel under OMF-0871-01-01-48	Q2	SC-PServ
Task Order Signed for TO12Bis for In-source personnel under OMF-0871 -2020	Q3	SC-PServ
Procurement and Delivery of CVD Diamond prototype	Q1	PSupply
Task Order Signed for Plant Controller Integration - System Integration, FAT, Shipping & Support	Q4	SC-PServ
Task Order Signed for Port Plug design, testing and diagnostic integration TO5	Q3	SC-PServ
Task Order Signed for Manufacturing support for Design of the Diagnostics OFC-0905	Q3	SC-PServ
Task Order Signed for TO02 BIS for I&C/Electronics Engineer under OMF-0620	Q4	SC-PServ
Task Order Signed for TO72 for In-source personnel under OMF-0871 (WAVS)	Q3	SC-PServ
Amendment 4 #62213 Signed for OPE-0829 - DN: Extension of tasks post-Preliminary Design Review	Q3	Amend
Task Order Signed for TO for In-source personnel under OMF-0871-01-01-45 Part IV	Q1	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 II	Q4	SC-PServ
TO 02 signed for FWC ANB Consultancy TBM Qual	Q4	SC-PServ
TO 01 Signed for Safety Analyses for TBS PD	Q2	SC-PServ
Contribution to TBM PT for IO-TBM activities 2020	Q3	Cash Contribution
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A

Site and Buildings and Power Supplies		
Site Security and Reception Services for the ITER Site 2021 signed from 12/20 to 12/21	Q4	SC-PServ
TB11 - Commitment for Completion works Contract - TO#05 - 2020	Q1	SC-PSupply
TB11 - Commitment for Completion works Contract - TO#06 - 2020	Q3	SC-PSupply
TB13 - Commitment for Contract for Design & Construction of Bldgs 44, 45, 46 & 47	Q4	PSupply
TB18 - Contract Signature	Q4	PSupply
TB19 - Commitment for Option 3: Sump Bldg 14	Q4	Option
Iter Site Cooperation Agreement for 2020	Q4	PServ
Iter Site Host Agreement for 2020	Q3	PServ
TB11 - Commitment for Completion works Contract - TO#07 - 2021	Q4	SC-PSupply
Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Supporting Activities		
Option release for extension of TO 02 under OMF-0895 PMS Lot 1: PPC Support	Q1	Option
Option release for extension of TO 03 under OMF-0895 PMS Lot 1: PPM Support NB 2020	Q1	Option
Option release for extension of TO 07 under OMF-0895 PMS Lot 1: PPM Support ANT 2020	Q1	Option
Task Order #3 under FwC F4E_OMF_0783 Lot 2 signed in Support of the MIR layer - DXL Senior/Junior	Q2	SC-PServ
Task Order Signed for TO 12 for Convention 4 for Real Convoys	Q2	SC-PServ
Task Order Signed for TO 13 for Convention 4 for Real Convoys	Q4	SC-PServ
TO 03 under FwC F4E-OMF-0895 Lot 2 for Risk Management Senior Support	Q2	SC-PServ
TO 2020 - Global transportation of HEL NON-EU ITER components	Q4	SC-PServ
TO for Transportation Management fees 2021	Q4	SC-PServ
TO under FwC F4E-OMF-0895 Lot 1 for Cost Control Support to BIPS PT	Q4	SC-PServ
TO 16 under F4E-OMF-0895-LOT1 for Cost Control support to FW series production (1)	Q4	SC-PServ
TO 17 under F4E-OMF-0895-LOT1 for Cost Control support to FW series production (2)	Q4	SC-PServ
Task Order #47 under FwC F4E-OMF-0871 LOT1 signed for Support in QA and NCR Mgmt. VV PT	Q2	SC-PServ
Task Order under FwC F4E-OMF-0871 LOT1 signed for Support in QA and NCR Mgmt. TS PT	Q4	SC-PServ
Task Order under FwC F4E-OMF-0871-01-01 signed for Support in QA and NCR Mgmt. IV-CB PT	Q4	SC-PServ
CSU - Commitments in 2020 for Scientific Journals and databases related to Fusion projects	Q1	SC-PServ
CSU - Commitments in 2020 for Rent and Community Charges 2nd & 3rd floor	Q1	SC-PServ
Commitment 2020 for Operational Missions	Q3	PServ
ICT- Commitments 2020 for Software maintenance fees (Software licences specific to the ITER project)	Q4	SC-PServ
ICT- Commitments 2020 for New Software licences specific to the ITER project	Q4	SC-PServ
NIS (New Insurance Scheme) Basis commitment 2020-2025	Q3	PServ
Additional Forecasted commitment for NIS (New Insurance Scheme) 2020-2025	Q4	PServ

Provision for Amendments, claims, reimbursement, indexation, late interest and budget reserve	N/A	N/A
Broader Approach		
Beam loss detection with high sensitivity	Q4	PServ
Repair PSYS & bleeders	Q4	PServ
Upgraded LEBT/RFQ interface	Q4	PSupply
Procurement of 2 ECRH Power Supplies - Part I	Q4	PSupply
On-site assistance for the operation of the SCMPS	Q3	PServ
Contract signed for JT-60SA Cryopump Design and Manufacturing	Q4	PSupply
Contract signed for JT-60SA Pellet Injector - Fuelling pellet source	Q2	PSupply
Option signed for JT-60SA Pellet Injector - Fuelling pellet source	Q4	Option
Contract signed for JT-60SA YAG Thomson scattering system part 1	Q2	PSupply
Contract signed for JT-60SA YAG Thomson scattering system part 2	Q4	PSupply
Error field correction coils Part 1	Q4	PSupply

Table 3 . Main Procurement Activities per action

TABLE 4 - LIST OF 2020 GRANTS PER ACTION

Action	Value (Euros)	Time of call	Budget line
Remote Handling			
CA10464 - GRT-901 Amendment for 3D Node for DRHS Markers (Cassette, Pipes, other)	600,000	2020 Q4	3.1
Diagnostics			
CA05710 - Specific Grant Signed for Design and R&D for Radial Neutron Camera/Gamma Spectrometer - Phase 1 SG7	1,819,126	2020 Q4	3.1
CA10154 - Amendment 2 signed for WAVS SG4 (Shutter Prototype + Optical hinge) #49131	196,401	2020 Q1	3.1
CA10175 - Amendment 2 for FPA-393-SG05 - Post PA acitvities	245,000	2020 Q1	3.1
CA10658 - Deviation #01 for Radial Neutron Camera/Gamma Spectrometer - SG07	177,916	2020 Q3	3.1
CA10823 - Amendment 4 signed for WAVS SG4 (RF cleaning) #	20,978	2020 Q4	3.1

Table 4 . Grants per action

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

TABLE 5 TIME OF CALL FOR THE PROCUREMENT PLAN

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

Procurement Procedures	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020
P Serv - Contract	1	10	2	4	5	6
P Supply - Contract	7	7	2	9	6	8
Pserv - Specific Contracts	50	29	16	33	22	35
PSupply - Specific Contracts	16	1	1	3	3	4

Table 5 . Indicative number and type of contracts per quarter

NB:

- During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2020.
- When a call for tender is not defined yet, the call is indicatively assigned to 6 months before the signature of the contract.
- For the specific contract, as they do not have call for tender, the table refers to its signature date.

ESSENTIAL SELECTION, AWARD CRITERIA AND UPPER FUNDING LIMITS FOR GRANTS

With regard to grant actions referred to in this Work Programme, the essential selection and award criteria are:

Essential Selection Criteria

- The applicants' technical and operational capacity: professional, scientific and/or technological competencies, qualifications and relevant experience required to complete the action.
- The applicants' financial capacity: stable and sufficient sources of funding in order to maintain the activity throughout the action.

Essential Award Criteria

- Relevance and quality of the proposal with regard to the objectives and priorities set out in this Work Programme and in the relevant call for proposals.
- Effectiveness of the implementation as well as of the management structure and procedures in relation to the proposed action.
- Cost-effectiveness and sound financial management, specifically with regard to F4E's needs and objectives and the expected results.

With regard to the specific action, more details will be provided in the call for proposals. Thresholds and weighting for the essential and additional award criteria will also be indicated in the call for proposals.

A proposal which does not fulfill the conditions set out in the Work Programme or in the call for proposals shall not be selected. Such a proposal may be excluded from the evaluation procedure at any time.

The timetable and indicative aggregated amounts for the actions are defined in this Work Programme.

Upper funding Criteria

With the entry into force of the recast F4E Financial Regulation and Implementing Rules on 1st January 2016, the following upper funding limits apply for grants:

1.	Research, technological development and demonstration activities	40%
2.	Purchase/manufacturing of durable equipment or assets and of ancillary services approved by the Joint Undertaking as necessary to carry out such activities	100%
3.	Coordination and support actions, including studies	100%
4.	Management activities, including certificates on the financial statements, and other activities not covered by paragraphs 1 and 2	100%

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