



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 2021 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 it¹ (hereinafter "the Statutes") and in particular Article 6(3)(e) thereof, last amended on 10 February 2015 by Council Decision Euratom 2015/224²;

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 Energy⁴ 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 2021 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 Single Programming Document.
- (2) The Administration and Management Committee (AMC) shall, in accordance with Article 8a (2) of the Statutes, comment on and make recommendations to the Governing Board on the proposal for the project plan, the work programme, the resource estimates plan, the staff establishment plan, the staff policy plan and other related matters, now part of the Single Programming Document drawn up by the Director;
- (3) The Technical Advisory Panel (TAP), in accordance with Article 6 (1) of the Statutes, shall advise the Governing Board on the adoption and implementation of the project plan and work programme, now part of the Single Programming Document;
- (4) With the prior agreement of the Chairs of the GB and AMC, F4E exceptionally and without prejudice to the AMC prerogatives in this regard, submits the present Budget amendment for adoption by the GB without the prior recommendation of the AMC

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.

- (5) The Governing Board, in accordance with Article 6 (3) (d) of the Statutes, shall adopt the project plan, work programme, resource estimates plan, the staff establishment plan and the staff policy plan, now part of the Single Programming Document;

HAS ADOPTED THIS DECISION:

Article 1

The 2nd Amended 2021 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 2021 annual Work Programme approved by the Governing Board.

Amendments to the 2021 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 1 million or 10%, 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 2021 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 and Title 4 of the annual Budget approved by the Governing Board.

Article 3

This Decision shall have immediate effect.

Done in Barcelona, 5 November 2021

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 2021 Annual Work Programme

WP2021 – 2nd Amendment

Executive Summary

Purpose

In accordance with the F4E Financial Regulation, this document lays down a detailed programme of activities that are foreseen to be implemented and financed under the budgetary appropriation for 2021.

Background

The Work Programme 2021 reference was adopted at GB49 in December 2020.

The available budget (see 2nd Amendment to the 2021 Budget) was allocated to the various Actions identified in this document. The budget breakdown between Actions is shown in table 2 to this 2nd Amendment to WP2021.

The Actions in the Work Programme represent the tasks planned in 2021 to contribute to the overall EU obligations to ITER and Broader Approach.

Summary

The introductory memorandum provides an overview of the most substantial changes in this WP2021 Amendment 2.

The introductory memorandum provides detailed justifications for changes affecting both progress of work and budget. Some activities were moved to 2022, some others anticipated, others were cancelled and some were affected by technical delays, change of strategy or delays in the signature of Procurement Arrangements (PAs) or other agreements. Some annual objectives, expected results and associated credits have been modified accordingly.

The F4E schedule used for the preparation of WP2021 amendment 2 is the version from end September 2021.

While the overall ITER schedule including assembly is under the control of the ITER Organization, F4E confirms that, to the best of their knowledge, no changes in this document will directly affect the 2025 First Plasma date or the overall project cost. F4E notes that the overall ITER schedule is under review by the ITER Organisation and ITER Council taking into account the impacts of Covid-19 and other events.

Recommendation:

The Governing Board of the Joint Undertaking is invited to adopt the attached document.

SPD2021_ANNEXES WORK PROGRAMME 2021 – Amendment 2

INTRODUCTORY MEMORANDUM

Changes to the Work Programme 2021

The Work Programme 2021 reference, as adopted at GB49, was based on the F4E set of schedules at the end of March 2020 and Work Programme 2021 Amendment 1 was based on the F4E set of schedules at the end of April 2021.

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.

While the overall ITER schedule including assembly is under the control of the ITER Organization, F4E confirms that, to the best of their knowledge, no changes in this document will directly affect the 2025 First Plasma date or the overall project cost. F4E notes that the overall ITER schedule is under review

by the ITER Organisation and ITER Council taking into account the impacts of Covid-19 and other events.

The available budget (see 2nd Amendment to the 2021 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 WP2021.

The Actions in the Work Programme represent the tasks planned in 2021 to contribute to the overall EU obligations to ITER.

The summary of the most substantial changes is provided in the table below and doesn't include minor modifications. It is noted that the 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 WP2021 Amendment 2 is the version from end September 2021.

The below table recaps the main changes per action brought by WP2021 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.

Action	Changes
Magnets	<p><u>Budgetary changes:</u> -1,760,000€ (-) Postponement to 2022 of an amendment to contract OPE-570 covering additional materials and consumables used in the production during 2021. The amendment signature is postponed since a Framework Contract has been launched to increase the competition and try to obtain a better price.</p> <p><u>Annual objective changes:</u> Annual objective "Approval by IO TFWP Acceptance Report" [EU11.1A.28125] postponed to 2022 → This milestone is now forecasted in 2022 due to the delay on the TF Coil Cases received from JA-DA. The delay in these components have impacted the production of the last TF Coil and, as a consequence, the final tests of the TF Winding Packs at the insertion facility before the final acceptance are delayed. This annual objective is replaced by the following one "Delivery of TFWP14 to Cold Test and Coil Insertion site [EU11.1A.22660]".</p> <p><u>Change in targets (kIUA):</u> Milestone "IO approval for Double Pancake Final Acceptance Document on DP 2 of PF4" has been anticipated from early 2022 to late 2021, hence the 0.25 kIUA increase for 2021 under the PF Coils related Procurement Arrangement.</p>

Main Vessel¹ (Vacuum Vessel, Blanket, Divertor and TBM)	<p>Main Vessel: + 6,112,194€</p> <p>Vacuum Vessel:</p> <p><u>Budgetary changes:</u> (+) Additional funds for the Vacuum Vessel action plan, including (but not limited to) final delivery bonuses, schedule stabilization incentives for on-target achievement of intermediate milestones, capital investments in schedule enablers and a risk fund.</p> <p>(+) Firm quotations for transportation related costs higher than original estimates.</p> <p><u>Annual objective changes:</u> “PS4 VV9 Fabrication Complete” [EU15.1A.1139820] is moved to 2022 → Persistent resource limitations and other bottlenecks at ENSA have resulted in unrecoverable delay on this segment, which is on the critical path for Sector 9.</p> <p>“PS3 VV9 Fabrication Complete” moved from Q3 to Q4 2021 [EU15.1A.1139800] → Due to some delays accumulated on this segment, which is not on the critical path for Sector 9.</p> <p>“S5 Ready for Lower and Upper Port assembly” moved from Q3 to Q4 2021 [EU15.1A.3082260] → Some delays on the completion of S5 PS2 have pushed the assembly activities of S5 to the next quarter. Still on track for delivery in Jan-2022.</p> <p><u>Change in targets (klUA):</u> Yearly target of CAS credits reduced from 14.005 to 10.444 klUA → Schedule delays, mainly caused by First of a Kind activities, resource bottlenecks at ENSA and Covid-19 related restrictions are reflected in the forecasted credit achievement. The biggest impact in terms of CAS credit has been the slippage of the delivery of Sector 5 to 2022 (3.5 klUA).</p> <p>In-Vessel (Blanket):</p> <p><u>Budgetary changes:</u> (+) Increase of the Task Order #2 of Beryllium Series after re-assessment of Supplier’s Beryllium free issue demands for the Blanket First Wall Series contract.</p> <p><u>Annual objective changes:</u> Annual objective “Task Order signed for Auditors TO#01 – LOT 1” [EU16.01.61400] has been reworded to indicate the number of the Task Order.</p> <p>Annual objective “Submission Deadline Tender for FwC BCM” [EU15.2A.100160] is deleted → F4E is currently under negotiations with potential tenderers for the Blanket Cooling Manifolds Series manufacturing.</p>
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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.

	<p>During these negotiations, an alternative technique for the support has been identified which could lead to significant savings. At the end of the negotiations, F4E would need to update tender documentation and technical specifications. This situation has impacted the schedule because F4E would need the acceptance by IO and there are on-going discussions that are impacting the procedure. The Tender submission deadline has therefore shifted to 2022.</p> <p><u>Change in targets (KIUA):</u> The 0.05 KIUAs CAS associated to “Submission Deadline Tender for FwC BCM” is moved to 2022 for the reasons described above.</p> <p>In-Vessel (Divertor): <u>Budgetary changes:</u> (-) Stage II of the Cassette Body Series was awarded with a lower value than the estimate, thanks to the fostered competition between tenderers and the procurement strategy defined.</p> <p><u>Annual objective changes:</u> Annual objective “Release Technical Specification for Inner Vertical Target Series Production [EU17.2B.12590] was postponed to Q4 2021 → The whole schedule, including this milestone was impacted following an update of PA Annex B (agreed with IO). This milestone is now achieved.</p> <p><u>Change in targets (KIUA):</u> NA</p> <p>TBM: <u>Budgetary changes:</u> (+) Additional scope is included in the Task Order #2 for Safety Analysis for TBS Preliminary Design. (+) Additional scope is included in the Task Order #1 for Proof of the TBM sets fabrication and Assembly processes feasibility.</p> <p><u>Annual objective changes:</u> Annual objective “Task Order F4E-OFC-1070-01 Signed for Proof of the TBM-Sets fabrication and assembly processes feasibility” [EU56.01.80210] moved from Q3 to Q4 2021 → The procurement procedure took longer than expected due to: requests for extension of the submission deadline, post-Brexit verification by legal unit on participation of English tenderer(s), difficulty in the electronic signature (new process for supplier), the complexity of the task offer (scope, price offer received) requiring long negotiations with contractor.</p> <p>Annual objective “Task Order 02 Signed for Safety Analyses for TBS PD” [EU56.01.1232060] moved from Q3 to Q4 2021 → Longer time to receive cost offer (e.g. sick leave of supplier key actor) and higher cost offer than expected requiring iteration/verification.</p> <p><u>Change in targets (KIUA):</u> NA</p>
<p>Remote Handling</p>	<p><u>Budgetary changes:</u> -11,696,885€</p>

	<p>(-) The signature of Task Order for Final Design Phase 2 of the Cassette Toroidal Mover (CTM) for the Divertor Remote Handling System (DRHS) is cancelled due to change in procurement strategy.</p> <p>(+) Change of procurement strategy for Final Design Phase 2 of Cassette Multifunctional Mover (CMM) for DRHS. The CMM Phase 2 and Phase 3 are merged to cover the full final design.</p> <p>(-) The signature of Task Order for Preliminary Design of remaining items is postponed to 2022 due to change in procurement strategy, which requires reconfiguration of design and manufacturing procurements.</p> <p>(-) The signature of the contract for the Final Design of Monorail Crane System (MCS) for Neutral Beam and Remote Handling System (NBRHS) is postponed to 2022 in order to further negotiate due to the complexity of the contract.</p> <p><u>Annual objective changes:</u> Forecasted quarter of “Task Order Signed for (577-02-02)” [EU23.03.14046592] changed from Q2 2021 to Q4 2021 → Forecasted quarter changed due to extended Preliminary Design Review closure and negotiation with supplier.</p> <p>Annual objective “Contract for Final Design of Monorail Crane for Neutral Beam Remote Handling System” [EU23.05.14054040] replaced by “Submission Deadline Tender for Final Design of Monorail Crane” [EU23.05.14053780] → The change of procurement strategy requires extra effort on direct contract negotiation for the first plasma system (Monorail crane) development.</p> <p>“Task Order for Final Design Phase 1 for IVVS Completed” [EU.57.01.50266] replaced by “IVVS Assembly of Pan &Tilt Prototype completed OMF-383-01-04” [EU.57.01.50260] → It was decided to launch a prototyping contract prior to Final Design. The prototype will provide important inputs for final design development.</p> <p><u>Change in targets (kIUA):</u> The decrease in CAS for PA 2.3.P5.EU.01 from 0.32 to 0 is due to a change of procurement strategy that requires extra effort to define scope repartition and negotiation with potential suppliers.</p>
Cryoplant & Fuel Cycle	<p><u>Budgetary changes:</u> - 3,068,523€</p> <p>(-) The signature of the Task Order for the Final Design of the Radiological and Environmental Monitoring System (REMS) is postponed to 2023 due to ongoing discussion between IO and F4E on the optimization of the design.</p> <p><u>Annual objective changes:</u> Annual objective “Preliminary Design Review Approved of Primary & Cryostat Leak Detection System” [EU31.03.25740] postponed from Q2 to Q4 2021 → Delay in closure of Preliminary design documentation (CHIT resolution) leading to a delay in Preliminary Design approval.</p> <p><u>Change in targets (kIUA):</u> NA</p>

Antennas and Plasma Engineering	<p><u>Budgetary changes:</u> +37,236,455 €</p> <p>(+) The values for the Integrator Framework Contract's Task Orders have been revised based on the initial offers received from the supplier during the ongoing negotiations. Final values will be confirmed with the submission of the final offer by the supplier.</p> <p>(+) New action to cover the approved PCR-001271 for the Ion Cyclotron procurement scope transfer to IO. The estimated cost has been agreed at a ceiling price of 50.3 M€ (2021), which is composed of cash contribution planned for 2021 and credit return.</p> <p><u>Annual objective changes:</u> Annual objective "Contract Signed for Supply of the EC ULs and Ex-Vessel Waveguides of ITER" [EU52.01.2000910] deleted → Due to new Upper Launcher issues resulting in an update of the PA strategy and extended negotiations, the contract signature has been realistically delayed to 2022.</p> <p>Annual objective "Task Order 01 Signed for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug" [EU52.01.3000000] deleted → Due to new Upper Launcher issues resulting in an update of the PA strategy and extended negotiations, the contract signature has been realistically delayed to 2022.</p> <p>Annual objective "Contract Signed for Manufacturing of Isolation Valve Prototypes and Series Production" [EU52.01.520160] postponed from Q3 to Q4 2021 → Due to extended negotiations, the framework contract signature has been delayed to Q4 2021.</p> <p><u>Change in targets (klUA):</u> The decrease in CAS for PA 5.2.P1B.EU.01 Electron Cyclotron Control System from 1.8299 klUA to 0.977 klUA is due to the postponement to 2022 of the milestones for the signature of the framework contract for the Integrator and the Pre-FDR meeting.</p>
Neutral Beam Heating & Current Drive	<p><u>Budgetary changes:</u> + 3,152,014€</p> <p>(+) Increase of the commitment for Technical Support of Neutral Beam Components to extend the validity of the Task Order from one year to two years and to extend the scope in order to follow up activities that has suffered delays accumulated due to COVID.</p> <p>(+) Increase of the commitment of the HVD1 & Bushing of IHNB-1 & IHNB-2 to cover the delays introduced by the new integrated schedule (IO, F4E and JAPA) revised by IO and by delay of B37 availability. This delay caused extra costs to the supplier.</p> <p>(+) New commitment to cover extra cost of the supplier caused by the delay of B15 availability.</p> <p><u>Annual objective changes:</u> Annual objective "Dispatch Invitation to submit final proposal for European Gyrotrons Procurement" [EU52.02.18380125] is moved to from Q3 to Q4 2021 → The submission of the final tender is split in two steps. First one already completed in quarter 3 and second step scheduled in Q4</p>

	<p><u>Change in targets (klUA):</u> PA 5.2.P4.EU.01 → Due to delays in availability of Building 15, part of CAS milestones planned in 2020 were delayed to 2021 so the CAS released value initially planned in 2021 has increased.</p> <p>PA 5.3.P9.EU.01 → Values updated due to rescheduling of activities in Padua based on new integrated schedule agreed with IO and RFX.</p>
Diagnostics	<p><u>Budgetary changes:</u> - 935,438€</p> <p>No major changes.</p> <p><u>Annual objective changes:</u> “Task Order signed for Bespoke Instrumentation Hardware” [EU55.01.203290] moved from Q2 2021 to Q3 2021 → Milestone achieved. Delays were due to discussions with the supplier to agree on prices due to the current electronic market situation.</p> <p>“HPC - IO Approval of FDR for Feedthroughs” [EU55.06.681270] moved from Q3 2021 to Q4 2021 → The associated milestone is related to the Final Design Review approval that has been delayed due to longer than planned documentation review time from IO and technical issues raised during the review.</p> <p>“Approval of BTP documentation” [EU55.06.682400] moved from Q3 2021 to Q4 2021 → The associated milestone is related to the Built to Print drawings approval which is the subsequent activity to the above Annual Objective related to Final Design Review.</p> <p><u>Change in targets (klUA):</u> PA 5.5.P1.EU.03 Diagnostics - Bolometers → The associated milestone is related to the approval of the Preliminary Design Review of some components and has been moved to 2022 due to technical reasons. The activity is not in the critical path of the project.</p> <p>PA 5.5.P1.EU.18 Diagnostics - Tokamak Services → CAS values adjusted to current project progress.</p> <p>PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems → Upper port 10 addition to the scope of the project has been re-adjusted as per the new procurement strategy.</p>
Buildings and Civil Infrastructures	<p><u>Budgetary changes:</u> + 7,896,774€</p> <p>(+) TB19 - the commitment for Option 1: Tritium above L2: Partial release of the commitment in 2021 and remaining cost moved to 2022 to follow finalization of works in TB18 (adapted to schedule needs).</p> <p>(-) TB20 - Commitment for Contract for B14 Doors Manufacturing / Installation is moved to 2022 due to call for tender negotiation phase the last more than expected.</p> <p>(-) TB22 - the Task Order #1 for completion and final fittings works is moved to 2022.</p>

	<p>(-) TB04 - Additional Design effort and changes in quantities and Non-Nuclear Building (NNB) : negotiations are still on going under the Manhattan project.</p> <p>(-) SO II - (Hot Cell Complex) Option 1 for engineering support services is moved to 2022. HCC strategy is still to be defined by Governing Board.</p> <p>(+) Architect Engineer - B14 Building services Construction Design (first plasma) has been transferred from TB04.</p> <p>(+) TB12 for Non Nuclear Building (NNB) has been transferred from TB04.</p> <p>(+) TB11 - transfer of scope from TB04 for Building (from TB12) and Lift lobby Doors (from TB20).</p> <p>(+) Additional forecast to cover potential past Claim for TB04.</p> <p>(+) Additional forecast for TB04 future subcontract.</p> <p>(+) Additional forecast for Architect Engineering (AE) for transfer of scope for the design and qualification of B11/B74 and procurement</p> <p><u>Annual objective changes:</u></p> <p>Annual objective Construction of Cryoplant Coldbox Building (52) Completed [EU62.05.460] is postponed to 2022. → The Cryoplant Coldbox Building has been transferred from TB04 to TB12. This change had an impact on the forecast completion date.</p> <p><u>Change in targets (klUA):</u></p> <p>Due to the new MINI CAS milestones distribution and Covid 19 impacts on construction site, changes have been brought to all projects distribution except for "Aux Buildings TB09/TB10", "Aux Building D&B TB13", "Common contractual activities" and "Headquarters Building".</p>
<p>Cash Contributions</p>	<p><u>Budgetary Changes:</u> -13,327,820€</p> <p>(-) 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.</p> <p>(+) The allocation for the Cash contribution to Japan (PA 5.3P6.JA.02) is increased to cover the full scope of the Neutral Beam Procurement Arrangement.</p> <p><u>Annual objective changes:</u></p> <p>"Reinforcement of commitment for TF coils structures and TF coils" added as annual objective → The commitment will happen in 2021 and is therefore added as annual objective.</p>
<p>Supporting Activities</p>	<p><u>Budgetary Changes:</u> - 6,134,631€</p>

	<p>(-) The reduction in the forecast for the transportation is due to the delays in the overall ITER schedule and of the Domestic Agencies in manufacturing the components, resulting in less components transported then scheduled during this period.</p> <p><u>Annual objective changes:</u> Annual objective “Contract Signed for Provision of System and Instrumentation Engineering Support for Nuclear Safety I&C” [EU.ES.03.60700] is moved from Q2 to Q3 2021 → Due to request for extension of time in tendering process</p>
Broader Approach	<p><u>Budgetary changes:</u> -19,755,465€</p> <p>(-) The definition of some technical aspects of the most critical High Heat Flux (HHF) contract is delayed, and it has an impact on the finalisation of the technical specification of the Normal Heat Flux (NHF) contract.</p> <p>(-) The definition of some technical aspects of the most critical High Heat Flux (HHF) contract is delayed, and it has an impact on the finalisation of the technical specification of the Divertor Cassette contract.</p> <p><u>Annual objective changes:</u> EU.BA.01.18620 – moved to 2022→ The objective is postponed to 2022 since the negotiation phase of launched tender is taking more time for potential suppliers’ assessment.</p> <p>EU.BA.01.21040 – moved to 2022→ The objective is postponed to 2022 since the contract is delayed due to late delivery from the supplier partially justified by COVID-19 and the supplier’s involvement in emergency medical supplies</p> <p><u>Change in targets (kBAUA):</u> Due to the delay in the signature of some procurement arrangements, also the corresponding credits shifted to next year. In addition, the delay in some of the project activities have resulted in the shift of the related credits. As the planning phase have evolved, some procurement arrangements have been renamed, and the kBAUA linked to some creditworthy items have been adjusted.</p>

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 2021 commitments. The cut-off level of confidence used in the tables is 70%.

1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2021 AMENDMENT 2

The 2021 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 2021, detailed objectives, expected results and target for each WP Action.

Main assumptions

The following assumptions are considered as the basis of the Work Programme 2021 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 2021.²
- The F4E schedule takes into account:
 - ✓ The latest input and developments of the schedules from the F4E suppliers, taking into account the agreed fabrication routes and showing the real development of the work.
 - ✓ The most realistic assumption of Procurement Arrangement (PA) signature dates based on the current status of the design of components and on the forecasted dates of the required design reviews prior to the PA signature.
 - ✓ The available manpower in F4E, taking into account bottlenecks in specific areas where staffing is not sufficient to grant a prompt process of the work. In specific cases, F4E foresees to satisfy its manpower needs by using external contractors.
 - ✓ The most realistic assumptions on the input data availability from IO to take into account the existing delays and the agreed dates of data delivery.
 - ✓ The information provided by the other DAs through their monthly Detailed Work Schedule to take into account any possible delay in the delivery of items to F4E that can cause delays to the EU in-kind procurements.
- The budget figures are based on the MFF 2021-2027 adopted by the Council on 22/02/2021 and the associated French contribution. The budget summary table of Work Programme 2021 Amendment 2 (WP_table 1) reflects the current status of the budget for the 2021 financing decision.
- In order to achieve an improvement of the quality of the PAs that need still to be signed, a common F4E/IO effort is still in progress to better identify the requirements that are linked to the specific procurement.
- Technically and commercially complex procurements will be implemented whenever appropriate through the competitive dialogue procedure or through the negotiated procedure, in order to improve the alignment of supply chain response to F4E needs and to proactively adopt cost containment measures. This will be done in compliance with F4E Financial Regulation.
- Grants related to recurring and sequential R&D activities, with a well-defined development path eventually leading to an EU procurement package, will be implemented whenever appropriate, through Framework Partnership Agreements (FPA), in order to streamline and channel R&D funding, improve its effectiveness and decrease the administrative burden to beneficiaries and F4E alike.

² Except for the Work Programme objectives of action 7 Antennas and Plasma Engineering that reflect the situation at the end of September 2020 to reflect the change in procurement strategy.

- Procurements which require a very close coordination between F4E and other entities will be implemented, whenever appropriate, through the Joint Procurement procedure.
- All the activities described in the overview of each Action and the list of contracts in WP_Table 3 is intended as credited by PA or ITA (Iter Task Agreement). If an Action is not credited, then it is explicitly mentioned in the overview. This is not applicable for the Action “Broader Approach” (i.e. not credited).
- F4E endorsement of the Japanese Procurement Arrangement that foresees an EU financial contribution will be preceded by a budgetary commitment for the entire amount of the F4E contribution.
- Changes originated by IO, or other DA’s, will be fully compensated by the IO Reserve Fund.
- Regarding the WP2021 for Broader Approach, the main assumptions are that this is to be coherent with the individual BA Projects' Work Programmes and Project Plans as approved by the Broader Approach Steering Committee.
- The Art. 5 of the F4E Statutes states that the Joint Undertaking may award grants and prizes in accordance with the rules of its financial regulation. In this regard, Essential selection, award criteria and Upper funding limits are defined in these annexes.
- Article 74 (2) of the F4E financial regulation in conjunction with Article 1(5) of Annex III to the F4E Statutes provides for the possibility to make use of annual instalments for actions extending over more than one financial year. An annual instalment consists in breaking down a budgetary commitment into annual instalments. Annual instalments can be implemented according to forecast of annual payment due, forecast of progress in the implementation of the contract, or annual budget availability. The instalments proposed for 2021 correspond to the latter case. Instalments may be used under the following actions
 - ✓ Main Vessel (Vacuum Vessel, Blanket, Divertor and TBM)
 - ✓ Site Buildings and Power Supplies.

Definitions and supporting information

1. "Action" for the purposes of Work Programme means “a coherent area of action with objectives and resources”. The list of the Actions and their definition is defined in the main text of the SPD.
2. Each Action of WP2021 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 2021 in that area. The “Procurement Activities” part instead focuses on the legal commitments foreseen during the year and to be covered by the financial decision and to be financed under the budget 2021. Furthermore, it includes (even if not explicitly mentioned):
 - i. Provisions for urgent general support tasks as cost/risk analysis, engineering support/analysis, I&C develop and support, experts, quality assurance and quality control, nuclear safety, CE marking analysis, transportation, storage, material characterization and qualification activities, resolution of non-conformities (in line with the mechanism agreed at ITER level), metrology and external legal support, cost of legal proceedings and alternative dispute settlement, including arbitration, as needed³. These tasks will be mainly implemented through specific contracts under existing framework contracts.

³ 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

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

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

iv. Provisions for BREXIT-related contractual modifications.

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

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

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

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

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

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

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

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

(e) **Human resources** (see HR_Table 1 of annexes to HR REP annexes). The table shows an indicative estimate of the Full Time Equivalent (FTE) staff assigned to the specific Action to cover all the activities carried out in 2021. Per each Action it is identified the "core" team and the additional staff (i.e. legal, financial, contractual, project management) assigned to the action according to the F4E matrix structure. Remaining staff from the Commercial Dept., Admin. Dept. and Office of the Director is instead allocated per action on a pro-rata basis.

(f) **Procurement plan:**

i. Main Procurement Initiatives (see WP_Table 3 of these annexes): these are, per Action, the list of the foreseen main contracts with value higher than 139,000 Euros⁴. Amendments, claims, reimbursement, indexation, late interest and budget reserve are grouped together due to the sensitivity of this information. The list is based on the current information at the time of writing the Work Programme. During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2021. Contracts that do not fulfill the Work Programme scope identified for each Action are not covered by this financial decision and therefore will not be authorized. A change to this list shall be considered as a non-substantial for the purposes of the Article 32 point 4 of the F4E Financial Regulations if not affecting the available budget for 2021 within the limit of the flexibility rule and if any related changes to the scope of the annual Work

activities to multiple WBSs (e.g. external resource to support overall risk management, etc.). In this case, they are included under Action 13

⁴ The threshold has been selected so to be in line with the FR.

Programme do not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.

ii. Value per Action: WP_Table 2 presents an indicative value of financial resources corresponding to each Action. F4E has evaluated the level of commitments planned for the Actions in 2021 by taking into account the progress of the project and the available manpower. A good implementation of the annual commitment is one of the objectives for F4E (see PP_Table 12 in Annexes to Project Plan). Any additional budget required and exceeding the currently available one will consist of unused appropriations adjusted to match the final needs.

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

iv. The plan may cover some activities moved from previous years into WP2021 due to changes in the overall planning and priorities.

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

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

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

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

2. OBJECTIVES AND KEY PERFORMANCE INDICATORS

Work Programme objectives

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

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

Annual objectives

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

AREA	Objective ⁵
Work Programme objectives	Implement a minimum percentage of Work Programme objectives <i>[including GB milestones and predecessors]</i> by end of the year
Credit Allocation Scheme [CAS]	Reach a minimum percentage of achieved CAS by end of the year
Annual budget	Implement minimum percentage of Commitment Appropriations by end of the year

Key Performance Indicators

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

Work Programme objectives

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

Credit Allocation Scheme (CAS)

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

Annual budget

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

⁵ Action 12 of the MAP Ad Hoc group endorsed by Governing Board 45 stated that "The targets for these measures will be defined before the start of each year to which the measures apply".

3. LIST OF WP2021 AMENDMENT 2 ACTIONS

Action 1. Magnets

Action 1	Magnets
<p>TF & PF Conductors</p> <p><u>Progress of Work</u></p> <p>Progress of Work All TF and PF conductor activities are completed, only some storage of strands will be required.</p> <p><u>Procurement Activities</u></p> <p>Amendments and/or options for existing contracts may be signed (i.e., storage of strands, claims, deviation notices, etc.)</p> <p>Pre-Compression Rings</p> <p><u>Progress of Work</u></p> <p>A new IO Task Agreement was signed in 2020 for extra scope: Additional PCR#10, eight 1/5 scale rings, 3 set of samples and additional pultruded length. The scale rings will be completed in 2021. Depending on the impacts of COVID-19, the additional PCR10, the samples and the additional pultruded length might also be completed in 2021.</p> <p><u>Procurement Activities</u></p> <p>Task orders related to Quality Inspection services might be renewed to follow up the manufacturing of the Pre-Compression Rings. Amendments and/or options for existing contracts may be signed (i.e., claims, deviation notices, etc.).</p> <p>Toroidal Field Coils</p> <p><u>Progress of Work</u></p> <p>All 10 TF Winding Packs will be finally shipped to the insertion facility, where the activity will be at full swing to complete the last stage of manufacturing of the TF Coils. During 2021 three TF Coils will be delivered to IO. These delivery dates are highly dependent on the impacts generated by the COVID-19 outbreak and on the dates and quality of the TF Coil Cases delivered by Japan and on the current sea transportation market situation.</p> <p><u>Procurement Activities</u></p> <p>Amendments and/or options for existing contracts may be signed (i.e., Non-Conformities on free issue items, Project Change Requests, components storage, contract extensions, claims, deviation notices, etc.).</p>	

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

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

Poloidal Field Coils

Progress of Work

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

Procurement Activities

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

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

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

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.1A.24800	TF-EU07 Welding Completed	Q3 2021	Predecessor of GB23	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.22660	Delivery of TFWP14 to Cold Test and Coil Insertion site	Q4 2021	Predecessor of GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.3B.01120	IPL > Delivery of PF2 Coil by EU-DA to IO	Q4 2021	WP21 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
EU11.3B.571550	DP2 - PF4.- DP VPI Completed	Q4 2021	WP21 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6

EXPECTED RESULTS

The main expected results for this action are:

1. Completion of the shipment of all TF Winding Packs to the insertion facility.

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

TARGET

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

	Yearly value	Cumulative value
PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	14.26200	75.52400
PA 1.1.P2A.EU.01 Pre Compression Rings	0	0.6
PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	11.75000	27.97000
PA 1.1.P6A.EU.01 Toroidal Field Conductors	0	43.39
PA 1.1.P6C.EU.01 Poloidal Field Conductors	0	11.22880977

Action 2. Vacuum Vessel

Action 2	Vacuum Vessel			
<u>Progress of Work</u>				
<p>In 2021 the manufacturing of all 5 Vacuum Vessel sectors will continue at full intensity. The first sector should be completed during 2021, but this being a First Of A Kind (FOAK) manufacturing activity, the uncertainty will remain until actual completion of the first sector mainly due to potential technically complex non-conformances and impact of Covid 19.</p> <p>To transport the sectors, so-called Transportation Frame Covers will be manufactured as well.</p>				
<u>Procurement Activities</u>				
<p>An amendment to Contract F4E-OPE-068 will be signed to allow for the implementation of an incentive scheme under the on-going contract.</p> <p>Provisions will be made for the transportation of the sectors to the ITER site stage, resolution of non-conformities (if required), participation in collaboration meetings with the Korean DA for the final assembly and commissioning of the sectors.</p> <p>Specific Contracts for support activities, like Inspectors, Documentation Support, Engineering and Analysis etc... will continue to be issued depending on the project needs.</p>				
WORK PROGRAMME OBJECTIVES				
Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA

EU15.1A.1139800	PS3 VV9 Fabrication Complete	Q4 2021	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3039360	S9_PS4_ Poloidal and Toroidal ribs welding and NDE complete	Q4 2021	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3081300	START OF FAT - Sector 5	Q4 2021	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3082260	S5 Ready for Lower and Upper Port assembly	Q4 2021	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EXPECTED RESULTS				
The main expected results for this action are:				
<ol style="list-style-type: none"> 1. Completion of the first European Vacuum Vessel sector 2. Full "D-shape" of the second sector completed 3. All four segments of the third, fourth and fifth sector in last manufacturing step i.e. Outer Shell welding (each sector consists of 4 segments that are joint together to form the D-shape of the sector) 4. Transportation frame and cover ready for the shipment of the sector 				
TARGET				
The target of 2021 is the achievement of a cumulative value expressed in KIUA (CAS):				
		Yearly value	Cumulative value	
PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel		10.44400	65.23700	

Action 3. In Vessel – Blanket

Action 3	In Vessel - Blanket
Blanket First Wall project	
<u>Progress of Work</u>	
<p>In 2021, the start of the activities for the preparation of the production line for the manufacturing of the First Wall (FW) panels is foreseen. The procurement of main raw materials (i.e. Beryllium and CuCrZr) will be implemented by way of task orders. These materials are planned to be provided as free issue items to the Suppliers in charge of FW Panels manufacturing.</p>	

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

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

Procurement Activities

In 2021, the main procurement activities foreseen as part of the FW series manufacturing is the signature of task orders for the procurement of Beryllium and CuCrZr materials. A framework contract is planned to be signed to procure He leak test services. In addition, resources needed to support the follow-up of the FW panels manufacturing will be insourced through specific task orders. Specific task orders for audit services of the cost-plus fee type of contract OMF-900 are planned. Provision of two different subsuppliers for solution annealing heat treatment of First Wall Panels is planned. Task orders for the High Heat Flux test of the ADMUs will also be signed, and options to perform testing and inspection activities to these components may be executed. Task orders for material characterization, additional thermal-mechanical finite element analysis and FSP metrology will be signed. In addition, the start of the manufacturing of mock-ups for ULBA Be qualification is foreseen. The call for tender for the procurement of standard parts for the FW series production will be launched.

Blanket Cooling Manifolds project

Progress of Work

In 2021, the main activities are related to the tendering phase for the Series production of Blanket Cooling Manifolds.

Procurement Activities

In 2021, the main procurement activity is the negotiation with tenderers leading to the award in 2022 of multiple framework contracts covering all eight tasks of the Blanket Cooling Manifolds series production. In addition, a task order of thermo-mechanical testing of preliminary welded support will be signed.

Resources needed to follow-up the design of the BCM support as well as the analysis of technical offers will be signed. Purchase orders for coating activities are planned. Moreover, additional activities are planned for complementary qualification and testing of alternative supports.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU15.2A.100160	Dispatch Invitation to Submit Updated Tender for FwC BCM	Q4 2021	WP21 objective	PA 1.6.P6.EU.01 Blanket Manifolds
EU.16.01.208250	Published Call for Tender for Procurement of Standard Parts	Q4 2021	WP21 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU16.01.61400	Task Order signed for Auditors TO#01 – LOT 1	Q4 2021	WP21 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.79750	Manufacturing Readiness Review Completed (ADMU) - OPE-443-01	Q3 2021	WP21 objective	ITA (C16TD169FE) Supporting Development

				Fabrication & Testing of First Wall full-scale prototypes
EXPECTED RESULTS				
The main expected results for this action are:				
<ol style="list-style-type: none"> 1. Proceed with the BCM Series tendering phase 2. Start of tendering activities procurement of Standard parts for the First wall manufacturing 3. Signed Task Order for Auditors to follow-up the execution of the Cost plus Fee OMF-900 contract 4. Manufacturing Readiness Review Completed (ADMU) – OPE-443-01 				
TARGET				
The target of 2021 is the achievement of a cumulative value expressed in KIUA (CAS):				
			Yearly value	Cumulative value
1.6.P1A.EU.01 Blanket First Wall			0.0	0.1
PA 1.6.P6.EU.01 Blanket Manifolds			0.0	0.2

Action 4. In Vessel – Divertor

Action 4	In Vessel – Divertor
Inner Vertical Target project	
<u>Progress of Work</u>	
<p>In 2021 the first Full Scale Prototype (FSP) of the Inner Vertical Target (IVT) is planned to be completed and shipped to IO (OPE-138-01) for assembly trials.</p> <p>For the three additional FSPs (OMF-567) the progress is expected to be as follows:</p> <p>For Lot 1 the fabrication of the Plasma Facing Units (PFUs) and the Steel Support Structure (SSS) will be completed.</p> <p>For Lot 2 the fabrication of the PFUs and the SSS will be completed, the TA will be shipped to RFDA for HHFTing and the FSP integration will be completed.</p> <p>Finally for Lot 3 the PFUs and SSS fabrication will be completed as well as the HHFTing in RFDA and the FSP Final Acceptance tests.</p> <p>In regard to the preparation of the call for tender for the Inner vertical target series production, the related technical specifications will be completed.</p>	
<u>Procurement Activities</u>	
<p>In 2021 the main activity foreseen will be the launch of the call for tender for the series fabrication of the Inner Vertical Target.</p>	

Additional resources and inspectors will be needed to closely follow up the fabrication of the FSPs as well as the preparation for the IVT series contract. These needs are planned to be insourced through task orders. Provision for non-destructive examination equipment will be in place. Moreover, commitments will be in place for the transportation of the OMF-567 contracts TAs to the testing site and for the transportation of the WEST elements to CEA.

Cassette Body project

Progress of Work

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

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

Procurement Activities

In 2021 the main activity foreseen will be the signature of Stage 2 for the cassette body series fabrication. The 1st amendment of the OMF-444 Lot 3 for the re-work the cassette body FSP in order to upgrade it to a standard cassette body to be installed into the machine is planned. Task Orders for the development of specific metrology equipment for the CBs will be placed. Furthermore additional resources will be needed specifically for Non Destructive Testing, welding inspection, documentation management, mechanical engineering support and metrology activities. These needs will be insourced through task orders.

Divertor Rails project

Progress of Work

For the Divertor Rails project, ITER IO proposed to delay the PA signature by one year to 2022, and F4E accepted. The reason for this delay was the need for IO to re-perform structural analysis of the system taking into account changes in the interfaces and expected dimensional deviations of the VV sectors.

Procurement Activities

N/A

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.1050800	HP - Reception of the Conformity of XM19 and 316-LN-IG material for Standard CBs (M_CBST_S14B)	Q3 2021	WP21 objective	PA 1.7.P1.EU.01 Cassette Body

EU17.01.1169400	HP -Reception of the conformity of 316L Tubes (D_TPRHRM_02)	Q3.2021	WP21 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.2B.12590	Release Technical Specification for IVT Series Production	Q4 2021	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.85750	Authorisation of shipment of the Testing Assembly to the HHF Testing Facility - OPE-567-03-01 (II.22)	Q2 2021	WP21 objective	PA 1.7.P2B.EU.01 Inner Vertical Target

EXPECTED RESULTS

The main expected results for this action are:

1. The procurement of materials for the series production of Std. CB will be completed (OMF-444 Lots 1 and 3)
2. Reception of the conformity of 316L tubes within the contract 1036 Transition Pieces and Remote Handling Flanges Series.
3. Completion of the inner vertical target plasma facing units with reference tube transition and alternative tungsten grades (OPE-138 Lot 1)
4. Completion of the manufacturing and qualification of the inner vertical target steel support structure (OMF 567 Lots 1,2,3)
5. Completion of the inner vertical target plasma facing units and twisted tapes (OMF 567 Lots 1,2,3).
6. Specs for the Series production of Inner Targets will be prepared.

TARGET

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

	Yearly value	Cumulative value
PA 1.7.P1.EU.01 Cassette Body	0.000	0.56
PA 1.7.P2B.EU.01 Inner Vertical Target	0.725	3.115

Action 5. Remote Handling

Action 5	Remote Handling
Divertor Remote Handling System (DRHS)	
<u>Progress of Work</u>	
<p>The focus will be given to the Final Design activities via two main development lines that will run in parallel: one for the Cassette Multifunctional Mover (CMM) and the other one for the Cassette Toroidal Mover (CTM). Final design activities will be accompanied with prototyping and laboratory test in some areas.</p>	

Procurement Activities

For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts. Grant amendment will be supporting the complementary developments at DTP2 site. Contracts may also be signed for design activities.

Cask and Plug Remote Handling System (CPRHS)Progress of Work

Activities are organized in two parallel development lines. One focuses on the first assembly casks that are first plasma components, the other one focuses on the nuclearized cask variants. After the completion of the preliminary design phase, final design development will continue on the full scope of the first plasma systems. Final design activities will be accompanied with prototyping in some areas. Non-first plasma nuclearized casks will continue with the preliminary design development.

Procurement Activities

For both of the main development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts. Contracts are also planned to be signed for design activities.

Neutral Beam Remote Handling System (NBRHS)Progress of Work

Activities are organized by subsystems and prioritized by their delivery needs for the different assembly stages. Main focus is given to the Monorail crane system that is first plasma item. Final design development of the Monorail crane system will continue, other non-first plasma systems will continue preliminary design developments towards design review. Final design activities will be accompanied with prototyping and laboratory test in some areas.

Procurement Activities

For the different development areas and the complementary activities, specific contracts will be launched through Remote Handling (RH) and Engineering Unit framework contracts. Contracts are also planned to be signed for design activities.

In-vessel viewing system (IVVS)Progress of Work

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

Procurement Activities

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

Common activities (transversal)

Progress of Work

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

Procurement Activities

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU23.03.14046592	Task Order Signed for (577-02-02) Prelim. Design MA-2 and Final Design MA-1 for CPRHS	Q4 2021	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14056380	M7 Preliminary design review meeting held (MA-1 last PDR)	Q2 2021	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.14053780	Submission Deadline Tender CON 2021 for Final Design of MRC	Q4 2021	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System
EU.57.01.50260	IVVS Assembly of Pan &Tilt Prototype completed OMF-383-01-04 (M8)	Q4 2021	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

EXPECTED RESULTS

The main expected results for this action are:

1. Signature of task orders for final design complementary scope of DRHS
2. Signature of task orders for the final design scope of first plasma CPRHS
3. Development of the preliminary design of non-first plasma NBRHS systems

4. Signature of task order for the final design scope of IVVS		
TARGET		
The target of 2021 is the achievement of a cumulative value expressed in KIUA (CAS):		
	Yearly value	Cumulative value
PA 2.3.P2.EU.01 Divertor Remote Handling System	0.2	1.4
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0	0.8
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0	0.3
PA 5.7.P1.EU.01 In-Vessel Viewing System	0.8	2.2

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle
<p>Fuel Cycle</p> <p><u>Progress of Work</u></p> <p>In the frame of the PA for leak detection and localization system, contract for the procurement of the Leak Detection systems will focus on design activities. Second phase of PA (localization systems) will include on tendering process of Helium Leak Localization systems, contract signature and start of design phase.</p> <p>Negotiations for the transfer to IO of the type A radwaste treatment and storage system will continue in 2021.</p> <p>In the frame of the PA for REMS (Radiological and Environmental Monitoring Systems), the contract for design and manufacturing of 1st plasma equipment will be signed followed by the start of design activities. For REMS Tokamak, activities related to design optimization and final design will take place. TOs under existing frameworks may be launched. An expert contract will be signed to support REMS activities.</p> <p>The activities in the field of vacuum pumping will keep growing:</p> <ul style="list-style-type: none"> • For the Torus and Cryostat Cryopumping System, manufacturing of the 8 cryopumps will start. • For MITICA and Neutral beam Cryopumps, the contract execution for MITICA Cryopump manufacturing and assembly (Lot1) will continue focusing on activities for production of the cryopump components and sub-assemblies. The supply of the charcoal coating of the cryopanel (Lot 3) will be completed in 2021. The task order for the MITICA Cryopump Installation tool and Mitica Cryopump assembly will be launched. 	

- The execution of Front End Cryopump Distribution System will continue : Cryojumpers will be tested and delivered, Warm Regeneration System and Cold Valve Boxes will be manufactured and tested. Task order for qualification of instrumentation and control will be closed and the one for first of a kind manufacturing will be signed.

Procurement Activities

- Task Order for Instrumentation and control of Front end Cryodistribution system and Torus and Cryostat Cryopumps: First Of A Kind (FOAK)
- Contract signature for final Design and procurement of Beryllium and environmental monitors (First plasma activities)
- Contract signature of Cryostat (Helium) Localization
- Task order for Technical support
- Amendments for existing contracts may be signed.
- TO under existing FwC to support development of main contracts (instrumentation and control, design activities, assembly activities, etc) may be signed

Cryoplant

Progress of Work

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

Procurement Activities

Amendments for existing contracts may be signed.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU31.01.11580	IPL > Delivery of Warm Regeneration System by EU-DA to IO	Q4 2021	Predecessor of GB28	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box

EU31.01.305060	M8 - Acceptance #CP4	Q2 2021	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.03.25740	M.14 - Preliminary Design Review Approved of Primary & Cryostat Leak Detection System	Q4 2021	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System
EU31.03.26280	Contract Signed for Helium Leak Localisation System	Q2 2021	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II - 1st Amendment)
EU31.03.26800	Quality Plan Approved	Q1 2021	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

EXPECTED RESULTS

The main expected results for this action are:

1. Manufacturing Readiness Review of Torus and Cryostat cryopumps successfully passed.
2. Final Acceptance test of Warm Regeneration Box completed
3. Charcoal coating panels of Mitica Cryopump delivered.
4. Negotiation phase with tenderers for Helium Leak Localization closed.
5. Contract signature of 1st plasma activities for Radiological and environmental monitors systems.
6. Start of commissioning activities of Gases Helium storage system

TARGET

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

	Yearly value	Cumulative value
PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	1	1
PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.36	0.54
PA 3.1.P1.EU.01 Warm Regeneration Lines	0	0.2
PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.12224	0.35203
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0.7	0.7
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II- 1 st Amendment)	0	0
PA 3.1.P3.EU.01 Leak Detection and Localization System Common Activities	0	0
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System (2 nd 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	1.29316	24.27610
PA 6.4.P1.EU.01 for Design of REMS	0.06	0.06

Action 7. Antenna & Plasma Engineering

Action 7	Antennas, Plasma Engineering & Operations
<p>ANTENNAS</p> <p>Ion Cyclotron Antenna</p> <p>No activities of design foreseen in 2021.</p> <p>PCR-001271 has been approved for the IC procurement scope transfer to IO. The estimated cost has been agreed at a ceiling price of 50.3 Meuros (2021), which is composed of 23.13 Meuros of cash contribution planned for 2021 and 26.16 Meuros of credit return.</p> <p>Electron Cyclotron (EC) Upper Launcher and ex-vessel waveguides (Upper and equatorial launcher)</p> <p><u>Progress of work</u></p> <p>Further Upper Launcher issues were detected by IO and F4E in in April 2021 in the frame of the PA preparation and tendering for the Technical Integrator. After assessment it was found that the FDR2 conducted in 2019 cannot be closed and the Upper Launcher design needs redressing in terms of functionality, manufacture and assembly (a new FDR is also needed).</p> <p>Accordingly, the PA strategy has been changed from a staged-built-to-print PA Annex Bs approach to a single functional specifications PA Annex B covering the remainder of ECH scope, with the following advantages:</p> <ul style="list-style-type: none"> ○ Schedule optimization by bringing-in an industrial technical integrator as soon as possible (necessary to resolve the new issues and industrialize the design of the remaining ECH items which are overall of low technical maturity) ○ Coherent commercial and PA approaches (1 main contract, 1 remaining Annex B) ○ Schedule optimization by merging of remaining Annex Bs <p>The main action is the preparation of the functional specifications PA Annex B, planned to be signed by 2021 end and consisting of negotiating with IO scope, requirements, interfaces and loads, with the aim to provide a stable working environment for the project. In parallel, ongoing design work, prototyping and procurement activities will proceed.</p> <p>The main challenges are the timely signature of the PA amendment in parallel to conclusion of Technical Integrator negotiations, as well as placement of contracts and task orders, and execution and follow-up of the technical activities consisting mainly of design and validation via prototyping and analysis of the Upper Launcher and Ex-Vessel Waveguides towards Intermediate Design Review (pre-FDR) early in 2022.</p>	

Procurement activities

Preparation of the functional specifications PA Annex B will proceed in parallel with procurement activities, design and validation works including prototyping, contracts execution and follow-up.

PA activities:

Mainly, negotiations for the Technical Integrator framework contract and first task order will continue with the aim to optimize price and schedule and align the contract with the PA Annex B under preparation. The first task order of the Technical Integrator framework contract⁶ is foreseen to include resolution of new Upper Launcher design issues and industrialization of the remaining components designs, up to FDR and manufacturing designs, as well as manufacture of some components (e.g. blanket shield modules, mirrors, material procurement, etc.) and assembly and testing of the EC Upper Launchers.

Series fabrication of the diamond disks will continue.

Another framework contract is planned to be signed by 2021 end for the isolation valves prototyping and series production.

Contracts are also foreseen for the testing of diamond disks and validation of other mm-wave components.

In addition and support to these main activities, other contracts are also foreseen, most of them specific contracts under existing frameworks.

ITA activities:

Design and validation activities will be ongoing during 2021, up to signature of the PA amendment for the remaining scope. These activities will be performed mainly through specific contracts as part of existing frameworks.

General activities:

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

Other support activities and additional resources are also foreseen in 2021, for both PA and ITA activities. Most will be implemented as specific contracts under existing frameworks.

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

PLASMA ENGINEERING & OPERATIONS

⁶ At the time of writing the Work Programme, there is a high probability that this commitment is postponed to 2022. This commitment is nevertheless kept in WP2021 for budget implementation purposes.

ITER Operations

In 2021, new activities have started focused on setting up and implementing a tri-partite collaboration between F4E, Eurofusion and IO for preparatory work for first plasma and Tokamak systems commissioning. This will be implemented mainly via expert contracts and specific support contracts, to be placed in the year.

Plasma Engineering**Procurement Activities**

A relevant part of the PE activity responds to (often urgent) requests and hence it is difficult to plan in advance. PE group in 2021 is going to focus on specific contracts in support of First Plasma preparation..

Electron Cyclotron Control System**Progress of Work**

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

Procurement Activities

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

FALCON Testing Facility

The FALCON facility will support the project in 2021 by testing components and prototypes as needed. This will include testing of the ex-vessel waveguides cooling and of the GCC waveguides pre-series. Maintenance of the facility is foreseen in 2021 with a refurbishment of the RF dummy loads and a possible revision of the High Voltage Power Supplies. Specific contracts under the existing framework contract for setup and operation of the EC components test facility (FALCON) are also envisaged in 2021, and the signature of contracts for other prototypes (e.g. windows) are also foreseen.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.2000458	PA Amendment Signature both parties	Q4 2021	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.203355	TO3 signed for Brazing of Diamond Disks for EC Window prototypes (OFC-729)	Q4 2021	WP21 objective	ITA (C52TD44FE) Prototype, Testing & Qualification program for the EC Upper Launcher Final Design
EU52.01.520160	Contract Signed for Manufacturing of Isolation Valve Prototypes and Series Production	Q4 2021	WP21 objective	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.05.500120	Task Order Signed for Support to IO and Design of EC Plant Controller	Q4 2021	WP21 objective	PA 5.2.P1B.EU.01 Electron Cyclotron Control System

EXPECTED RESULTS

The main expected results for this action are:

1. Signature of the PA amendment for the remaining scope of the Electron Cyclotron (EC) Upper Launcher and ex-vessel waveguides (Upper and Equatorial)
2. Signature of the framework contract for the Manufacturing of Isolation Valves Prototypes and Series production.
3. Signature of task order 3 for EC Window prototypes brazing of Diamond Disks
4. ECPC Stage 2 (GCC control system) commissioned at IO temporary location.
5. Testing of ex-vessel transmission lines prototypes and partial valve component mock ups.

TARGET

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

	Yearly value	Cumulative value
PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	0.977	0.977
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0.05000	1.05000

Action 8. Neutral Beam and EC Power Supplies and Sources

Action 8	Neutral Beam and EC Power Supplies and Sources
<p data-bbox="183 405 1356 443">Electron Cyclotron (EC) Gyrotrons, Power Sources and Power Supplies (PS)</p> <p data-bbox="183 499 435 533"><u>Progress of Work</u></p> <p data-bbox="183 555 1417 622">Completion of the Manufacturing and Factory Acceptance Tests of the UNITS 3-4 of the European EC Power Supply</p> <p data-bbox="183 645 1417 712">Preparation activities for start of installation and commissioning of the EU EC Power Supply system.</p> <p data-bbox="183 734 970 768">Technical Follow-up of the EC Power Supplies will continue.</p> <p data-bbox="183 790 1417 857">The performance of the improved 1MW Continuous Wave Gyrotron prototype will be verified with the long pulse, high power tests.</p> <p data-bbox="183 880 1305 913">The preparation of the offers to the Call for Tender of the Gyrotrons will be completed.</p> <p data-bbox="183 936 1417 1003">The evaluation of offers from the Gyrotrons manufacturers and the corresponding negotiations will be in progress.</p> <p data-bbox="183 1025 510 1059"><u>Procurement Activities</u></p> <p data-bbox="183 1081 643 1115"><u>Electron Cyclotron (EC) Gyrotrons:</u></p> <p data-bbox="183 1137 1417 1384">The 5.2.P3.EU.01 Gyrotrons PA consists in the procurement of 6 units of 1MW Gyrotrons at 170 GHz for the Electron Cyclotron Heating and Current Drive system of ITER. The work scope includes the design, manufacturing, assembly, factory testing, delivery, on-site installation and commissioning of the Gyrotrons. Each gyrotron unit is composed of a gyrotron tube, a superconducting magnet, a filament power supply, a control system, a cooling manifold system and auxiliaries and supporting structures. After PA signature, the main activities will be Call for tender and evaluation of the offers.</p> <p data-bbox="183 1406 651 1440"><u>Electron Cyclotron Power Supplies:</u></p> <p data-bbox="183 1462 1417 1541">Options will be released for the main contract for the procurement of the EC Power Supplies and specific contracts signed for the supervision, auxiliaries and Interfacing systems.</p> <p data-bbox="183 1630 395 1664">Neutral Beam</p> <p data-bbox="183 1686 435 1720"><u>Progress of Work</u></p> <p data-bbox="183 1742 1417 1809">MITICA Beam Source – completion of the manufacturing for the majority of the sub-assemblies and starting of factory assembly</p>	

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

NBTF progress towards transfer to IO of MITICA gas and vacuum system

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

HNB confinement and shielding:

- PA signature (HNB Vessels) foreseen in the third quarter of 2021

HNB General Assembly – Tooling:

- PA signature (HNB Tooling only) foreseen in the second quarter of 2021

HNB Power Supplies:

- Completion of detailed design activities for Residual Ion Dump (RID) Power Supplies and Acceleration Grid Power Supplies Conversion System (AGPS-CS). Progress with detailed design activities of High Voltage Deck 1, HV Bushing Assembly and Ion Source and Extraction Power Supplies

Procurement Activities

Specific contracts will be signed for technical follow-up.

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

The components of the HNB1 and 2 Injectors are under PA-53-4. The whole scope of supply will be arranged in 8 stages depending also of the availability of the technical build-to-print documentation from IO. The baseline and stage 1 of the Procurement Arrangement, covering the Neutral Beam Vacuum Vessels, will be signed in 2021.

For the PA 53-1- General Assembly, only the Tooling, first stage of the PA 53-1- General Assembly, will be signed in 2021.

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

Pending timely signature of the PAs and availability of all relevant input documents from IO, the procurement procedures for the HNB Vessels will be launched in the last quarter of 2021.

Neutral Beam Test Facility (NBTF)

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

Neutral Beam Power Supplies

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.02.18380125	Dispatch Invitation to submit updated proposal for European Gyrotrons Procurement	Q4 2021	WP21 objective	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons
EU52.04.12635	3rd set of the Gyrotrons high voltage power supply completed at Supplier Site	Q2 2021	WP21 objective	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply
EU53.06.07280	Start of Manufacture of Acceleration Grids Power Supply - Conversion System of Iter Heating Neutral Beam – 1	Q4 2021	Predecessor of GB27	PA 5.3.P6.EU Neutral Beam Power Supply
EU53.06.07680	Final Design Report of Acceleration Grids Power Supply - Conversion System of Iter Heating Neutral Beam – 1 accepted by IO	Q4 2021	WP21 objective	PA 5.3.P6.EU Neutral Beam Power Supply

EXPECTED RESULTS

The main expected results for this action are:

1. Procurement Arrangements (PA) signature for NB Vessel
2. Procurement Arrangement (PA) signature for NB Tooling
3. Launch of procurement procedure for the European Gyrotrons Procurement
4. EU Gyrotrons improved prototype: first test campaign on the long pulses test completed
5. Start of factory assembly of MITICA beam source
6. Completion of design activities for two neutral beam power supplies systems of ITER units

TARGET

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

	Yearly value	Cumulative value
PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply	3.948	8.491
PA 5.3.P6.EU Neutral Beam Power Supply	1.2	16.56
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	0.8	17.20

Action 9. Diagnostics

Action 9	Diagnostics
<p><u>Progress of Work</u></p> <p>The Diagnostics Programme will continue during 2021 with the manufacture of several components or systems for delivery to ITER, mostly for First Plasma. These include various types of in-vessel magnetic sensors, the mineral insulated cabling, cable supports and junction boxes that will connect to all in-vessel diagnostic sensors and fission chambers for the radial neutron camera diagnostic.</p> <p>The design of all remaining Diagnostics systems will also progress, both under the on-going Framework Partnership Agreements and under industrial design contracts, as will the design of ITER Port structures and the integration of Diagnostics into the Ports.</p> <p>Several Diagnostics systems and subsystems will complete their design activities with approval of the final design review, including the Tokamak electrical feedthroughs, the collective Thomson scattering system.</p> <p><u>Procurement Activities (contracts and grants)</u></p> <p>Procurement activities will focus mainly on two areas: placement of manufacturing contracts or task orders for the production of components for delivery to ITER and procedures for the completion of the design of less mature Diagnostics systems. These will be complemented with contracts and task orders for the production and testing of prototypes and task orders for the provision of industrial expertise and for engineering analysis. In-sourcing of personnel is foreseen to support the Programme during 2021, as is the use of Inspectors for manufacturing contracts and Experts in specialist areas, including in support of design reviews. Amendment to on-going grants or specific grants may be required.</p> <p><u>Manufacturing contracts</u></p> <p>The Diagnostics Programme will launch and/or sign procurement procedures for manufacturing of several Diagnostics subsystems needed for First Plasma, either as individual contracts or as task orders under a framework contract to be launched during 2021.</p> <p>One of these subsystems comprises opto-mechanical components of the Wide-Angle Viewing System (WAVS) in Equatorial Port Plug 12. These components will allow collection of images of the ITER plasma and wall, in both visible and infrared light, for transmission to cameras located in the port cell and must withstand harsh thermal and nuclear loads while maintaining exceptional optical performance.</p> <p>Other subsystems include Vacuum Vessel electrical feedthroughs, platforms that will support bolometer cameras mounted in the Vacuum Vessel and bespoke instrumentation hardware for the huge array of magnetics sensors on ITER, among others.</p>	

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

Design contracts

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

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.0102290	Manufacturing Design for Bespoke Instrumentation Hardware Available	Q4 2021	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.01.0103640	Manufacturing Readiness Review meeting for Plant Controller	Q3 2021	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.01.203290	Task Order signed for Bespoke Instrumentation Hardware	Q3 2021	Predecessor of GB39	PA 5.5.P1.EU.01-02-16-17-19 Diagnostics - Magnetics
EU55.06.681270	HPC - IO Approval of FDR for Feedthroughs	Q4 2021	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.06.682400	Approval of BTP documentation	Q4 2021	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services

EXPECTED RESULTS

The main expected results for this action are:

1. Delivery of the first batch of Inner Vessel Magnetic Coils assemblies.
2. Delivery of in-vessel cables for vacuum vessel sector 6
3. Completion of final design for Tokamak electrical feedthroughs
4. Completion of final design for the collective Thomson scattering system.

TARGET

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

	Yearly value	Cumulative value
PA 5.5.P1.EU. 02-16-17-19 Diagnostics - Magnetics	0.12855	0.58513
PA 5.5.P1.EU.03 Diagnostics - Bolometers	0	0
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.00000	0.19160
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.38476	0.77226
PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0	0.13769
PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0	0
PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0	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	0.11724
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	0	1.38681
PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software	0.14000	0.50000

Action 10. Test Blanket Module

Action 10	Test Blanket Module
<p><u><i>Progress of Work</i></u></p> <p>It is foreseen to continue the Preliminary Design activities and Safety Analysis for TBM Sets and Ancillary Systems.</p> <p>The consultancy of an Agreed Notified Body, mainly for the qualification of the TBM Box, will continue as well as the handling and storage of EUROFER and other steel products.</p> <p>In addition it is planned to complete the Post Irradiation Examination of EUROFER specimen, needed for EUROFER qualification and the preliminary Welding Procedure Specifications needed for the manufacturing of the TBM box.</p> <p>The activities for the development of TBM Industrial Feasibility and Fabrication Technologies will commence.</p> <p>The collaboration with EUROfusion and EFLs will continue.</p>	

In case EUROfusion would discontinue activities in the following area and F4E would not be able to use existing contractual tools, F4E might need to publish Call for Tenders for three new FwCs and sign:

- WCLL TBM Set Preliminary and Final Design Activities;
- WCLL-TBS Safety Analyses and Studies;
- Definition and codification of EUROFER97 design limits in RCC-MRx design and construction code.

Procurement Activities

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

- Preliminary Design of TBM Sets, of Ancillary Systems and of the related Safety Analyses and studies;
- Consultancy of an Agreed Notified Body;
- Proof of the TBM-sets fabrication and assembly processes feasibility;
- Handling and Storage of EUROFER and steel materials;
- The transport of EUROFER and other materials/products to and from the storage facility.

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

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

The Test Blanket Module procurement plan is not in response to PA or ITA but to the TBM Arrangements (TBMA). All activities are not credited.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU56.01.10180	TO 01 Signed for Preliminary Design of WCLL AS	Q3 2021	WP21 objective	NA
EU56.01.1227200	Task Order F4E-OFC-0950-01-02 Signed for Preliminary Design of HCPB TBM set	Q3 2021	WP21 objective	NA
EU56.01.1232060	TO 02 Signed for Safety Analyses for TBS PD	Q4 2021	WP21 objective	NA

EU56.01.80210	Task Order F4E-OFC-1070-01 Signed for Proof of the TBM- Sets fabrication and assembly processes feasibility	Q4 2021	WP21 objective	NA
EXPECTED RESULTS				
<p>The main expected results for this action are:</p> <ol style="list-style-type: none"> 1. The completion of Post Irradiation Examination of EUROFER specimen. 2. The completion of the first on-going activities for the preliminary Welding Procedure Specifications needed for the manufacturing of the TBM box. 3. TBS WCLL Conceptual Design Review approved by the Review Panel <p>Target credit NA</p>				

Action 11. Site and Buildings and Power Supplies

Action 11	Site and Buildings and Power Supplies
<u>Progress of Work</u>	
<p>Construction works will progress for the Tritium Building (B14) civil works (TB18), and for the Neutral beam Power Supplies Buildings (B37), Control Building (B71) and Fast Discharge Resistor Building (B75) (TB12).</p> <p>Design activities for Emergency Power Supplies Buildings and equipment (TB13) and for the Plant Bridges (TB12) will progress, allowing a start of first construction activities planned for the Emergency Power Supplies buildings.</p> <p>The remaining Auxiliary Buildings activities will progress with the Radio frequency building (B15) building services works and with the Cryoplant Buildings (B51 and B52) building services works (TB04 scope transferred to TB12). TB04 design activities will progress to completion for the Diagnostic Building (B74) and will progress for the Tokamak building (B11). The building services execution design, qualification and procurement of equipment will continue up to end of 2022 in TB04 and will progressively be handed over to TB21 for procurement. Painting (TB19), doors installation (TB03) and finishing works (TB11) will continue in the Tokamak Complex with painting finalized up to level B1 in the Tritium building (B14) and with painting finalized in Tokamak building (B11) in September 2021.</p> <p>The manufacture of the cargo lift will start (TB02).</p> <p>Specific contracts will be signed under ongoing framework support services and works contracts. Changes and exercise of options to the ongoing services and construction contracts in relation with Project Changes Requests (PCRs), input data delays, and re-allocation of scope between contracts will be implemented through amendments to the ongoing contracts and budget transfer by BCR.</p>	

Procurement Activities

Contracts to be signed by the end of 2021 include:

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

Contracts to be launched by the end 2021 but signed in 2022:

TB20: Doors Installation Tritium Building (B14). Tender process launched in Q2 2021, will be awarded in Q2 2022.

TB21 tender process will be launched in 2021 but awarded early 2022.

TB22: Civil, Architectural, Finishing and Retrofitting works – Tender process launched in Q2 2021, will be awarded end of Q2 2022/Beg. of Q3 2022.

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

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU62.02.72206	HPC - IO approval of Contractor Final & Construction Design (Structure) for Bldg 46 - MRR#1 for B44-45-46-47	Q4 2021	Predecessor of GB24	AUX BUILDINGS D&B TB13
EU62.02.72486	HPC - IO approval of Contractor Final & Construction Design (Structure) for Bldg 47 MRR#1 for B44-45-46-47	Q4 2021	Predecessor of GB26	AUX BUILDINGS D&B TB13
EU62.050206	IPL > Tokamak Building (11) RFIOC L3M area	Q3 2021	WP21 objective	MAIN MILESTONES
EU62.05.29019	NPC - Notice to Commence construction of Control Bldg 71 Non PIC	Q1 2021	Predecessor of GB34	AUX BUILDINGS D&B TB12
EU62.600650	IPL > Tokamak Building (11) RFIOC Level L4 (Axis T10-T12)	Q3 2021	WP21 objective	MAIN MILESTONES

EXPECTED RESULTS

The main expected results for this action are:

1. Tokamak Building last level Ready For IO Contractors
2. Emergency Power Supplies Building construction start
3. Cargo lift manufacturing activity start
4. IO approval construction design civil works for the Medium Voltage Distribution Building LC/1A and LC/2B (B46 and B47)

TARGET

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

	Yearly value	Cumulative value
MAIN MILESTONES	7.94000	18.24000
COMMON	3.70500	56.65365
TOKAMAK COMPLEX	11.91400	79.08272
AUX BUILDINGS TB03/TB04	3.28454	61.46370
AUX BUILDINGS D&B TB05	0.95156	15.25156
AUX BUILDINGS D&B TB06	2.08000	9.56000
AUX BUILDINGS D&B TB07	0.00000	6.74850
AUX BUILDINGS TB09/TB10	0.00000	0.00000
AUX BUILDINGS D&B TB12	0.89000	0.89000
AUX BUILDINGS D&B TB13	0.00000	0.00000
LOAD CENTERS	4.30800	4.30800
INTERCONNECTING ACTIVITIES	12.92000	16.49835
AUX BUILDINGS D&B TB17	0,00000	0.00000
COMMON CONTRACTUAL ACTIVITIES	0.00000	42.79000
PA 6.2.P2.EU.06 Headquarters Building	0.00000	13.85000

Action 12. Cash Contributions

Action 12	Cash Contributions			
<p>Cash Contribution to IO</p> <p>This action covers the EURATOM contribution that F4E⁷ shall deliver to ITER International Organisation (IO) in cash (10 %) and in-kind (90%) for the construction of ITER facility in accordance with ITER Agreement⁸.</p> <p>The present Work Programme includes the cash contributions to IO due by F4E for the following year N+1. The whole amount is committed in advance based on estimates of the IO draft budget N+1 and under the terms approved by ITER Council⁹.</p> <p>Cash Contribution to Japan¹⁰</p> <p>The action also covers the transfer of procurement responsibility from EURATOM to Japan under the supervision of the ITER Organization in accordance with ITER Agreement. This is financed through a cash contribution from EU to Japan paid by F4E. The amount is committed in advance based on the provisions set out in the agreement with Japan (Annex C of PA for the Cadarache NB power supplies). An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year.</p>				
WORK PROGRAMME OBJECTIVES				
Milestone	Scope Description	Forecast achievement date	Type of milestone	PA
Cash to IO	Yearly Commitment ¹¹	Q4 2021	WP21 objective	NA

⁷ F4E is the European Domestic Agency that manages the EURATOM contribution to the ITER project.

⁸ Article 8 "Resources of ITER Organization" (ITER Agreement 2006)

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

¹⁰ At the time of writing the Work Programme, there is a risk that the activity corresponding to PA 5.3.P6.JA.02 is postponed from 2021 to 2022. The budget is nevertheless allocated to year 2021 where the probability of implementation is higher at the time of writing the document.

¹¹ The cash contribution required by IO for the year N is committed by F4E at the end of the year (N-1). E.g. the commitment shown here in WP 2021 is the cash contribution to IO for 2022.

Cash to Japan	NB Power Supplies for Cadarache	Q4 2021	WP21 objective	PA 5.3.P6.JA.02
	Reinforcement of commitment for TF coils structures and TF coils	Q4 2021	WP21 objective	PA 1.1.P1B.JA.01
EXPECTED RESULTS				
<p>The expected result for this Action is to pay to IO the contribution as agreed by the ITER Council and to Japan as defined in the schedule for the relevant credits assigned to JA DA for those components transferred by the EU to them. As far as the cash to IO is concerned, the target for 2021 is to commit the cash contribution for 2022 according to the decisions due to be taken by the ITER Council in November 2021. As far as the cash to Japan is concerned, the target for 2021 is to commit the amount agreed in the Annexes C to the Japanese PA 5.3.P6.JA.02 due to be signed during the year and the contribution to reinforce the commitment for the escalation revision PA 1.1.P1B.JA.01.</p> <p>Target credit NA</p>				

Action 13. Technical Support Activities

Action 13	Technical Support Activities
<p>The procurement of the supporting activities is mainly performed through Framework contracts and specific contracts.</p> <p>Technical Support to In-Kind Procurement</p> <p>Engineering Support activities Engineering Unit during 2021 will continue supporting the ITER Departments project Teams (and to a limited extent the BA department) by providing them technical expertise and technical resources in the key domains of engineering and fusion technologies. The unit will provide technical expertise and resources in the following areas: Design office activities, System Design and Mechanical engineering, Analysis: Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism, Nuclear Analyses; Design Codes and Standards; Instrumentation and Control; Metrology. Beyond the preparation of task orders, the procurement activities in TSS will be mainly focused on renewing Framework Contract providers, for adapting the level of support to the needs of the project teams.</p> <p>Material and Fabrication For 2021 the Materials of the Engineering Unit has the aim to support the ITER Department's Project Teams (and to a limited extent the BA department) by providing technical expertise in the domains of Materials Science, Materials Technologies and Manufacturing Processes.</p>	

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

The focus for 2021 will be to support the critical components design and fabrication mainly in the areas off Magnets, Vacuum Vessel, EC Antenna, Neutral Beam and In-Vessel.

Assembly Integration and Validation (AIV)

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

Nuclear Safety

Progress of Work

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

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

Procurement Activities

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

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

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

A nuclear safety culture assessment will be conducted at the end of the year by an external expert. A specific contract will be signed.

Quality Assurance and Quality Control

Progress of Work

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

As for QA, support aims at ensuring that F4E's QA processes are properly followed in the development of the different ITER projects and in line with the F4E Quality Management Policy.

As for QC, the support to the projects will be provided in the follow-up and control of the activities performed by F4E's contractors.

Procurement Activities

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

CE Marking

Progress of Work

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

Procurement Activities

A framework contract will be signed for the continuation of support services in the area of CE marking and Task Orders under the new framework contract will be issued for the CE Marking activities.

Systems Engineering

Progress of Work

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

Procurement Activities

One framework contract will be signed for the continuation of the supply of Services for Systems Engineering. Task Orders under existing framework contracts and the new one will be issued to continue to support the F4E Project Teams both in Barcelona and in Cadarache.

Office of the Chief Engineer

Progress of Work

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

on technical matters and the assurance of consistency, adequacy and maturity in relevant Design Reviews.

Procurement Activities

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.ES.01.8140	Published Call for Tender for Engineering Support Contract	Q3 2021	WP21 objective	All
EU.ES.02.5860	Contract Signed for Mechanical analysis of ITER Components LOT 1	Q4 2021	WP21 objective	All
EU.ES.03.60700	Contract Signed for Provision of System and Instrumentation Engineering Support for Nuclear Safety I&C	Q3 2021	WP21 objective	All
EU.PM.3035350	Option release for extension of TO #23 under FwC F4E-OMF-0937-01 signed for QA Support to BIPS Project Team (cont.TO 03)	Q3 2021	WP21 objective	All
EU.PM.3051990	FWC F4E-OMF-1127 signed for System Engineering Support Services (2021-2024)	Q4 2021	WP21 objective	All
EU.NS.01.23220	FwC F4E-OMF-1110 signed for Eng. Supp. Serv. in the Area of Nuclear Safety 2021-2025	Q4 2021	WP21 objective	All
EU.PM.51380	Task Order under OMF-0783-01 signed for Support to Technical Integration (cont. TO 05 OMF-783-01-02)	Q2 2021	WP21 objective	All

EXPECTED RESULTS

The main expected results for this action are:

1. Implementation of the framework contract F4E-OMF-1153 which will provide Fusion for Energy with specific contracts in the field of Mechanical Analysis,
2. Provision of System and Instrumentation Engineering Support for Nuclear Safety I&C and Proc.
3. Support for Conventional I&C Systems.

Signature of a new framework contract to continue to provide support services in the area of Nuclear Safety. Assessment of Nuclear Safety Culture level by end of 2021.

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

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

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

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

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

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

Transportation

Transportation

During 2021, Engineering /Transportation will be in charge of the management, on the F4E side, of technical aspects of the joint procurement with IO for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of all ITER Components from the port/airport of entry (Fos or Marignane) to ITER site.

During 2021, this activity will mainly cover transportation of NON EU loads between Fos and Cadarache (EU-leg). The main cost driver is for Highly Exceptional Loads (HEL) that follow the dedicated ITER itinerary.

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

WORK PROGRAMME OBJECTIVES

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

EXPECTED RESULTS

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

Target Credit NA

Other Technical Support Activities

Programme Management

Progress of Work

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

Procurement Activities

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

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

Other Expenditures

Progress of Work

A general provision is foreseen for consultancy services (e.g. participation to specific committees, support/advice to F4E Management, technical support, management retreat, support on business processes management definition and support on documentation management system, etc.) as well as provision for interim management services, operational missions, the provision of ICT support (hardware, software and services) for the specific benefit of the operational activities and audit.

Logistic and legal support to operational activities is also included.

This part also includes insurances.

Procurement Activities

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

Insurances will be mainly implemented via reimbursement of IO according to the Agreement on provision of insurance services signed 20/07/2020. For insurances not falling in the scope of this scheme, such as decennial insurance for buildings, F4E Third Party Liability, they are procured or renewed by F4E directly.

Operational Support servicesProgress of Work

A general provision is foreseen for operational support to F4E Programme Teams in Pre-procurement (this covers Business Intelligence & Market Analysis) and Procurement areas and Commercial contract management as well as Commercial reporting.

Procurement Activities

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3081920	Task Order #05 under FwC F4E-OMF-0895 LOT 2 signed for Risk Management Senior Support (cont. TO 03)	Q2 2021	WP21 objective	All
EU.PM.3072460	Task Order 22 under FwC F4E-OMF-0895 LOT 1-01 signed for PPM Support VV (cont. TO 08)	Q2 2021	WP21 objective	All
EU.PM.3081580	Option 5 for extension of Task Order #02 under FwC F4E-OMF-895LOT 3 in Support on Planning & Scheduling BIPS	Q2 2021	WP21 objective	All
EU.PM.3076400	FWC F4E-OMF-1147 signed for Project Management Systems Support Services (2021-2025) – LOT 1	Q3 2021	WP21 objective	All

EXPECTED RESULTS

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

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

<p>Signature of a new framework contract for external operational support on procurement and commercial activities.</p>

<p>The expected result for the activities in Operational Support services is to provide the requested support to all Project Teams on these matters.</p>
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<p>The target for 2021 is to manage the F4E operative processes and to contribute in achieving the cumulative credit forecasted for each action in this WP2021 thanks to the support granted to the work under each action.</p>

<p>The expected result for the activities in Other Expenditures is to provide the requested support to all Project Teams on matters concerning additional services (i.e. logistics, ICT, legal, etc.).</p>
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Action 14. Broader Approach

Action 14	Broader Approach
<p>JT-60SA</p> <p><u><i>Progress of Work</i></u></p> <p>The activities defined in the STP WP2021, as recommended by the STP Project Committee will be implemented. These include the procurement of critical spare parts and engineering services for EU already supplied systems and components, and selected machine enhancements and diagnostics in collaboration with EUROfusion.</p> <p><u><i>Procurement Activities</i></u></p> <p>Critical contracts for development and/or fabrication of the JT-60SA Actively Cooled Divertor¹², Error Field Correction Coils power supplies, Electron Cyclotron Resonance Heating power supplies will be launched in 2021. A set of activities in support of urgent repair and enhancement of magnets power distribution system and power supplies are going to be implemented. The activities under the responsibility of F4E are carried out through grants, task orders of existing/new framework contracts or existing/new supply and service contracts. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe</p>	

¹² At the time of writing the Work Programme, there is a high probability that the commitment for the Supply of JT-60SA actively cooled Divertor HHF elements Stage 1 is postponed from 2021 to 2022. This commitment is nevertheless kept in WP2021 for budget implementation purposes.

operations, funded respectively by F4E through expert contracts and specific contracts. Specific Contracts for support activities like engineering and analysis will be issued depending on the project needs. Cash contributions on specific QST Call for Funds, covering EU Contribution to operation, maintenance and assembly will also be made.

IFMIF/EVEDA

Progress of Work

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

Procurement Activities

Additional contracts will have to be placed for demonstrating the operation and for consolidating the reliability and the beam availability. Preparatory activities for the forthcoming operation phases (commissioning of the accelerator at the nominal energy of 9 MeV and deuteron beam intensity of 125 mA in pulsed mode and continuous waves) will continue in 2021. F4E will be supported by experts, and on-site health and safety services to ensure safe operations as well as dedicated transportation services to support maintenance and refurbishment activities, funded respectively by F4E through expert contracts and supply, service and specific contracts. Cash contributions as contribution to Common Fund and Common Expenses will also be made.

IFERC

Progress of Work

The IFERC project comprises three activities, CSC (Computer Simulation Centre), REC (Remote experimentation Centre) and DEMO design and R&D. The CSC objective is to provide high power computer (HPC) resources for JA and EU scientists in order to advance simulation studies for ITER, JT-60SA and fusion reactors in general (e.g. DEMO). CSC will foster collaboration research projects between JA and EU by sharing computer resources and by further jointly developing state-of-the art models. REC activities will concentrate in three aspects: collaborative activities with JT-60SA, ITER, and the IFMIF-EVEDA LIPAc accelerator. A collaboration under the ITER BA agreement will start in April 2020 to advance test technologies for remote experiments and data transfer, including remote CODAC application testing, remote data access, live data viewing for ITER, fast data transfer, and secure remote connection. In DEMO design activities, priority will be given to activities also directly relevant for ITER and JT-60SA exploitation, such as plasma scenario development, divertor and power exhaust, breeding blanket and tritium extraction and removal. The objective of activities in fusion materials R&D will be to continue to support ITER in issues related to Tritium retention in first wall materials, and to contribute to the materials database for future reactors such as DEMO, which will be in part validated in a future IFMIF type installation. All activities will be performed in collaboration with EUROfusion.

Procurement Activities

There are contracts to be placed for preparation of remote participation rooms for tests with ITER and IFMIF/EVEDA and testing activities as well as related to CSC for code adaptation

for possible procurement process. F4E will be supported by experts funded by F4E through expert/specific contracts. Cash contribution will also be made as EU contribution to the Project Team.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.BA.01.22360	Contract signed for Supply of ECRH Power Supplies for two (plus two optional) gyrotrons for JT-60SA	Q1 2021	WP21 objective	ECRH
EU.BA.01.34220	Deliverable 6th of Optical Fibres for JT-60SA Thomson Scattering	Q4 2021	WP21 objective	Thomson scattering
EU.BA.01.19740	Remote participation tests REC-IO and REC-IFMIF completed	Q4 2021	WP21 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator
EU.BA.01.31820	Supply of beam loss detection with high sensitivity	Q3 2021	WP21 objective	LIPAc Activities

EXPECTED RESULTS

The main expected results for this action are:

JT-60SA:

1. Contract placement for Error Field correction Coils
2. Contract Electron Cyclotron Resonance Heating Power Supplies placed
3. First design report for the Error Field correction coils completed
4. Optical fibres for Thomson scattering delivered
5. Power Supplies industrial Support to JT-60SA Integrated Commissioning and First Operation Completed

IFMIF/EVEDA

1. Procurement of injector spare parts to ensure availability of the LIPAc accelerator completed
2. Qualification of the complete LIPAc accelerator at 5 MeV in pulsed mode

IFERC

1. Detailed R&D plan for IFERC Phase II
2. Equipment for tests of remote experiment with ITER and IFMIF/EVEDA and support of remote experiments

TARGET

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

Cash contribution JT-60SA 2021 (CASH02)	0.300	12.842
Power Supplies Spare Parts – Part 1 (SPO01)	2.306	2.306
EF Correction Coils (EFCC PS)	1.044	1.044
Cryopumps (CRPUM)*	0.130	0.130
Thomson Scattering (TOSCA)	2.420	2.420

On-site support for JT-60SA Integrated Commissioning and Preparation for Scientific Exploitation (EU-IC&EP)	1.200	1.200
Spare Parts and Support for Cryogenic System (CRSP01)*	0.739	0.739
Displacement and Stresses Monitoring System for the JT-60SA TF coils (DSMS02)	0.300	0.300
Target Research & Development Plan (LF06)	0.200	0.200
AF04 First Cryomodule of SRF LINAC (EU)	0.920	5.810
Control System (AF8-2)	0.200	0.200
Design feedback for Neutron Source (ED06-2)	0.200	0.200
Assembly of the LIPAc Cryomodule and the Supply of Beam Loss Monitors for IFMIF/EVEDA Project (AF04-2)	0.400	0.400
Common Expenses	0.200	0.450
Common Fund	1.760	3.440
Demo design activities	0.639	0.639
Structure material development for in-vessel components	0.256	0.256
Database for material corrosion	0.064	0.064
Neutron irradiation experiment of breeding functional materials	0.543	0.543
Tritium technology for collection and inventory evaluation	0.128	0.128
CSC-EU	0.200	0.200
REC-EU	0.100	0.100
Project Team - EU staff	0.183	0.183
Project Team - EU Common Expenses	0.050	0.100

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

WP_TABLE 1 WORK PROGRAMME 2021 AMENDMENT 2 BUDGET SUMMARY

Budget Summary of the 2021 Work Programme - Amendment 2

Budget article		Second amendment to the Work Programme Commitment appropriations (EUR)
3 1	ITER construction including site preparation	756,785,849.19
3 2	Technology for ITER	6,299,857.26
3 3	Technology for Broader Approach & DEMO	13,544,091.45
3 5	External Support Activities	18,257,931.09
3 6	Other Operational expenditure	5,897,778.06
Total Title III of the Budget		800,785,507.04
4 1	ITER construction from ITER host state contribution	185,236,653.44
4 2	Activities linked to ITER Organization	18,324,140.04
4 3	Other earmarked expenditure	1,399,515.87
Total Title IV of the Budget		204,960,309.35
Total amount available for the operational expenditure		1,005,745,816.39

Work Programme		2021 Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1 + 4 1 + 4 2 + 4 3	Expenditure in support of ITER Construction	3,192,279.00	638,284,628.54	320,269,251.00
Sub total ITER construction + RF		961,746,158.54		
3 2	Design and R&D in support of ITER, not credited	0.00	6,299,857.26	0.00
Sub total technology for ITER		6,299,857.26		
3 3	Expenditure in support of Broader Approach	0.00	11,564,407.45	1,979,684.00
Sub total Technology for Broader Approach and DEMO		13,544,091.45		
3 5	External Support Activities	0.00	18,257,931.09	0.00
Sub total External Support Activities		18,257,931.09		
3 6	Other Expenditure	0.00	5,897,778.06	0.00
Sub total Other Expenditure		5,897,778.06		
Totals Operational Expenditure		3,192,279.00	680,304,602.39	322,248,935.00
		1,005,745,816.39		

WP_Table 1 . Work Programme Budget Summary

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

Action #	Action	Budget WP2021	Budget WP2021 Amendment 1	Δ (Am.1 - Original)	Budget WP2021 Amendment 2	Δ (Am.2 - Am.1)
1	Magnets	10,179,277	7,510,000	-2,669,277	5,750,000	-1,760,000
2,3,4,10*	Main Vessel	167,984,720	144,980,000	-23,004,719	151,092,194	6,112,194
5	Remote Handling	30,840,485	36,400,000	5,559,515	24,703,115	-11,696,885
6	Cryoplant & Fuel Cycle	11,110,183	12,570,000	1,459,817	9,501,477	-3,068,523
7	Antennas and Plasma Engineering	38,773,146	41,490,000	2,716,854	78,726,455	37,236,455
8	Neutral Beam and EC Power Supplies and Sources	4,733,417	4,620,000	-113,417	7,772,014	3,152,014
9	Diagnostics	45,565,240	42,420,000	-3,145,240	41,484,562	-935,438
11	Site and Buildings and Power Supplies	341,994,310	348,307,143	6,312,833	356,203,917	7,896,774
12	Cash Contributions	301,143,374	308,860,000	7,716,626	295,532,180	-13,327,820
13	Technical Support Activities	27,233,306	27,250,000	16,694	21,115,369	-6,134,631
14	Broader Approach	30,901,742	33,620,000	2,718,258	13,864,535	-19,755,465
	Total	1,010,459,197	1,008,027,143	-2,432,054	1,005,745,816	-2,281,327

*The Actions of Vacuum Vessel, In-Vessel Blanket, In-Vessel Divertor and Test Blanket Module are presented merged in one single line due to commercial sensitive information.

WP_Table 2 . Financial Resources per action

WP_TABLE 3 - 2021 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

	Action	Signature	Type of contract
	Magnets		
CA09025	TO XY OMF-0937-01 Inspection Services for PF Coils 2-5 Mfr. (2nd Inspector) (cont. TO 05 OMF-0937-01) [24 months]	SC-PServ	Q3
CA09027	TO XY OMF-0937-01 Inspection Services for PF Coils 2-5 Mfr. (3rd Inspector) (cont. TO 07 OMF-0937-01) [24 months]	SC-PServ	Q4
CA10475	Task Order Signed for TO 92 Mechanical Engineering Support for the Magnets PT	SC-PServ	Q1
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
	Vacuum Vessel		
CA11993	Commitment signed for F4E-OMF-0304-01-94 transport of 5v LF to AMW	PServ	Q2
CA11843	Contractual activities of F4E-OMF-1082-01-03 of UTPA files prod.during the VV manufacturing	SC-PServ	Q2
CA05910	Commitment 2021 for Engineering Analysis and Qualification of VV Sectors	SC-PServ	Q4
CA08398	Commitment and Task Order Signed - F4E-OMF-789-02-05 for 1 VV Resident Inspectors	SC-PServ	Q3
CA08832	Commitment and Task Order Signed - F4E-OMF-789-WT-B21 for 1 VV Resident Inspectors	SC-PServ	Q4
CA08395	Commitment and Task Order Signed - F4E-OMF-789-01-39 for 1 VV Resident Inspectors	SC-PServ	Q4
CA06293	Commitment and Task Order Signed - F4E-OMF-789-01-38 for 1 VV Resident Inspectors	SC-PServ	Q4
CA08400	Commitment and Task Order Signed - F4E-OMF-789-01-34 for 1 VV Resident Inspectors (ENSA)	SC-PServ	Q1
CA08401	Commitment and Task Order Signed - F4E-OMF-789-01-37 for 1 VV Resident Inspectors (ENSA)	SC-PServ	Q4
CA08402	Commitment and Task Order Signed - F4E-OMF-789-01-35 for 1 VV Resident Inspectors	SC-PServ	Q2
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
	In Vessel- Blanket		
CA11180	Instalment LOT 1 - OMF-900	PSupply	Q2
CA11180-1	Instalment LOT 1 - OMF-900	PSupply	Q2
CA11283	Instalment LOT 3 - OMF-900	PSupply	Q2

CA11283-1	Instalment LOT 3 - OMF-900	PSupply	Q2
CA08354	TO 02 Procurement of Beryllium (Series)	SC-PSupply	Q4
CA11818	Manufacturing of mock-ups for ULBA Be qualification	Amend	Q4
CA11943	Amendment OMF-900 for provision of two different sub-suppliers for SAHT of First Wall Panels	Amend	Q4
CA11817	TO for Resources - Documentation Management TO#02/ PPM support	SC-PServ	Q4
CA11471	TO for Resources (Sergio)	SC-PSupply	Q1
CA09258	TO 01 for HHF (High Heat Flux) testing of In Vessel components (OMF-1033)	SC-PServ	Q4
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
	In Vessel- Divertor		
CA06532	STAGE 2 Cassette Body Series Production	PSupply	Q3
CA06532-1	STAGE 2 Cassette Body Series Production	PSupply	Q3
CA10364	TO-21 OMF-0878-01 signed for Metrology 2021 for CB Series Stage 1 (cont. TO-06)	SC-PServ	Q1
CA10721	TO-14 OMF-0878-01 signed for Metrology 2021 for CB Series Stage 1	SC-PServ	Q1
CA10924	TO-04 OMF-1082-01 Signed for the Provision and Qualification of Test Bench and UT Qualification Blocks for IVT Series	SC-PSupply	Q4
CA09600	TO-21 OMF-0937-01 for Resident Inspector CSC-Welding	SC-PServ	Q1
CA10728	TO-28 OMF-937-01 signed for Resident QA Documentation Inspector	SC-PServ	Q2
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
	Remote Handling		
CA08384	Task Order (577-02-02) for Preliminary Design MA-2 (CES) and Final Design MA-1 (CDS) for CPRHS	SC-PSupply	Q4
CA06538	Task Order Signed for Final Design Phase 2 (CMM) for DRHS	SC-PSupply	Q4
CA07471	CON for Development of Radiation Hardened Application specific Circuits (ASICs)	PSupply	Q4
CA11081	Task order (OMF-1034-01-04) for Final Design MA-1 EPP & UPP (fast track)	SC-PSupply	Q3
CA07449	Task Order Signed for Final Design Phase 1 for IVVS	SC-PSupply	Q4
CA11688	Amendment (383-04) DACC#130789 Extra scope: Deployment system prototyping and testing	Amend	Q2
CA10455	Task Order Signed for Manufacturing and testing of Camera Serializer & Rad Hard drivers for Actuators	SC-PSupply	Q2
CA10463	CON for OMS Development	PSupply	Q4

CA10954	TO 01 OMF-1115-01 for FP Diagn., BIPS I&C, Add. Heating and Real Time Software Support Activities	SC-PServ	Q4
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Cryoplant and Fuel Cycle			
CA09047	contract signed for FD&Procurement of BE&ENV monitors (First plasma activities)	PSupply	CA09047
CA10384	Contract Cryostat (Helium) Localization	PSupply	CA10384
CA08896	I&C TO3 FECDS and TCCS: Manufacturing and Delivery FOAK	SC-PSupply	CA08896
CA11361	FECDS Technical support 2021	SC-PServ	CA11361
CA10954	TO 01 OMF-1115-01 for FP Diagn., BIPS I&C, Add. Heating and Real Time Software Support Activities	SC-PServ	CA10954
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Antenna and Plasma Engineering			
CA09611	TO4 signed for ECH waveguide components and M4 design finalisation	SC-PServ	Q3
CA01587	Task Order 03 Signed for Optical testing of Diamond Disks for EC Windows	SC-PServ	Q4
CA08930	Contract signed for Manufacturing of EC Window prototypes	PSupply	Q2
CA04981	TO signed for mm-wave testing of RF components	SC-PServ	Q3
CA03742	Task Order Signed for Support to IO and design for EC Plant Controller	SC-PSupply	Q4
CA08038	Contract Signed for Procurement of GCC Waveguides for ITER	PSupply	Q4
CA11121	Task Order 05 Signed for Local structural assessment of the ex-vessel waveguides components	SC-PServ	Q2
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Neutral Beam and EC Power Supplies and Sources			
CA07651	Commitment for Technical Support of Neutral Beam Components for 2022-23	SC-PServ	Q4
CA10954	TO 01 OMF-1115-01 for FP Diagn., BIPS I&C, Add. Heating and Real Time Software Support Activities	SC-PServ	Q4
CA12366	Release of Option H - SC#1 MITICA Beam Source	Option/Stage	Q4
CA12010	TO signed for Welding Support for the MITICA Beam Line Components-OMF-1082-	SC-PServ	Q2

CA11708	Commitment for Engineering Support Neutral Beam Power Supplies (2021-2022)	SC-PServ	Q2
CA05360	NP - Contract Signed - PRIMA#3 Assembly	SC-PServ	Q4
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Diagnostics			
CA06143	Contract signed for Final Design and Manufacturing of IDES and Manufacturing of In-Vessel Supports	PSupply	Q3
CA06111	TO for PFPO1 Design for CPTS -> Specific Contract 01 Signed for Preliminary Design CPTS	SC-PServ	Q1
CA10548	Task Order Signed for CXRS Preliminary & Final Design & BTP	SC-PServ	Q4
CA05711	Task Order Signed for Port Plug design, testing and diagnostic integration TO6 - Final Design	SC-PServ	Q1
CA11258-1	Task Order Option signed for Task Order for UP10	Option/Stage	Q2
CA05705	Task Order signed for Bespoke Instrumentation Hardware - OFC-1087	SC-PSupply	Q3
CA10076	Contract Signed for Irradiation Testing for Bolometer Sensor Prototype & Electrical Connections	PServ	Q1
CA05665	Task Order Signed for Development of Mfg Specs for RNC port-plug components (EPP01) FWC-0905	SC-PServ	Q2
CA09101	Contract Signed for Irradiation testing of prototypes/materials	PServ	Q1
CA05672	Task Order Signed for Development of Mfg Specs for Port Plug Components	SC-PServ	Q4
CA09750-1	Task Order signed for UP10	SC-PServ	Q2
CA11265	Task Order Signed for TO85 Support to the Diagnostics PT (2020-2022) - Part IX	SC-PServ	Q2
CA10820	CON Coating of large scale mirror (group 4)	PSupply	Q2
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Test Blanket Module			
CA09802	TO 01 for Proof of the TBM-sets fabrication and assembly processes feasibility	SC-PServ	Q4
CA06816	TO 02 Signed for Safety Analysis for TBS Preliminary Design	SC-PServ	Q4
CA08656	TO 01 signed for Ancillary Systems WCLL PD	SC-PServ	Q3
CA06587	TO 02 Signed for Preliminary Design HCPB TBS Ancillary Systems	SC-PServ	Q3
CA06586	TO 02 Signed for Preliminary Design of HCPB TBM sets	SC-PServ	Q3
CA08660	TO 04 signed for ANB Consultancy (AS + TBM Set)	SC-PServ	Q4
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A

Site and Buildings and Power Supplies			
CA07135	TB04 - Commitment for Option 4. B14 (Tritium building) procurement	Option/Stage	Q2
CA11601	TB13 - Commitment for Contract for Design & Construction of Bldgs 44, 45, 46 & 47. Instalments 2021	PSupply	Q2
CA10174	TB11 - Commitment for Completion works Contract - TO#07	SC-PSupply	Q1
CA07181	SO II – Engineering support services Jan 2022 – Dec 2025. 1st Commitment	PServ	Q4
CA11603	TB13 - Commitment for Option 2. Instalments 2021	Option/Stage	Q2
CA11601-1	TB13 - Commitment for Contract for Design & Construction of Bldgs 44, 45, 46 & 47. Instalments 2021	PSupply	Q2
CA11606	TB13 - Commitment for Technical Contingency. Instalments 2021	PSupply	Q2
CA11194	TB13 - Commitment for Option 6. Covid impact	Option/Stage	Q4
CA11184	TB18 - Option 1. Instalments 2021	Option/Stage	Q1
CA11195	TB13 - Commitment for Option 4	Option/Stage	Q4
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Supporting Activities			
CA08976	2021 Commitments for Legal Services charged against Operational Budget	SC-PServ	Q1
CA09707	Commitment 2021 for Operational Missions	PServ	Q1
CA11705	TO 93 for KO-DA 1 HEL VV sector #01	SC-PServ	Q1
CA06445	TO for Management fees 2022	SC-PServ	Q4
CA11845	TO 95 for US DA 2 HEL CS MODULES #2 and #3	SC-PServ	Q2
CA10743	ICT - Commitments 2021 for Software maintenance fees (Software licences specific to the ITER project)	SC-PServ	Q1
CA12400	TO 99 for JA DA 1 HEL TF COIL #16	SC-PServ	Q4
CA11979	TO 96 for JA-DA 1 HEL TF COIL #10	SC-PServ	Q2
CA12078	TO 98 for JA-DA 1 HEL TF COIL #02	SC-PServ	Q3
CA07538	Task Order Signed for TO 14 for Convention 4 for Real Convoys	SC-PServ	Q2
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A
Broader Approach			
CA10812	Procurement of 2 ECRH Power Supplies	PSupply	Q1
CA09642	Error field correction coil PS	PSupply	Q1

CA07935	Contract signed for JT-60SA Cryopump Design and Manufacturing	PSupply	Q1
CA10661	Repair PSYS & bleeders option	Option/Stage	Q4
CA11464	TO01 for Engineering Support Services for Broader Approach	SC-PServ	Q4
CA11838	Option 3 for Procurement of 2 ECRH Power Supplies - Part I	Option/Stage	Q2
CA12011	TO10 for Engineering Support Services for Broader Approach (OMF-0871-01-02) (Repl OMF-871-01-01-106)	SC-PServ	Q3
CA12554	TO 01 OMF-1115-01 for FP Diagn., BIPS I&C, Add. Heating and Real Time Software Support Activities	SC-PServ	Q4
CA10367	ECRH Power Supplies procurement of 2PS - Option 1	PSupply	Q2
CA10868	Upgraded LEBT/RFQ interface	PSupply	Q1
	Provision for amendments, claims, reimbursement, indexation and late interest	N/A	N/A

Table 3 . Main Procurement Activities per action

WP_TABLE 4 - LIST OF 2021 GRANTS PER ACTION

Action		Time of call	Value (In-Year Euros)	Budget line
Remote Handling				
CA10465	GRT-901 Amendment for DTP2 Additional experiments	Q4 2021	100,000	3.1
CA11850	Amendment #133540 for extension of duration of GRT-974	Q2 2021	22,000	3.1
CA12106	Amendment #144321 for extension of duration for 6 months	Q3 2021	33,000	3.1
Diagnostics				
CA10428	Amendment of SG05 for additional prototyping (FPA-384SG05)	Q3 2021	747,479	3.1
CA11340	Grant Agreement Signed for Completion of the design of WAVS in EP#12 and post-design technical support	Q3 2021	1,999,941	3.1
CA11613	Amendment 3 for FPA-393-SG05 - DN: grant extension signed	Q2 2021	249,828	3.1
CA11744	Amendment of F4E-FPA-384 SG05 for flexible procurement of hardware	Q3 2021	40,000	3.1
Total			3,192,279	

WP_Table 4 . Grants per action

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

WP_TABLE 5 TIME OF CALL FOR THE PROCUREMENT PLAN

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

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

WP_Table 5 . Indicative number and type of contracts per quarter

NB:

- During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2021.
- When a call for tender is not defined yet, the call is indicatively assigned to 6 months before the signature of the contract.
- For the specific contract, as they do not have call for tender, the table refers to its signature date.

ESSENTIAL SELECTION, AWARD CRITERIA AND UPPER FUNDING LIMITS FOR GRANTS

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

Essential Selection Criteria

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

Essential Award Criteria

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

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

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

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

Upper funding Criteria

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

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

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