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 FIRST AMENDED 2022 ANNUAL WORK PROGRAMME OF THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY

THE GOVERNING BOARD OF FUSION FOR ENERGY,

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

HAVING REGARD to Council Decision (Euratom) No 198/2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it, last amended on 22 February 2021 by Council Decision (Euratom) No 2021/281[3];

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

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

HAVING REGARD to the comments and recommendations of the Joint Undertaking's Administration and Management Committee and of the Technical Advisory Panel on the first Amended 2022 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 shall, in accordance with Article 8a (2) of the Statutes, comment on and make recommendations to the Governing Board on the proposal for the project plan, the work programme, the resource estimates plan, the staff establishment plan, the staff policy plan and other related matters, now part of the Single Programming Document drawn up by the Director.

(3) The Technical Advisory Panel, in accordance with Article 6 (1) of the Statutes, shall advise the Governing Board on the adoption and implementation of the project plan and work programme, now part of the Single Programming Document.

1 O.J. L 90, 30.03.2007, p. 58.
2 O.J. L 37, 13.02.2015, p.8.
3 OJ L 62, 23.2.2021, p. 41
4 F4E (19) GB45 21.1 adopted on 10.12.2019
5 OJ L 122, 10.5.2019, p. 1–38.

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

HAS ADOPTED THIS DECISION:

Article 1

The 1st Amended 2022 Annual Work Programme (F4E_D_2WYUPS v1.1) 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 2022 annual Work Programme approved by the Governing Board.

Amendments to the 2022 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.

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 2022 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, 8 July 2022.

For the Governing Board

Dr. Carlos Alejaldre
Chair of the Governing Board
(Electronically Signed in IDM)

For the Secretariat

Romina Bemelmans
Secretary of the Governing Board
(Electronically Signed in IDM)

SPD2022_ANNEXES WORK PROGRAMME 2022 – Amendment 1

INTRODUCTORY MEMORANDUM

Changes to the Work Programme 2022

The Work Programme 2022 reference, as adopted at GB53, was based on the F4E set of schedules at the end of March 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 1st Amendment to the 2022 Budget) was allocated to the various Actions identified in this document. The budget breakdown between Actions is shown in table 2 to this 1st Amendment to WP2022.

The Actions in the Work Programme represent the tasks planned in 2022 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 original Work Programme as amended by 1st Amendment reflect the full planned scope of activities for the year.

The F4E schedule used for the preparation of WP2022 Amendment 1 is the version from end April 2022.

The below table recaps the main changes per action brought by WP2022 Amendment 1. 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
Action 1 - Magnets	Budgetary changes: + 3,263,602€ (+) The Covid outbreak effect and the geopolitical instability due the Russia-Ukraine war are heavily impacting the price of the booking of the vessel for the sea transportation of the TF Coils. Annual objective changes: Annual objective EU11.1A.11800 "Delivery of TF17 (EU 07) by EU-DA to ITER Site (GB 23)" moved from Q1 to Q2 2022." TF Coil #6 was delayed due to some issues with the main milling machine HVAC system. This delay was initially implemented on TF Coil #6 and now it is implemented on TF Coil #7. On top of this, several delays (i.e. more than 2 months) have been generated by the Coil transportation arrangements due to the current very complex sea transportation market situation, which is out of F4E control. Annual objective EU11.1A.28115 "HPC- Approval by IO for Document CFAD (HP 9.1.6) / TF-EU10 (IC64 /GB54)" has been replaced by "HPC- Approval by IO TFWP Acceptance Report (HP8.4.6) / TFWP14". TF Coil #10 has been delayed due to the late arrival of the last set of TF Coil Cases from JADA, which have been delayed several times in the past months. Annual objective EU11.3B.41960 "Placing DP7 for PF3 Stacking/ Connections/ Ground Insulation/ Impregnation" is replaced by EU11.3B.41980 "DP7 of PF3 placed for Stacking/ Connections/Ground Insulation/Impregnation". In the original WP2022, the activity was selected instead of the milestone. In this updated version of the fiche this clerical mistake has been fixed. No delay is reported in the scope of this milestone. Change in targets (kIUA): Decrease of 3.1kIUA of yearly value and 3.554kIUA in cumulated value for "PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets". The decrease is mainly due to the slippage of the last TF Coil Delivery to IO from 2022 to 2023 (impacting the yearly value). The cumulative value has further

	decreased due to the slippage of one minor milestone from 2021 to 2022 and another one from 2022 to 2023 (not impacting the yearly value but impacting the cumulative value). The increase of 0.25 kIUA in cumulative value for PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6 is due to the anticipation of IO approval for Double Pancake Final Acceptance Document (DPFAD) on DP 2 of PF3 from 2023 to 2022.
Main Vessel[1] (Vacuum Vessel, Blanket, Divertor and TBM)	**Main Vessel:** - 260,043€ **Sub-action 2_Vacuum Vessel** <u>Budgetary changes:</u> (+) Additional budget allocation for the transportation of the Sector 5. (+) Additional budget allocation for the implementation of the second part of the schedule stabilization action plan requested by the Governing Board. <u>Annual objective changes:</u> All changes made to the annual objectives are linked to the well-known difficulties of the Vacuum Vessel project. They are mainly driven by the First of a Kind and Nuclear aspects of the project as well as flagrant underperformance by the supplier. Monthly project status reports have been sent to the Governing Board. Annual objective EU15.1A.3091140 “S9 all segments on final assembly jig” and EU15.1A.16440 “Delivery of Sector 9 by EU-DA to ITER Site” have been removed from the list. Annual objectives EU15.1A.3091160 “S9 Machining of PS1 completed” and EU15.1A.3091120 “S9 Machining of PS2 completed” have been delayed to later quarters. Annual objectives EU15.1A.08500 “Delivery of Sector 5 by EU-DA to ITER Site” and EU15.1A.3081300 “Start of Factory Acceptance Test - Sector 5” have been added to the list. <u>Change in targets (kIUA):</u> The in-year value has changed from 13.66900 to 13.62094 kIUA. The cumulative value has changed from 83.46600 to 75.37094 kIAU Same justification as the one provided above for the changes to Annual Objectives. **Sub-action 3_In-Vessel (Blanket)** <u>Budgetary changes:</u> (+) The preliminary offer for the task order 1 of the Blanket Cooling Manifolds (BCM) contract is above the initial forecast, the scope has been therefore divided in tasks 1a and 1 b with two different contractors.

[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.

	(+) The Task Order for the procurement of 316L ITER grade is impacted by the current international situation on material prices. Annual objective changes: Annual objective EU15.2A.12100 for "Task Order Signed for Task 1 - Qualif. and Manuf. of 1st Pipe Bundles" moved from Q1 2002 to Q4 2002 due to new IO need dates agreed, in particular for first pipe bundles through BCP815 approved in November 2021. Tendering procedure for the Blanket Cooling Manifold series adapted accordingly to cope also with material market instability. Annual objective EU.16.01.208600 for "Contract Signed for Procurement of Standard Parts" moved from Q3 2022 to Q4 2022. The signature of this contract is postponed due to other prioritisation based on workload and staff allocation. Change in targets (kIUA): Increase of yearly 2022 value for PA 1.6.P6.EU.01 Blanket Cooling Manifolds from 0.15 kIUAs to 0.20 kIUAs. After agreement on new IO need dates, Tender Submission Deadline for FwC BCM (0.05 kIUAs) was moved from 2021 to 2022. Tendering procedure for the Blanket Cooling Manifold series adapted accordingly. Deletion of yearly 2022 value for PA 1.6.P1A.EU.01 Blanket First Wall (from 0.5 kIUAs to 0 kIUAs). End of Manufacturing of First Wall Panels for qualification is now scheduled in 2024 (0.5 kIUAs). IO need dates currently under discussion will provide more margin to the deliveries. **Sub-action 4_In-Vessel (Divertor)** Budgetary changes: (-) The second specific contract for the Inner Vertical Target (IVT) Pre Serie Production is postponed to 2023 due to sanctions imposed to Russian Federation. Annual objective changes: Deletion of annual objectives EU17.01.1057000 and EU17.01.1066900 for "Send of the Hot He Leak Test" since IO need date for Cassette Body #01 is now in 2024. Deletion of annual objective EU17.03.1040 for "PA 1.7.P2E.EU.01 APFC Signed". Following RED FLAG Meeting held on 07 April 2022 between EU-DA and IO, the new agreed PA signature date is December 2023. Change in targets (kIUA): Yearly 2022 value removed from PA 1.7.P1.EU.01 Cassette Body since "Delivery of CB-01 +2 caps & Spreader Number 1 from EU to IO" (0.09 kIUA) is moved to 2024. **Sub-action 10_Test Blanket Module** Budgetary changes:

	(+) The specific contract for the Preliminary Design of TBMs Set is anticipated to 2022 as a result of a clear visibility on the signature of scope sharing contract with the Korean Domestic Agency. (-) The estimated value of a specific contract for Helium Cooled Pebble Bed (HCPB) Ancillary Systems Preliminary Design is re-adjusted as a result of scope sharing with the Korean Domestic Agency. Annual objective changes: Annual objective EU56.01.1238780 "Task Order 03 Signed for Safety Analyses for Helium Cooled Pebble Bed Test Blanket System Preliminary Design" moved from Q2 2022 to 2023. Safety analysis for HCPB TBS will be transferred to KO-DA after signature of the partnership agreement in 2022. This objective is temporarily moved to 2023 waiting for cancellation. Annual objective EU56.01.1242745 "Contract Signed for FwC for EUROFER design limits codification in RCC-MRx" moved from Q1 2022 to Q4 2022. Delay caused by lack of resources. Annual objective EU56.01.89050 "Signature of Task Order 06 for FWC ANB Consultancy" moved from Q3 2022 to Q4 2022. Delay caused by lack of resources. Annual objective EU56.02.1240080 "Task Order 3 Signed for Handling, Cutting Storage Services for Steel Products related to the EU TBMs" moved from Q4 2022 to 2023. Duration of on-going TO2 was increased up to end of Q1 2023, therefore start of Task Order 3 is then postponed (no impact on programme schedule). Annual objective EU56.01.1226470 "HCCP Consortium agreement signed with Korea" added as new WP22 objective. Signature of scope sharing agreement with KO-DA is a strategic milestone. Annual objective EU56.01.81635 "Published Call for Tender for WCLL TBM Set Preliminary Design & Final Design" added as new WP22 objective. This is a major contract for Water Cooled Lead Lithium for preliminary design and final design. Change in targets (kIUA): NA
Action 5 - Remote Handling	Budgetary changes: - 1,931,553€ (-) Sum of several minor changes. (+) Additional budget allocation for the Task Order 3 of the Final Design for the In Vessel Viewing System (IVVS), contract shifted from end of 2021. Annual objective changes: All 4 annual objectives have been rescheduled to consider the new construction schedule and build higher confidence through risk buffer into schedule. Annual objective changed from "EU Cask and Plug Remote Handling System Final Design Review Machine Assembly 1 Items meeting completed" to "Approval of CAD Models for Cask Transport System, Equatorial Port Plug and Upper Port Plug in preparation of Final Design Review" (EU23.03.14060380)

	Annual objective changed from “Task Order Signed for (577-02-03) Manufacturing of Casks for MA-1 for CPRHS” to “Approval of Preliminary design for Cask Docking System Assembly Phase 1” (EU23.03.14063120). Annual objective changed from “Final Design of Monorail crane (Incl. other first priority items) Hold Point released” to “Contract signed for Final Design of Monorail Crane System for Neutral Beam Remote Handling System” (EU23.05.14054040). Annual objective changed from “EU In-Vessel Viewing System Final Design Review 1 meeting Completed (probe)” to “Task Order (383-01-06) Signed for Final Design Phase 2 for IVVS” (EU57.01.50420) Change in targets (kIUA): The 2022 CAS target changed from 4.29974 to 0.8 due to the above-mentioned rescheduling
Action 6 - Cryoplant & Fuel Cycle	Budgetary changes: + 1,085,279€ (-) The contract for the Manufacturing and Testing of Instrumentation and Control (I&C) Cabinets for Torus & Cryostat Front End Cryopump Distribution System (FECDS) and TCCS is postponed to 2023. (-) The contract for the Manufacturing and Delivery of Neutral Beam (NB) Cryolines, Cryojumpers and JC for Cold Valve Boxes (CVB) is postponed to 2023 because of delay in tendering process. If there is an opportunity to advance this activity in 2022, the budget need will be assessed in September. (-) Long negotiations with supplier for a claim covid 2020. (+) High probability to sign an amendment for the on-going Manufacturing and Testing of NB CVBs contract (initially was foreseen as a new tendering process in the future). Annual objective changes: Due to technical issues on the glue used for the charcoal coating, annual objective EU31.01.10261 “Delivery of First Torus & Cryostat Cryopump by EU-DA to ITER Site” replaced by EU31.01.41160 “1st installation of one all-metal double seal on an ITER style flange completed #1”. Due to delays linked to COVID in the procurement of material, annual objective EU31.01.12098 “Delivery of Torus & Cryostat Front End Cryopump distribution system and Cryojumpers 5-8 (4 no.) Batch 2 by EU-DA to IO” replaced by EU31.01.12131 “Cold Valve box 1 completed”. Due to delays arising from technical difficulties, annual objective EU31.01.30480 “Manufacturing and Testing Completed - MITICA Cryopump Assembly” replaced by EU31.01.30920 “Frame 1 of Mitica Cryopump completed”. Due to delays linked to design issues, annual objective EU31.03.26160 “Final Design Meeting of Primary & Cryostat Leak Detection System” replaced by EU31.03.40320 “Electrical & Instrumentation and control (I&C) Design – Cryostat Direct Leak Detection System (CDLDS) completed”.

	Change in targets (kIUA): PA 3.1.P1.EU.04 Neutral Beam Cryopumps: CAS postponed to 2023 due technical difficulties in execution leading to a delay. PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box: CAS postponed to 2023 due delay in execution, mainly difficulty in procurement of materials (COVID). 0.076 still probability to be achieved in 2022. PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System: CAS postponed to 2023 due to design issues in execution leading to a delay. PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems: CAS postponed to 2023. Late availability of utilities lead to a delay in execution. PA 6.4.P1.EU.01 for Design of REMS ➔ CAS postponed to 2023. Changes in requirements and late availability of input data lead to a delay in execution.
Action 7 - Antennas and Plasma Engineering	Budgetary changes: + 2,023,180€ (+) During the final months of the negotiation for the Technical Integrator contract (Q4 2021), in order to decrease the price, a number of technical risks were identified and not transferred to the framework (Annex K). Furthermore a Pre-FDR is held to identify major design issues. An amendment for each year has been included for the materialization of these technical issues. Annual objective changes: Annual objective EU52.01.422055 “ADP #2 TO 729-02: Series production of Diamond Disks for EC Windows” has been postponed to 2023 and therefore removed from the list. The delay is due to unexpected increase of durations from supplier for testing of the Diamond Disks. Some time could possibly be recovered based on actual data from first batch testing. Does not impact delivery of components. Annual objective EU52.01.460060 “Task Order Signed for Manufacturing of Isolation Valve prototypes and FDR documentation” has been postponed to Q3 2022. The delay is due to the prolonged negotiations with the single supplier for the Isolation Valves Framework contract. The negotiations have been prolonged due to discussions on contractual requirements, QA and Nuclear Safety documentation and propagation to suppliers, and technical issues. Annual objective EU52.05.211470 “Contract Signed for FDR preparation for EC Plant Control System (Stage 3)” has been postponed to Q1 2025. The contract has been postponed due to the delay in the integrated commissioning of the gyrotrons. Annual objective EU52.01.1002340 “Delivery & ADP Approval for GCC RF Load” has been removed. The procurement of a dummy load for the Gyrotron Commissioning Components was cancelled by ITER-IO and the ITA C52TD57FE amended accordingly. Change in targets (kIUA): CAS milestones and kIUA distribution have been updated as per the PA Amendment signed in Q4 2021. Current targets are in line with the planned targets for 2022 included in the PA Amendment.

Action 8 - Neutral Beam Heating & Current Drive	Budgetary changes: -26,375,101€ (-) The signature of contract for the Neutral Beam Injector (NBI) 1 & 2 Vessel is postponed to the first quarter 2023 due to delay in the definition of the procurement strategy. (-) The signature of the Contract for the Neutral Beam tooling NBI 1 & 2 Phase II is postponed to 2023 due to delay in the definition of the scope and the assembly strategy. Annual objective changes: Annual objective EU52.02.12660 for "Signature of F4E-OMF-1108 for European Gyrotrons" moved to Q2 2022 since the award procedure was impacted by the international crisis (Ukraine/Russia situation). Annual objective EU53.04.111000 "Contract Signed for Neutral Beam Injectors-1&2 Vessels" is shifted to 2023. The delay on signature date is due to: - IO PA change notice for PA applicable documents delayed the starting of procedure - Procurement procedure Step1 longer than foreseen Annual objective EU53.06.08510 "Start of Manufacture of EU-High Voltage Deck 1 & EU-Bushing of Injectors Heating Neutral Beam 1 & 2 (first items)/Manufacturing Readiness Review Closure" moved to Q4 2022 since it is affected by the rescheduling of ITER power supplies units (impacting EU & JADA) and affected by the schedule adjustment linked to availability of buildings. Annual objective EU53.06.447392 "Start of Manufacturing of Acceleration Grid Power Supplies-Converter System of Injector Heating Neutral Beam -1 for Inverters" is moved to Q4 2022 since it is affected by the rescheduling of ITER power supplies units (impacting EU & JADA) and affected by the schedule adjustment linked to availability of buildings. Change in targets (kIUA): The yearly CAS value reduction of PA 5.2.P4.EU.01 is due to the delay on availability of building 15. The yearly & cumulative CAS value increase of PA 5.3.P6.EU Neutral Beam Power due to rescheduling of ITER power supplies units (impacting EU & JADA) and affected by the schedule adjustment linked to availability of buildings. The yearly CAS value increase of PA 5.3.P9.EU.01 Neutral Beam Test Facility Components is due to the Beam Line Component Manufacturing Schedule update and delays in Neutral Beam Team Facility (PADOVA site) activities and strategy changes.
Action 9 - Diagnostics	Budgetary changes: + 2,008,345€ (-) The Grant for the Completion of the Wide Angle Viewing System (WAVS) Design in EP#3, 9 and 17 is moved to 2023 due to on-going revision of the schedule for Equatorial (EQ)#3 and EQ#9 in view of expected changes to the Second Plasma RAD dates. (+) New forecast for External Support Services has been performed according to the expected workload in 2023 and 2024.

	Annual objective changes: Annual objective EU55.01.0001180 “ADP Approval for CON Procurement and Delivery for Bespoke Instrumentation Hardware” is moved to 2023. The delay is due to the electronics’ supply chain worldwide situation. Annual Objective EU55.06.68040 “Kick-off Meeting for Feedthroughs for Tokamak Services” moved from Q3 2022 to Q4 2022. The resource constraints delayed the preparation of the technical documentation which postponed the launch of the framework contract. Change in targets (kIUA): PA 5.5.P1.EU.02-16-17-19 Diagnostics – Magnetics: Correction of a logic error in the schedule related to sequencing of the Site Acceptance Tests. PA 5.5.P1.EU.03 Diagnostics – Bolometers: Preliminary Design Review moved from 2021 to 2022 have pushed the subsequent Final Design Review to 2023. PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges: Final Design closure moved to 2023 due to technical issues encountered in final prototype testing. PA 5.5.P1.EU.18 Diagnostics - Tokamak Services: Quality assurance issues in documentation delayed dispatch of delivery to IO. PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer: Resource constraints in preparation of technical documentation delayed the launch of the call for completion of design activities. PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems: Alignment of the CAS milestone for upper port 10 with corresponding milestones of the remaining 5 ports.
Action 11 - Buildings and Civil Infrastructures	Budgetary changes: + 9,201,196€ (+) Architect Engineering: Impacted risks, contingency increase, and transfer from TB04 in the context of Manhattan project. (-) Support to the Owner II: Contract awarded for a lower price than expected together with option for Engineering support services redistributed from 2022 to 2030 and transfer from TB04 in the context of Manhattan project. (+) TB04: Additional budget for the Amendment 9 and Contract realignment. (-) TB09: The Hot Cell Complex Engineering support is moved to 2023. (+) TB11: Task Order 10 re-estimated including B61 annex and Lift lobby Doors reviewed and inclusion of instructions originally intended in Task Order 7. (-) TB11: Partial scope of the Task Order 11 is moved to TB21. (+) TB12: Risk impacted to cover additional quantities and tasks in Non-Nuclear Building. (+) TB16: Risk impacted to cover last negotiations and finalization of the contract.

	(-) TB19: Option 1 Tritium above L2 exercised in 2021 and Core Team and Site Management committed in 2021. (+) TB20: Contract value re-estimated in November 2021. (-) TB21: Partial scope of Task order 1 moved to Task Order 2 in 2023. (-) TB21: Task Order 3 moved to 2023. (+) New task order for Design of the tokamak Complex first phase. (-) Adjusted amount for the commitments expected to be regularised in 2022 for the Reserve Fund. (+) Additional allocation to cover indexation in 2022. <u>Annual objective changes:</u> Annual objective EU62.05.26311 “Notice to Commence construction of MV Distribution Bldg LC/1A (46)” has been removed as WP 2022 objective as it was achieved in May 2021. EU62.05.26611 “Notice to Commence construction of MV Distribution Bldg LC/2B (47)” has been removed as WP 2022 objective as it was achieved in May 2021. Annual objective EU62.05.272720 “Construction of Cryoline Bridge (between B52 & B11) Completed” has been postponed from Q2 2022 to Q3 2022. Delay due to design issues + tower crane dismantling on site + late start due to COVID-19. Annual objective EU62.05.570 “Control Building (71 non PIC part) RFE (RFE #14)” has been postponed from Q2 2022 to Q3 2022. Delay due to design issues + contractor procurement delay and installation (steel structure) + late start due to COVID-19. Annual objective EU62.604260 “Construction of 2 Bus-Bar Bridges (between B32 &74 and B33 &74) Completed” has been removed as WP 2022 objective as it has been postponed 2023. Delay due to TB12/TB13 interfaces (coordination on site) + design issues + contractor procurement delay. <u>Change in targets (kIUA):</u> Changes in all projects distribution except: “Aux Buildings TB09/TB10”, “Common contractual activities” and “ Headquarters Building” ➔ New MINI CAS milestones distribution and COVID 19 impact on construction site
Action 12 - Cash Contributions	<u>Budgetary Changes:</u> + 28,774,727€ (+) The forecast of the Cash Contribution to IO has been increased based on estimates of the IO draft budget 2023 approved by 29th ITER Council on 17 - 18 November 2021. <u>Annual objective changes:</u> Annual objective “Commitment for PA 5.3.P6.JA.02 – 2022” is removed since the commitment was made in 2021.

Action 13 - Technical Supporting Activities	Budgetary Changes: + 5,763,595€ (+) Addition allocation for the transportation of Highly Exceptional Loads (HEL) NON-EU ITER components such as the Korean VV Sector and the Japanese TFC. Annual objective changes: Procurement procedure number added and correction of FwC duration in the scope description for Annual Objective EU.PM.3051650 that now reads "Published Call for Tender of FWC F4E-OMF-1321 for Quality Control - Inspectors for ITER Project (2023-2027)". Scope description changed for Annual Objective EU.PM.3076660 that now reads as follows "Specific contract #01 signed under FwC OMF-1127-01 for System Engineering Supports at F4E Barcelona". The description now correctly covers all System Engineering services. Annual Objective EU.PM.3105110 changed to "Specific contract #14 signed under FwC OMF-1159-LOT1-01 for Support in the area of Technical Integration to the OCE". Instead of a Direct Contract as initially foreseen, a specific contract under OMF-1159-LOT1 General Engineering Services will be launched to cover the same scope of Technical Integration. Annual Objective EU.PM.3076190 "Contract Signed of FWC F4E-OMF-1220 for PPM Support (2022-2026)" moved from Q2 to Q3 2022. During the preparation of the new framework contract, the ceiling requirements were established and exceeded the 10MEur threshold. With this, the internal processes are more complex and the overall time from Call for Tender preparation to contract signature became longer than initially foreseen. The new date should not impact the implementation of support services to the Project Teams. Milestone name also updated to reflect the procedure number. EU.PM.3092200 "Specific contract #08 signed under F4E-OMF-0895 Lot 2 for Risk Management Senior Support (cont. F4E-OMF-0895-LOT2-01-05)". The milestone name was corrected to reflect the current task order number (TO 08 instead of TO 07).
Action 14 - Broader Approach	Budgetary changes: -9,607,549€ (-) The signature of the Electron Cyclotron Resonance Heating (ECRH) Waveguides contract is postponed to 2023 as the technical discussions with QST have taken longer than expected. (+) Increase of the budget allocation for the contract High Heat Flux (HHF) element stage 1 which was previously allocated to 2021 for budgetary reason. The contract was finally not implemented 2021 and the budget is needed in 2022. Annual objective changes: Annual objective EU.BA.01.28220 "Delivery of Polychromators for JT-60SA Thomson Scattering" moved to 2023 because of delayed availability of electronic components due to market situation the objective is moved to the 2023.

	Annual objective EU.BA.01.25080 “Contract placement for the integration of cassette bodies, the High Heat Flux and Normal Heat Flux elements of the JT-60SA actively cooled Divertor” moved to 2023 since it was not possible to place the contract due to lack of human resource. Annual objective EU.BA.01.28260 “Delivery of 10 divertor cryopumps units” removed due to delays in the contract execution also associated to COVID-19. The final delivery milestone moved to beginning of 2023. Annual objective EU.BA.01.27580 “Refurbished PSYS and new parts with documentation” moved from Q2 to Q4 2022. The hardware had to be sent back to Europe for investigation, and it has taken longer than expected, as the well as the investigation itself. Annual objective EU.BA.01.27600 “Completion of the SRF Linac assembly in the Joint Research Building” moved to 2023 mainly due to the entry ban to Japan – European experts and contractors could not enter Japan, so the assembly start had to be shifted. <u>Change in targets (kBAUA):</u> The full table is revised. The delays have arisen due to not available raw materials, electronic components, COVID-19 and the entry ban to Japan. In addition, several PAs have just been signed recently resulting in the clear distribution of milestones and their expected dates.

1. DEFINITIONS, ASSUMPTIONS AND SUPPORTING INFORMATION TO WP2022

The 2022 Work Programme as amended by amendment 1 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 2022, detailed objectives, expected results and target for each WP Action.

Main assumptions

The following assumptions are considered as the basis of the Work Programme 2022 as amended by amendment 1:

- The F4E schedule used for the preparation of this document is the one submitted to IO at the end of April 2022.
- 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 approved by the Council on 22/02/2021 plus ITER Host State and Membership contributions. The budget summary table of Work

Programme 2022 (WP_table 1) reflects the current status of the draft budget for the 2022 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.
- Procurements which require a very close coordination between F4E and other entities will be implemented, whenever appropriate, through the Joint Procurement procedure.
- All the activities described in the overview of each Action and the list of contracts in WP_Table 3 is intended as credited by PA or ITA. If an Action is not credited, then it is explicitly mentioned in the overview. This is not applicable for the Action “Broader Approach” (i.e. not credited).
- F4E endorsement of the Japanese Procurement Arrangement that foresees an EU financial contribution will be preceded by a budgetary commitment for the entire amount of the F4E contribution.
- Changes originated by IO, or other DA’s, will be fully compensated by the IO Reserve Fund.
- 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.

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 WP2022 as amended by Amendment 1 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 2022 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 2022. Furthermore, it includes (even if not explicitly mentioned):

i. Provisions for urgent general support tasks as cost/risk analysis, engineering support/analysis, I&C develop and support, experts, quality assurance and quality control, nuclear safety, CE marking analysis, transportation, storage, material characterization and qualification activities, resolution of non-conformities (in line with the mechanism agreed at ITER level), metrology and external legal support,

cost of legal proceedings and alternative dispute settlement, including arbitration, as needed[2]. These tasks will be mainly implemented through specific contracts under existing framework contracts.

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

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

iv. Provisions for BREXIT-related contractual modifications.

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

vi. Provisions for new contracts and contractual modifications related to expiry of Switzerland co-operation agreement

vii. Provisions for specific cash compensations to IO required in case of transfer of activities from F4E to IO approved by the ITER Management Advisory Committee.

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

i. ITER Council/Governing Board (IC/GB) milestones in 2022;

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 2022 and the cumulative CAS foreseen to be achieved by the end of 2022 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 2022. 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 Euros[3]. Amendments, claims, reimbursement, indexation, late interest and budget reserve are grouped together due to the sensitivity of this information. The list is based on the current information at the time of writing the Work Programme. During the implementation of the Work Programme activities, F4E may identify the need for new calls, group more activities in a single call or split one activity in more calls. This will in any case be performed preserving the scope and objective presented in WP2022. Contracts that do not fulfill the Work Programme scope identified for each Action are not covered by this financial decision and

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

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

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 2022 within the limit of the flexibility rule and if any related changes to the scope of the annual Work Programme do not have significant impact on the nature of the Actions or on the achievement of objectives of the multiannual Project Plan.

ii. Value per Action: WP_Table 2 presents an indicative value of financial resources corresponding to each Action. F4E has evaluated the level of commitments planned for the Actions in 2022 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 7 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 WP2022 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 terms of the financing decision does not change significantly from one year to the next.

2. OBJECTIVES AND KEY PERFORMANCE INDICATORS

Work Programme objectives

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

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

Annual objectives

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

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

Key Performance Indicators

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

Work Programme objectives

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

Credit Allocation Scheme (CAS)

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

Annual budget

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

3. LIST OF WP2022 ACTIONS

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

Action 1. Magnets

Action 1	Magnets

TF & PF Conductors

Progress of Work

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

Procurement Activities

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

Pre-Compression Rings

Progress of Work

All work for Pre-Compression Rings is completed.

Procurement Activities

No procurement activities are expected.

Toroidal Field Coils

Progress of Work

In 2022, the last TF Coils will be delivered to IO. These delivery dates are highly dependent on the impacts generated by COVID-19 and on the quality of the TF Coil Cases delivered by Japan.

Procurement Activities

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

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

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

Poloidal Field Coils

Progress of Work

The ground insulation, impregnation and final assembly (before cold test) for the fourth PF Coil (PF #4) will be completed. In parallel, the production of the last PF Coil (PF #3) Double

Pancakes will be in full swing. The evolution of these activities is highly dependent on the impacts generated by COVID-19.

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

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU11.1A.11800	IPL > Delivery of TF17 (EU 07) by EU-DA to ITER Site (GB 23)	Q2 2022	GB23	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.1A.28125	HPC- Approval by IO TFWP Acceptance Report (HP 8.4.6) / TFWP14	Q2 2022	Predecessor of GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets
EU11.3B.41980	Placing DP7 for PF3 Stacking/Connections/Ground Insulation/Impregnation	Q2 2022	WP22 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6
EU11.3B.571090	PF4 WP VPI Completed	Q3 2022	WP22 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. Delivery of the 8th TF Coil to IO.
2. Delivery to IO of 3 TF Coils.
3. Final assembly (before cold test) of PF4 completed.
4. Completion of PF3 DP3 Double Pancake (6th DP of PF3).

TARGET

The target of 2022 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	10.66200	86.18600
PA 1.1.P2A.EU.01 Pre Compression Rings	0.00000	0.60000

PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	5.25000	33.22000
PA 1.1.P6A.EU.01 Toroidal Field Conductors	0.00000	43.39000
PA 1.1.P6C.EU.01 Poloidal Field Conductors	0.00000	11.22881

Sub-action 2. Vacuum Vessel

Sub-action 2	**Vacuum Vessel**

Progress of Work

By the end of 2023 the manufacturing of all 5 Vacuum Vessel sectors is scheduled to be completed.

At the time of writing, Sector 5 has entered into the final stage of manufacturing ("Sector Assembly"). Due to the technical complexities and the First Of A Kind (FOAK) manufacturing activities, there is a considerable risk on potential schedule slippages until actual completion of the first sector (Sector 5) and its consequent propagation to the remaining 4 sectors.

In addition, the Covid-19 pandemic can continue affecting the fabrication schedule.

To transport the sectors, the manufacturing of the Transportation Frame Covers will be completed and the Transportation Frame and Lifting Frames will be delivered to the manufacturing sites.

Procurement Activities

Provisions will be made for the transportation of the sectors to the ITER site, resolution of non-conformities (if required), possible incentive schemes for 24/7 operations, inspectors and additional ANB support and the possibility to add specialized resources to the project. Contractual options for the Main VV contract may be released, as needed.

In case the risk of not reaching the contractual tolerances materializes, F4E may be requested to contribute to the resolution of the non-conformity by IO.

Specific Contracts for support activities, like follow-up Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc… will continue to be issued depending on the project needs.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU15.1A.08500	IPL > Delivery of Sector 5 by EU-DA to ITER Site	Q4 2022	GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3081300	START OF FAT - Sector 5	Q3 2022	Predecessor of GB16	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel

EU15.1A.3091120	S9 Machining of PS2 completed	Q3 2022	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel
EU15.1A.3091160	S9 Machining of PS1 completed	Q4 2022	Predecessor of GB25	PA 1.5.P1A.EU.01 Vacuum Vessel - Main Vessel

EXPECTED RESULTS

The main expected results for this action are:

1. Full completion of the D-shape assembly of Sector 4
2. Segments 1, 2 and 3 of Sector 9 completely finished (including final machining)
3. Final machining of all segments of Sector 3 started
4. Outer shell welding of all segments of Sector 2 completed

TARGET

The target of 2022 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	13.62094	75.37094

Sub-action 3. In Vessel – Blanket

Sub-action 3	In Vessel - Blanket

Blanket First Wall project

Progress of Work

In 2022, both contractors of the Blanket First Wall Series (OMF-900) will continue the manufacturing activities of the first wall panels for qualification, and a first re-opening of competition is foreseen. The procurement of main raw materials (Beryllium and CuCrZr) will continue to be implemented through task orders. These materials are being provided as free issue items to the Suppliers in charge of FW Panels manufacturing. In support of the main procedure OMF-900, material characterisation activities will be carried out through task orders and options of the OMF-1082. Since the OMF-900 is a cost-plus fee type of contract, audits will be performed under the OFC-1094.

In parallel, a series of tests will be performed on the Full-Scale Prototypes and Alternative Design Mock-Ups (ADMUs) manufactured under contracts OPE-443 such as High Heat Flux (HHF) testing under the contracts OPE-319 and OMF-1033. The manufacturers of full scale prototypes (OPE-443) will perform additional activities through planned options to the mock-ups (e.g. UT after HHF, FAT, dimensional check, etc.).

In 2022, the manufacturing of standard parts will also start, after the eventual successful completion of the tendering phase of this procedure.

Procurement Activities

In 2022, the main procurement activities foreseen as part of the FW series manufacturing are the signature of task orders for the procurement of CuCrZr materials. For the procurement of Beryllium materials, deviations to change the thickness of deliveries are planned as well as a provision for disposal of Beryllium mock-ups. Deviation notices for connection pipes and the manufacturing of mock-ups for ULBA Be qualification are planned. In addition, two commitments are planned for the implementation of contingencies for the FW series (two lots), besides an amendment for provision of two different sub-

suppliers for SAHT of First Wall Panels. Options will be released for additional spares (including corresponding procurement of raw materials) for blanket first wall panels. Task Orders and related options are planned to be signed to procure Helium Leak Testing services and High Heat Flux Testing services for First Wall components. A new task order for material characterization and related options in support to the OMF-900 will be signed. In addition, specific task orders for audit services of the cost-plus fee type of contract OMF-900 are planned. Options to perform inspection and testing activities to the ADMU may be executed and purchase order for ADMU shipment is planned. In addition, resources needed to support the follow-up of the FW panels production will be insourced through specific task orders. The procurement of standard parts for the FW series production will be signed. Finally, specific task orders for additional analysis and FSP metrology are also foreseen.

Blanket Cooling Manifolds project

Progress of Work

In 2022, the main activities will be the start of the qualification phase and of the manufacturing of the first pipe bundles of three 10-degree sectors (Task 1 of OMF-1080). Additionally, Task 7 –procurement of connector helicoflex seal & circlip kits and V-band flanges (COTS)- and Task 8 –procurement of 316L material (piping)- will be launched shortly after.

Procurement Activities

In 2022, the main procurement activity is the completion of the negotiation with tenderers leading to the award of multiple framework contracts covering all eight tasks of the Blanket Cooling Manifolds series production. In 2022, several lots for Task 1 (several suppliers in parallel), a specific contract for Task 7 and a specific contract for Task 8 will be signed. Task orders and options are planned for additional testing of support designs and stress analysis of supports. Furthermore, additional resources will be needed and will be insourced through task orders.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU15.2A.12100	Task Order Signed for Task 1 - Qualif. and Manuf. of 1st Pipe Bundles	Q4 2022	WP22 objective	PA 1.6.P6.EU.01 Blanket Manifolds
EU.16.01.100330	MS2.A.2 Final Acceptance of the Production Line	Q4 2022	Predecessor of GB37	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.207500	Task Order Signed for Procurement of CuCrZr (Series) (TO#02) - LOT 1	Q3 2022	WP22 objective	PA 1.6.P1A.EU.01 Blanket First Wall
EU.16.01.208600	Contract Signed for Procurement of Standard Parts	Q4 2022	WP22 objective	PA 1.6.P1A.EU.01 Blanket First Wall

EXPECTED RESULTS

The main expected results for this action are:

1. Start of manufacturing activities of the 30 Deg Sector Pipe Bundles under Blanket Cooling Manifold PA.
2. Final acceptance of the production line (Task 1 of the FW Series)
3. Signature of Task order for the procurement of CuCrZr (Series)
4. Signature of Contract for the procurement of standard parts.

TARGET

The target of 2022 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 1.6.P1A.EU.01 Blanket First Wall	0.00000	0.10000
PA 1.6.P6.EU.01 Blanket Manifolds	0.20000	0.40000

Sub-action 4. In Vessel – Divertor

Sub-action 4	In Vessel – Divertor

Cassette Body project

Progress of Work

In 2022 both contractors of the Divertor Cassette Body Series will continue the manufacturing activities and the first Cassette Bodies will be ready to be delivered to ITER IO. After the re-opening of competition for the remaining Cassette Bodies, the contractor(s) will start in parallel to procure the needed materials for this part of the scope. The focus will also be given to the continuation of the manufacturing activities of the contract OPE-1036 related to the fabrication of the transition pieces and remote handling flanges. Concerning the contract OPE-1112 of Ancillary Items of Pins Sleeves and Links of the CB Series, the procurement of material and the engineering phase will start.

Procurement Activities

In 2022 the main activity foreseen will be the signature of the contract OPE-1112 of Ancillary Items of Pins Sleeves and Links of the CB Series.Commitments for indexation of CB Series Stage 1 (OMF-444) and transition pieces and remote handling flanges (OPE-1036) are planned. A task order will be signed for the support for the T-Probe on top of robotic arm system and a purchase order is planned for training sessions for the machine checking gauge. Furthermore, additional resources (inspectors for non-destructive testing, welding, metrology, etc.) will be needed and will be insourced through task orders.

Inner Vertical Target project

Progress of Work

In 2022, the additional scope of the contract OPE-138 concerning the fabrication of additional PFUs with new W grade and qualified electron beam welded tube to tube transition is expected to be completed. After delivery of the IVT Prototype to IO in 2021, the high heat flux (HHF) testing and the subsequent characterization will be performed. On OMF-567 Lots 1 and 2, the preliminary integration of prototypes and test assemblies will be performed and followed by the HHF testing and the Prototypes' final integration and acceptance tests. After the completion of the Full Scale Prototype of OMF-567-03 and the related final acceptance tests, this prototype will also be shipped to IO for assembly trials.

In 2022, the tendering activities for the Inner Vertical Target series production will continue until the signature of several framework contracts.

Procurement Activities

In 2022 the main activities foreseen will be to complete the negotiated procedure and sign several framework contracts for the Inner Vertical Target series production.

In order to cover the needs for the Plasma Facing Units HHF testing beyond the agreement with IO to endorse some of these tests, a task order will be signed.

Commitments for transportation of the Test Assembly for High Heat Flux Testing, transportation of WEST elements to CEA and transportation of the prototype to IO Integration Site are planned.

Additional resources and inspectors will be needed to closely follow up the fabrication of the Prototypes and to prepare the IVT series contract. These needs are planned to be insourced through task orders.

Divertor Rails project

Progress of Work

In 2022 the preparation of the documentation for the signature of the PA for Divertor Rails will be carried out.

Procurement Activities

N/A

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.1151850	Contract Signed for Ancillary Items of Pins Sleeves and Links of the CB Series	Q4 2022	WP22 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.01.1192180	MRR for CBST Stage II Approved (MSII_CBST_S13)	Q4 2022	WP22 objective	PA 1.7.P1.EU.01 Cassette Body
EU17.2B.140500	Contract Signed for IVT Pre-Series and Series (Lot-1)	Q4 2022	Predecessor of GB45	PA 1.7.P2B.EU.01 Inner Vertical Target
EU17.2B.86650	HP - Send to IO the report of the Final dimensional check of the Prototype - OPE-567-03-01	Q1 2022	WP22 objective	PA 1.7.P2B.EU.01 Inner Vertical Target

EXPECTED RESULTS

The main expected results for this action are:

1. Signature of contract for ancillary items of pins, sleeves and links of the CB Series
2. Approval of MRR for Stage II Standard Cassette Body
3. Signature of Framework Contract for Inner Vertical Target (IVT) Production Line and Pre-Series
4. Completion of the second Inner Vertical Target full-scale prototype (OMF-567 Lot 3)

TARGET

The target of 2022 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value

PA 1.7.P1.EU.01 Cassette Body	0.00000	0.56000
PA 1.7.P2B.EU.01 Inner Vertical Target	0.02500	3.14000

Action 5. Remote Handling

Action 5	Remote Handling

Divertor Remote Handling System (DRHS)

Progress of Work

The focus will be given to the Final Design activities via two main development lines that will run in parallel: one for the Cassette Multifunctional Mover (CMM) and the other one for the Cassette Toroidal Mover (CTM). Final design activities will be accompanied with prototyping and laboratory test in some areas.

Procurement Activities

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

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. Focus will be given to the final design development and preparation for the manufacturing of 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 be continuing on the preliminary design development.

Procurement Activities

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

Neutral Beam Remote Handling System (NBRHS)

Progress of Work

Activities are organized by subsystems and prioritized by their delivery needs for the different assembly stages. Main focus is given to the Monorail crane system that is first plasma item. Final design development and preparation for manufacturing 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 final design and manufacturing.

In-vessel viewing system (IVVS)

Progress of Work

Main focus will be given to the final design development to move towards the design review and preparation for the manufacturing. Final design activities will be prepared/accompanied by 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 and cameras. Activities will be implemented (design and tests) aiming at manufacturing of first components (e.g. rad hard cameras and electronics) to be integrated in the RH systems.

Procurement Activities

Specific contracts will be launched through Remote Handling (RH) 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
EU23.03.14060380	Approval of CAD Models for CTS, EPP and UPP (DDL-207)	Q4 2022	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.03.14063120	M2 - Approval of PD design for CDS MA-1	Q4 2022	Predecessor of GB32	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System
EU23.05.14054040	CON 2021 signed for Final Design of MCS for NBRHS	Q4 2022	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System
EU57.01.50420	TO (383-01-06) Signed for Final Design Phase 2 for IVVS	Q4 2022	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System

EXPECTED RESULTS
The main expected results for this action are: 1. Continuation of final design of DRHS CTM and CMM. 2. Continuation of final design of first assembly casks of CPRHS. 3. Preparation of the final design direct contract of first-plasma NBRHS. 4. Continuation of final design of IVVS.

TARGET		
The target of 2022 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	0.20000	1.60000
PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	0.00000	0.80000
PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	0.32000	0.62000
PA 5.7.P1.EU.01 In-Vessel Viewing System	0.28000	2.48000

Action 6. Cryoplant and Fuel Cycle

Action 6	Cryoplant and Fuel Cycle

Progress of Work

Fuel cycle

In the frame of the PA for leak detection and localization system, contracts for the procurement of the Leak Detection and localization systems will focus on qualification, design activities and launching the procurement of long lead items. Task Orders for instrumentation and control systems is planned.

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

In the frame of the PA for REMS (Radiological and Environmental Monitoring Systems), the contract for design and manufacturing of 1st plasma equipment will continue on qualification and design activities. Task Orders under on-going Framework contracts may be launched.

The level of manufacturing activities in the field of vacuum pumping will remain high:

• For the Torus and Cryostat Cryopumping System, the production of the eight cryopumps will continue.

• For MITICA and Neutral beam Cryopumps, the manufacturing of the MITICA Cryopump will continue. The task order for the MITICA Cryopump assembly tooling and installation of the Mitica Cryopump will be covered under Action 8.

• For Front End Cryopump Distribution System, the Cryojumpers will be manufactured and delivered, the manufacturing of the eight Cold Valve Boxes will be continue, a Task order for first

of a kind cabinets will continue and contract for series manufacturing of these cabinets will be prepared. Contract signature of Neutral Beam cold valve boxes is planned.

The scope of Cabling for Torus and Cryostat cryopumping system and for Front end Cryopumps distribution system, is planned to be cash transferred to IO by end 2022 (risk of delay to early 2023).

Specific Contracts for support activities like Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc, will continue to be issued depending on the project needs

Procurement Activities

- Contract signature for Cryolines, cryojumpers and Johnston coupling[5]
- Contract signature of Neutral Beam cold valve boxes (via an amendment to an existing contract or a new specific contract)[6]
- Instrumentation and control for Leak Detection systems.
- Cash transfer to IO of cabling activities for Front end cryodistribution system and Torus and cryostat distribution system.[7]
- Amendment to an existing contract may be signed
- Task order to an existing Framework contracts may be signed.
- Specific Contracts for support activities like Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc, will continue to be issued depending on the project needs

Cryoplant

Progress of Work

The commissioning of the LN2 Plant and Auxiliary Systems located in the Cryoplant building at Cadarache will be pursued. Each component of the Cryoplant will be started up according to a pre-defined sequence and testing campaigns will be carried out in order to check the performance and compliance with the operational requirements of all the equipment (compressors, cold boxes, helium and nitrogen tanks, quench tanks, dryers, heaters, quench line header, ancilliary systems) successively.

Procurement Activities

- Amendments for existing contracts may be signed.
- Specific Contracts for support activities like Inspectors, Documentation Support, Engineering and Analysis, Project Management support etc. will continue to be issued depending on the project needs.
- Task order to an existing Framework contracts may be signed.

[5] At the time of writing the Work Programme, there is a possibility that this commitments is anticipated from 2023 to 2022. The budget is nevertheless allocated to 2023

[6] At the time of writing the Work Programme, there is a possibility that this commitment is postponed from 2022 to 2023. The budget is nevertheless allocated to 2022.

[7] At the time of writing the Work Programme, there is a possibility that this commitment is postponed from 2022 to 2023. The budget is nevertheless allocated to 2022.

WORK PROGRAMME OBJECTIVES				
Milestone ID	**Scope Description**	**Forecast achievement date**	**Type of milestone**	**PA**
EU31.01.12131	Cold Valve Box 1 completed	Q3 2022	Predecessor of GB28	PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box
EU31.01.30920	Frame 1 of Mitica Cryopump completed	Q3 2022	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps
EU31.01.41160	M12.1. 1st installation of one all-metal double seal on an ITER style flange completed #1	Q3 2022	Predecessor of GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps
EU31.03.40280	Mechanical design of Cryostat Remote Leak Detection System completed	Q1 2022	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System
EU31.03.40320	Electrical and Instrumentation and control (I&C) Design of Cryostat direct Leak Detection system (CDLDS)	Q2 2022	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System

EXPECTED RESULTS

The main expected results for this action are:

1. Torus and cryostat cryupumps: Pre-assembly cryopanels 1 and 2 started
2. Front end cryodistribution system: Manufacturing of Cold Valve Boxes 1 to 4 completed
3. Mitica and neutral beam cryopumps: Assembly and testing cryopump 1 for MITICA started
4. Leak detection and localization system: Mechanical design of Cryostat Direct Leak Detection system completed.
5. Radiological environmental systems: Process design completed
6. LN2 and auxiliary systems: Test LN2 plant started

TARGET

The target of 2022 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	0.00000	1.00000
PA 3.1.P1.EU.04 Neutral Beam Cryopumps	0.00000	0.54000
PA 3.1.P1.EU.01 Warm Regeneration Lines	0.00000	0.20000
PA 3.1.P1.EU.02 Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box	0.00000	0.35203
PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	0.00000	0.70000
PA 3.1.P3.EU.01 Primary and Cryostat Leak Localisation System (phase II - 1st Amendment)	0.15000	0.15000
PA 3.2.P5.EU.01 Water Detritiation System – Tanks	0.00000	3.25200

PA 3.4.P1.EU.01 Liquid Nitrogen Plant and Auxiliary Systems	1.04750	25.32360
PA 6.4.P1.EU.01 for Design of REMS	0.00000	0.06000

Action 7. Antenna & Plasma Engineering and Operations

Action 7	Antennas & Plasma Engineering and Operations

ANTENNAS

Ion Cyclotron Antenna

No activities of design are foreseen in 2022.

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.

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

Progress of work

In 2022 PA activities will continue based on the single functional specifications PA Annex B2 which has been signed in Q4-2021, as well as on the Built to Print specifications PA Annex B1 signed in 2019.

The main action for Annex B2 is the signature of the Technical Integrator framework contract and task order 1 and corresponding works. Both the Framework contract and the Task Order 1 have been signed in March 2022. An Intermediate Design Review (Pre-FDR) is planned early in 2022 to review latest designs and their validation, and collect feedback from a panel of experts, with the aim to provide a complete package of information to the Technical Integrator early on in the contract (expediting knowledge transfer and ramp-up of design activities, anticipating issues and improving supplier focus). The kick-off meeting for the Pre-FDR meeting has been organized in April 2022 and the Pre-FDR Meeting is planned for June 2022.

The Technical Integrator will work on the resolution of Upper Launcher functional, manufacture and assembly issues and industrialization of the design of the remaining components in-vessel and ex-vessel, towards Final Design Review in 2023, and covering e.g. system engineering and integration, design, validation by engineering, analyses and prototyping, qualification, requirements management.

Additional Task Orders for the Integrator Framework contract will be signed, covering the remainder of the scope series production, assembly and testing.

The Framework Contract and Task Order 1 for the Isolation Valves framework contract will also be signed, covering manufacturing of the isolation valve prototypes and design and validation progress of isolation valve towards FDR in 2023.

The Diamond disks testing specific contract has been signed for the tests to be performed mid-2022. The diamond disks brazing qualification specific contract will also be signed in Q2-2022.

The main challenges will be timely placement of the contracts and monitoring and control of the execution of the works under the contracts to ensure timely progress of the technical activities consisting mainly of design, validation and qualification via engineering, prototyping and analysis of the Upper Launcher and Ex-Vessel Waveguides towards FDR in 2023.

Procurement activities

The two main Task Orders are the Task Order 1 for the Integrator Framework Contract[8] and the Task Order 1 for the Isolation Valves Framework contract as mentioned above.

The first task order of the Technical Integrator framework contract includes 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.

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

And other contracts are foreseen in support of these main activities (e.g. engineering, design, analyses, resources, inspectors, prototyping), most of them specific contracts under existing frameworks.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.2001282	Completion of Initial Optical Design Refinement	Q4 2022	WP22 objective	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.2001312	Completion of UL Plug Architecture & I/F Definition	Q3 2022	WP22 objective	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher
EU52.01.460060	Task Order Signed for Manufacturing of Isolation Valve prototypes and FDR documentation	Q3 2022	WP22 objective	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher

EXPECTED RESULTS

The main expected results for this action are:

[8] At the time of writing the Work Programme Amendment 1, the Task Order has been signed in Q1 2022 with a budget allocated to year 2021.

1. Completion of UL Plug architecture and interface definition
2. Completion of the initial optical refinement for the Upper Launcher
3. Signature of Task Order for Manufacturing of Isolation Valve prototypes and FDR documentation
4. Manufacturing completed for the first 40 Diamond Disks

TARGET

The target of 2022 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[9]	0.39488	0.51898

PLASMA ENGINEERING & OPERATIONS

ITER Operations

In 2022, the activities under ITER Operations will focus on setting up and implement 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.
As for 2021, Plasma Engineering Studies and Engineering Support for PE and Antennas will mainly be not credited through PAs.

In 2022, Plasma engineering activities will focus on scenario preparation for first plasma and specific simulations and code development as needed. Transversal support to F4E procurement remains in the Plasma Engineering scope and will be implemented via engineering contracts as required.

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) took place in 2021. In 2022 the activity will focus on the integration of the system with the ITER CODAC environment and with the available local units.

Procurement Activities

The main activities for 2022 will regard the support to IO for the integration of the ECPC Stage 2 with the CODAC environment and the available local controllers.

[9] The CAS will linearly increase as of May-2022 once the PCR-1296 is approved for the additional design scope under the EC UL & EW PA.

FALCON

Progress of Work

The FALCON facility will support the F4E projects in 2022 by testing components and prototypes as needed. This will include support to the F4E gyrotrons project and preparation for the testing of the pre-series gyrotron procured by DTT in the frame of the DTT-F4E common procurement and support to BA procurement for JT60-SA.

Contracts are also foreseen for procurement of instrumentation and EC components for the ITER GCC.

Procurement Activities
Maintenance of the facility is foreseen with adaptations to the control system aimed at supporting operation of prototypes linked to the F4E gyrotrons procurement for ITER.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	ITA/PA
EU52.01.171055	Contract Signed for Procurement of GCC Waveguides for ITER	Q3 2022	WP22 objective	ITA (C52TD57FE) Procurement of Instrumentation and spare parts for EC Installation & Commissioning
EU52.01.3012220	Contract Signed for GCC Instrumentation & Support for slow controller	Q4 2022	WP22 objective	ITA (C52TD57FE) Procurement of Instrumentation and spare parts for EC Installation & Commissioning

EXPECTED RESULTS

The main expected results for this action are:

1. Integration of the ECPC Stage 2 control system to prepare for operation of Gyrotron Commissioning Components (GCC).
2. Procurement of waveguides for GCC.

TARGET

The target of 2022 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
PA 5.2.P1B.EU.01 Electron Cyclotron Control System	0.05000	1.10000

Action 8. Neutral Beam and EC Power Supplies and Sources

Action 8	Neutral Beam and EC Power Supplies and Sources

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

Progress of Work

EU EC Power Supplies

- The Manufacturing and Factory Acceptance Tests of the UNITS 4 to 6 of the EU EC Power Supply will be completed
- Installation and commissioning of the EU EC Power Supply system will continue
- Commissioning and site acceptance tests of the EU EC Power Supply of UNIT 1 will start
- Technical Follow-up of the EC Power Supplies will continue

EU EC Gyrotrons

- The evaluation of the offers to the Call for Tender of the EU Gyrotrons will be completed.
- The framework contracts for the joint procurement of F4E and DTT Gyrotrons will be signed.
- The task order for F4E Gyrotrons will be prepared

Procurement Activities

Electron Cyclotron Power Supplies:

- Options will be released for the main contract for the procurement of the EC Power Supplies and specific contracts for technical supervision.
- Specific contract for on site expert technical support will be foreseen

Electron Cyclotron (EC) Gyrotrons:

- The framework contracts for the joint procurement of F4E and DTT Gyrotrons will be signed and the specific contract will be launched.
- Preparation and publication of the procurement procedure for the support to the EU Gyrotrons procurement will start.

Neutral Beam Test Facility

Progress of Work

- MITICA Beam Source – manufacturing for the part of the sub-assemblies will be completed and factory assembly will progress
- MITICA Beam Line Components – manufacturing of sub-assemblies will proceed as planned and assembly of main components (NED, ERID, CAL) will start together with instrumentation integration
- NBTF Assembly - MITICA rotating platform and drying system will be transferred to IO

- NBTF Control System (CODAS) - MITICA instrumentation, control, diagnostic and assembly contracts will progress

Procurement Activities

- Specific contracts will be signed for the NB Test Facility, namely for NBTF Control System, Interlock and Safety.
- Specific contracts for technical support in the area of Neutral Beam components will be signed.
- MITICA Beam Line Component and Beam Source: supporting tasks and release of options for the final acceptance tests and delivery to RFX PRIMA site will be implemented

Neutral Beam for ITER – Cadarache

Progress of Work

- Drift-Duct PA preparatory activities will continue towards PA signature
- Absolute Valve: pre-PA activities will continue
- PMS and ACC Coils: PA preparatory activities will continue towards PA signature
- General Assembly and Tooling: preparatory activities for HNB General Assembly (PA Stage 2) will be performed
- NB Power Supplies: Detailed design activities will be completed for high voltage deck and manufacturing activities will start for most power supplies

Procurement Activities

- NB Vessels: procurement activities will continue towards contract signature
- NB Tooling Assembly procurement activities will continue towards contract signature
- Specific contracts will be signed for technical support and activities follow-up
- NB Power Supplies: Some options will be released, mainly for spare and tests.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU52.02.12660	Signature of F4E-OMF-1108-01 for European Gyrotrons Procurement FWC	Q2 2022	Predecessor of GB48	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons
EU52.04.12761	Procurement of the MHVPS Transformer for 52HV12 (AAG Set#8) Completed	Q2 2022	Predecessor of GB48	PA 5.2.P4.EU.01 Electron Cyclotron High Voltage Power Supply

EU53.06.08510	NP - Start of Manufacture of EU-HVD1 & EU-Bushing of IHNB-1 & IHNB-2 (first items)/MRR Closure	Q4 2022	Predecessor of GB30	PA 5.3.P6.EU Neutral Beam Power Supply
EU53.06.447392	Start of Manufacturing of AGPS-CS of IHNB-1 for Inverters	Q4 2022	Predecessor of GB27	PA 5.3.P6.EU Neutral Beam Power Supply

EXPECTED RESULTS

The main expected results for this action are:

1. ECPS Commissioning started of set #1 at ITER site
2. MITICA Beam Source Manufacturing completed
3. Design activities for AGPS, GRPS and HVD1 of ITER units completed

TARGET

The target of 2022 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	2.68972	11.18072
PA 5.3.P6.EU Neutral Beam Power Supply	1.80000	17.36000
PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	1.98000	19.18000

Action 9. Diagnostics

Action 9	**Diagnostics**

Progress of Work

The Diagnostics Programme will continue during 2022 with the manufacture of several components or systems for delivery to ITER, mostly for First Plasma. These include mainly in-vessel supports, in-divertor electrical services, vacuum vessel feedthroughs, cable installation templates for the bolometer diagnostic, fission chambers for the radial neutron camera diagnostic, inner vessel coils and divertor coils.

Several Diagnostics systems and subsystems will complete their design activities with approval of the final design review, including the first plasma port and ex-vessel components for the equatorial visible/IR wide angle viewing system, the port plug mounted bolometer cameras, the port plug radial neutron camera components and the sensor head and electronics for the Diagnostics Pressure Gauges.

The design of all remaining Diagnostics systems and subsystems 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.

Procurement Activities

Procurement activities will focus mainly on two areas: placement of manufacturing task orders under framework contracts 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, as well as amendments of on-going grants or specific contracts if necessary. In-sourcing of personnel is foreseen to support the Programme during 2022, as is the use of Inspectors for manufacturing contracts and Experts in specialist areas, including in support of design reviews.

Due to high project synergies, it was decided to transfer to IO the design and procurement of a minor number of Tokamak electrical services components through a cash compensation to IO.

Manufacturing contracts

The Diagnostics Programme will sign during 2022 task orders under existing manufacturing framework contracts of several Diagnostics subsystems needed for First Plasma.

The Diagnostics Programme will launch as well a Framework contract for manufacturing of remaining components of the Diagnostics systems.

Design contracts

The Diagnostics Programme will also launch procurement procedures during 2022 to complement or to finalize the design work for several Diagnostics, including the Vacuum Vessel and Divertor bolometer cameras and the core plasma Thomson scattering system.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU55.01.12366680	Approval of D14 Digital integrator first of series	Q4 2022	Predecessor of GB39	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software
EU55.06.68040	Kick-off Meeting for Feedthroughs for Tokamak Services	Q4 2022	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.06.68320	ITER Dept Review & Approval of Final Tech Specs for Task Order for Feedthroughs & IO Concurrence Review	Q1 2022	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.16.10875	Integrated system FAT v1.0	Q4 2022	Predecessor of GB39	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software

EXPECTED RESULTS
The main expected results for this action are: 1. Delivery of inner vessel coils. 2. Delivery of in-vessel cabling. 3. Completion of final design for the equatorial visible/IR wide angle viewing system for the First Plasma port 4. Completion of final design for the port plug radial neutron camera (RNC) components. 5. Completion of final design magnetic reconstruction scientific analysis software. 6. Completion of final design for the 6 EU ports. 7. Completion of final design for the collective Thomson scattering system. 8. Completion of preliminary design for the port plug mounted bolometer cameras.
TARGET
The target of 2022 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	0.25710	0.84223
PA 5.5.P1.EU.03 Diagnostics – Bolometers	0.11800	0.11800
PA 5.5.P1.EU.07 Diagnostics - Pressure Gauges	0.00000	0.19160
PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	0.55044	1.11840
PA 5.5.P1.EU.15 Diagnostics - Radial Neutron Camera/Gamma Spectrometer	0.13769	0.27538
PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1	0.00000	0.00000
PA 5.5.P1.EU.09 Diagnostics - Low Field Side Collective Thomson Scattering	0.17218	0.34436
PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	0.00000	0.00000
PA 5.5.P1.EU.06 Diagnostics - Equatorial Visible/Infrared Wide-Angle Viewing System	0.23448	0.35172
PA 5.5.P1.EU.10-11-12-13-14 Diagnostics - Port Engineering Systems	1.49807	2.88488
PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software	0.00000	0.50000

Sub-action 10. Test Blanket Module

Sub-action 10	Test Blanket Module
Progress of Work The Preliminary Design and Safety Analysis activities for TBM Sets and Ancillary Systems will continue. The consultancy of an Agreed Notified Body will continue as well as the handling and storage of EUROFER and other steel products. The activities for the development of TBM Industrial Feasibility and Fabrication Technologies will continue.	

The collaboration with EUROfusion and EFLs will continue.

The definition and codification of EUROFER design limits in RCC-MRx design and construction code will resume.

Procurement Activities

It is planned to sign Task Orders and 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;
- Definition and codification of EUROFER design limits in RCC-MRx;
- The transport of EUROFER and other materials/products to and from the storage facility.

In addition, specific contracts for support activities like engineering, safety 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 (TBMAs).

No activities are credited.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU56.01.1226470	HCCP Consortium agreement signed with Korea	Q3 2022	WP22 objective	NA
EU56.01.1242745	Contract Signed for FwC for EUROFER design limits codification in RCC-MRx	Q4 2022	WP22 objective	NA
EU56.01.81635	Published Call for Tender for WCLL TBM Set PD & FD	Q2 2022	WP22 objective	NA
EU56.01.89050	Signature of TO 06 for FWC ANB Consultancy	Q4 2022	WP22 objective	NA

EXPECTED RESULTS

The main expected results for this action are:

1. Perform the Preliminary Design activities for WCLL TBS needed for the PD status assessment workshop with IO 2. Perform the Preliminary Design activities needed for HCPB TBS, in collaboration with KO-DA, needed for the PD statement assessment workshop with IO 3. Transmission to IO of the first set of consolidated data in view of the update of the Preliminary safety Report Target credit NA

Action 11. Site and Buildings and Power Supplies

Action 11	Site and Buildings and Power Supplies

Progress of Work

Construction works will be focused on advancing the construction of the medium voltage distribution buildings (B44, B45, B46 and B47), NB Power Supply Building (34), NB High Voltage Power Supply Building (37) and the Tritium Building civil works (B14) up to the roof and to deliver it painted until level L2.

The Control building (B71 Non PIC part) and the Fast Discharge Resistor building (B75) will be delivered.

The installation of HVAC, Electrical & Handling Equipment in the Heating building (B15) will be completed and the Load center LC04 will be operational.

Execution design, qualification activities and procurement of buildings services for the Tokamak Complex will progress.

Procurement Activities

Contracts to be signed by 2022 include:

TB20: Doors Installation Tritium Building (B14). Tender process launched in Q2 2021, plan to be awarded in Q3-Q4 2022.

TB21: Electrical and Mechanical work for Tokamak Complex and surrounding Buildings- planned contract signature Q3 2022.

TB22: Civil, Architectural, Finishing and Retrofitting Works - First lots contract signature Q3-Q4 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) and consultancy for advice on interpretation of French Regulatory Law 2012.

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

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

Financial Arrangement (reference LGA-2020-A-97) and Amendment to the PA 4.1.P1A-8B.EU.02 in relation with the cash contribution by F4E to the IO to be signed in Q2 2022.

Specific cash compensation to IO as required in case of transfer of some activities from F4E to IO, approved by the ITER Management Advisory Committee.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU62.05.272720	Construction of Cryoline Bridge (between B52 & B11) Completed	Q3 2022	GB57	AUX BUILDINGS D&B TB12
EU62.05.435	IPL > Cryoplant Compressor Building (51) RFE (RFE #8B)	Q2 2022	GB19	MAIN MILESTONES
EU62.05.460	IPL > Construction of Cryoplant Coldbox Building (52) Completed	Q3 2022	GB21	MAIN MILESTONES
EU62.05.570	IPL > Control Building (71 non PIC part) RFE (RFE #14)	Q3 2022	GB34	MAIN MILESTONES
EU62.05.610	IPL > Fast Discharge & Switching Network Resistor Building (75) RFE (RFE #11)	Q3 2022	WP22 objective	MAIN MILESTONES

EXPECTED RESULTS

The main expected results for this action are:

1. Construction completed of the Cryoline Bridge allowing the connection between Cryoplant Coldbox Building (B52) and the Tokamak building (B11)
2. Control Building (71 non PIC part) majority of works completed providing access to a section to allow IO occupancy and installation of ITER equipment.
3. Cryoplant Compressor Building (51) majority of works completed providing access to a section to allow IO occupancy and installation of ITER equipment.
4. Construction completed of the Cryoplant Coldbox Building (52)
5. Fast Discharge & Switching Network Resistor Building (75) majority of works completed providing access to a section to allow IO occupancy and installation of ITER equipment

TARGET

The target of 2022 is the achievement of a cumulative value expressed in kIUA (CAS):

	Yearly value	Cumulative value
MAIN MILESTONES	3.22000	21.46000
COMMON	5.57836	59.50701
TOKAMAK COMPLEX	21.30866	90.43672
AUX BUILDINGS TB03/TB04	3.26800	62.00716
AUX BUILDINGS D&B TB05	0.95156	15.25156
AUX BUILDINGS D&B TB06	0.83922	9.62922
AUX BUILDINGS D&B TB07	0.00000	6.74850

AUX BUILDINGS TB09/TB10	0.00000	0.00000
AUX BUILDINGS D&B TB12	18.45058	19.05058
AUX BUILDINGS D&B TB13	0.00000	0.00000
LOAD CENTERS	0.00000	4.30800
INTERCONNECTING ACTIVITIES	12.70197	22.62932
AUX BUILDINGS D&B TB17	0.06920	0.06920
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

Cash Contribution to IO

This action covers the EURATOM in-cash contribution that F4E[10] shall deliver to ITER International Organisation (IO) in cash (10%) together with its contribution in-kind (90%) for the ITER project in accordance with ITER Agreement[11].

The present Work Programme includes the cash contribution 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 Council[12].

Cash Contribution to Japan

The action also covers the transfer of procurement responsibility from EURATOM to Japan under the supervision of ITER Organization in accordance with ITER Agreement. This is financed through a cash contribution from EU to Japan paid by F4E. An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year.

WORK PROGRAMME OBJECTIVES[13]

Milestone	Scope Description	Forecast achievement date	Type of milestone	PA

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

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

12 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.

13 The figures committed under F4E Work Programme 2022 represent the cash contributions due for 2023 to IO and JA DA.

EUCC.01.240	Cash Contributions to ITER Organization 2023	Q4 2022	WP22 objective	Cash Contributions to ITER Organization

EXPECTED RESULTS

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

As far as the cash to IO is concerned, the target for 2022 is to commit the cash contribution for 2023 according to the decisions due to be taken by the ITER Council in November 2022.

Target credit NA

Action 13. Technical Support Activities

Action 13	Technical Support Activities

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

Technical Support to In-Kind Procurement

Engineering Support activities
The Engineering Unit during 2022 will continue supporting the ITER Departments Programmes (and to a limited extend the BA department) by providing them technical expertise in the key domains of engineering and fusion technologies.

The unit will provide technical expertise in the following areas:

Design office activities, Technical Data Management, System Design, Mechanical Engineering, Analysis: Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism, Nuclear Analyses; Design Codes and Standards; Electrical Engineering; Instrumentation and Control; CODAC; Metrology, Material and Fabrication and Assembly Integration and Validation (AIV).

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

Nuclear Safety

Progress of Work

The scope includes the oversight of the implementation of all nuclear safety requirements by F4E and its contractors. The Nuclear Safety activities also provides support to the project teams involved in PIC/PIA (Protection Important Components/Activities) to ensure compliance with the necessary regulation. This includes support to nuclear safety management, identification

of optimum positions for key nuclear safety issues, review of relevant documentation and nuclear safety inspections in F4E suppliers' premises.

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

Procurement Activities

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

F4E will be supported by experts on Nuclear Safety expertise funded by F4E through expert contracts.

All other activities will be implemented through Task Orders under existing framework contracts or purchase orders.

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

Task Orders under existing framework contracts 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

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

Office of the Chief Engineer

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.01.8320	Contract Signed for Engineering Support Contract LOT 1	Q2 2022	WP22 objective	All
EU.ES.01.8380	Contract Signed for Engineering Support Contract LOT 2	Q2 2022	WP22 objective	All
EU.PM.3051650	Published Call for Tender of FWC F4E-OMF-1321 for Quality Control - Inspectors for ITER Project (2023-2027)	Q4 2022	WP22 objective	All
EU.PM.3076660	Specific contract #01 signed under FwC OMF-1127-01 for System Engineering Supports at F4E Barcelona	Q1 2022	WP22 objective	All

EU.PM.3105110	Specific contract #14 signed under FwC OMF-1159-LOT1-01 for Support in the area of Technical Integration to the OCE	Q3 2022	WP22 objective	All

EXPECTED RESULTS

The main expected results for this action are:
1. Implementation of the framework contract which will provide Fusion for Energy with framework contracts in the field of Engineering Support (OMF-1159), Provision of Metrology Services (OMF-1227) and Provision of Metrology Equipment (OMF-1331).

2. 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.

3. 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 2022 is to contribute in achieving the cumulative credit forecasted for each action in this WP2022 thanks to the support granted to the work under each specific action.

Transportation

Transportation

During 2022, Engineering Unit/Transportation will be in charge of the management, on the F4E side, of technical aspects of the joint procurement with IO for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of all ITER Components from the port/airport of entry (Fos or Marignane) to ITER site.
During 2022, 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 2022 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.4022095	Task Order Signed for TO 16 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2022	WP22 objective	All
EU.PM.4022215	Task Order Signed for TO 17 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2022	WP22 objective	All

EXPECTED RESULTS

1. Transportation of Highly Exceptional Loads amongst others, EU & JA-DA TF coils, US CS Coils and EU & KO-DA VV-sectors between Maritime Port of Marseille and ITER site.

2. Gendarmerie Task Orders to escort the HEL convoys

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

One or more framework contracts will be signed for the continuation of the supply of Project Performance Management Support.

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

F4E will be supported by an expert on Project Management expertise, funded by F4E through an expert contract.

Administration (IT, POI, LSU, CSU and HR)

Progress of Work

A general provision is foreseen for technical support activities, including operational consultancy, legal, logistics and assurance services, improvement and change projects related to technical processes or documentation management system of technical documents. The action also includes operational meetings, missions as well as hardware and software tools used for the direct benefit of the operational projects.

Procurement Activities

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

Commercial (Finance)

Progress of Work

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

This part also includes insurances related to risk occurring during construction activities on the ITER Site such as All Risk Insurance, Third Party liability, Faulty Design insurance. It does not include Decennial insurance, Third Party liability related to the escort of convoys of component transport to ITER Site.

Procurement Activities

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

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 reimbursement scheme, such as decennial insurance for buildings, complement to F4E Third Party Liability, they are procured or renewed by F4E directly.

WORK PROGRAMME OBJECTIVES

Milestone ID	Scope Description	Forecast achievement date	Type of milestone	PA
EU.PM.3076190	Contract Signed of FWC F4E-OMF-1220 for PPM Support (2022-2026)	Q3 2022	WP22 objective	All
EU.PM.3092200	Specific contract #08 signed under F4E-OMF-0895 Lot 2 for Risk Management Senior Support (cont. F4E-OMF-0895-LOT2-01-05)	Q2 2022	WP22 objective	All

EXPECTED RESULTS

1. Signature of one or more new framework contracts to continue to provide support services in the area of Project Performance Management Support.

2. Signature of the required Task Orders in order to support the Project Teams.

3. The expected result is to provide the requested support to F4E and all Project Teams on matters concerning Programme management.

4. The expected result is to provide the requested support to all Project Teams on matters concerning additional services (i.e. logistics, ICT, legal, etc.) and to provide the requested support to all Project Teams on Operational Support Services and Insurance.

The target for 2022 is to manage the F4E operative processes and to contribute in achieving the cumulative credit forecasted for each action in this WP2022 thanks to the support granted to the work under each action, and support the teams to deliver within time and budget.

Action 14. Broader Approach

Action 14	Broader Approach

JT-60SA

Progress of Work

The implementation of activities for the Operation/Enhancement phase of the project will continue. These activities include the procurement of critical spare parts and engineering services for EU already supplied systems and components, and selected machine

enhancements and diagnostics in collaboration with EUROfusion (including maintenance and assistance to on-site assembly and commissioning).

Procurement Activities

Critical contracts for the cassette bodies, the High Heat Flux (HHF) and Normal Heat Flux (NHF) elements of the JT-60SA actively cooled Divertor, several studies and procurements for the enhancements of the power supply systems will also be launched in 2022. The activities under the responsibility of F4E are carried out through task orders of existing/new framework contracts or existing/new supply and service contracts. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts and specific contracts. Cash contributions on specific QST Call for Funds, covering EU Contribution to operation, maintenance and assembly will also be made.

IFMIF/EVEDA

Progress of Work

In 2022 the LIPAc (Linear IFMIF Prototype Accelerator) operation at Rokkasho will focus on demonstrating the expected performances required for beam operations at high duty cycle of all the accelerator subsystems except the superconducting part (cryomodule) whose assembly will be carried out in parallel on Rokkasho site by a European company under F4E responsibility.

Procurement Activities

Additional contracts will have to be placed for demonstrating the operation and for optimizing the maintainability of the accelerator and subsequently the beam availability. Activities for the preparation of the LIPAc accelerator in its final configuration for the forthcoming operation phases will continue in 2022. F4E will be continuously supported by experts, and on-site health and safety services to ensure safe operations, funded respectively by F4E through expert contracts, specific contracts, and Agreements of Collaboration with European Institutes. 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 focus on the implementation of the remote collaboration tools agreed with JT-60SA, ITER, and the IFMIF-EVEDA LIPAc accelerator. The collaboration under the ITER BA agreement will continue 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 the DEMO design activities, priority will be given to activities directly relevant for ITER and JT-60SA exploitation, such as plasma scenario development, divertor and power exhaust, breeding blanket and tritium extraction and removal. The objective of activities in fusion materials R&D will be to continue to support ITER in issues related to Tritium retention in first wall materials, and to contribute to the materials database for future reactors such as DEMO,

which will be in part validated in a future IFMIF type installation. All activities will be performed in collaboration with EUROfusion.

Procurement Activities

There are contracts to be placed for preparation of remote participation rooms for tests with BA Projects and ITER, and testing activities. F4E is supported by experts, funded by F4E through expert and 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.01.13520	LIPAC Injector Spare parts completed	Q2 2022	WP22 objective	IFMIF - LIPAc Activities
EU.BA.01.18620	Contract placement for Supply of JT-60SA actively cooled Divertor HHF elements - Stage 1	Q3 2022	WP22 objective	Divertor for Operation Phase 3
EU.BA.01.25300	Supply of equipment for tests with BA Projects and ITER, and establishment of control room	Q4 2022	WP22 objective	IFERC-REC
EU.BA.01.27580	Refurbished PSYS and new parts with documentation	Q4 2022	WP22 objective	IFMIF - LIPAc Activities
EU.BA.01.32480	Contract placement for the Supply of the Centrifuge Accelerator for JT-60SA Pellet Launching System	Q2 2022	WP22 objective	Pellet Injector
EU.BA.01.36380	Start of the SRF Linac assembly in the Joint Research Building	Q4 2022	WP22 objective	LIPAc Activities

EXPECTED RESULTS

The main expected results for this action are:

JT-60SA:

1. Delivery of JT-60SA new grounding system
2. Completion of repair activities on JT-60SA electrical insulation EU part
3. Completion of factory tests for the Error Field Correction Coils
4. Delivery of Thomson Scattering primary optics

IFMIF/EVEDA

1. Procurement of injector spare parts of the LIPAc accelerator completed
2. Procurement of spare parts for the radio frequency power supply to ensure maintenance and availability completed
3. Completion of the Erosion/Corrosion Engineering design,

IFERC

1. Completion of functional test Remote Data Access to ITER Data Base under the collaboration REC-IO
2. Completion of manufacturing of Irradiation rigs for the R&D on the Neutron Irradiation experiments of Breeding Functional Materials for the DEMO R&D
3. Complete T analysis of JET-ILW-3 tiles and dusts and summarize T inventory data
4. Identification of Power exhaust R&D issues for tokamak experiments for DEMO Design activities

5. Supply of high performance computer resources and analysis and support of simulation projects		
TARGET		
The target of 2022 is the achievement of a cumulative value expressed in kBAUA[14] (CAS):		
	Yearly value	Cumulative value
Cash contribution JT-60SA 2022 (CASH02)	0.85	13.692
PS spare parts and on-site support (EU-PSSPOS)	0.450	2.306
EF Correction Coils (EFCC PS)	1.790	2.864
Electrical components	0.500	0.500
Cryogenic Spare Parts and Support (SSC)	0.461	1.200
Thomson Scattering (TSS)	0.000	2.420
Spare Parts of the LIPAc Injector (AF02-2)	0.500	0.500
Assembly of the LIPAc Cryomodule and the Supply of Beam Loss Monitors for IFMIF/EVEDA Project (AF04-2)	0.400	0.800
Supply of the Maintenance of the Radio Frequency Power System of LIPAc for the IFMIF/EVEDA Project (AF06-2)	0.630	0.630
Design feedback for Neutron Source (ED06-2)	0.220	0.220
Lithium Target Enhancement (LF06-2)	0.110	0.110
Common Expenses	0.050	0.500
Common Fund	1.660	5.100
Demo design activities	1.172	1.811
Structure material development for in-vessel components	0.469	0.725
Database for material corrosion	0.117	0.181
Neutron irradiation experiment of breeding functional materials	0.000	0.543
Tritium technology for collection and inventory evaluation	0.234	0.362
CSC-EU	0.200	0.400
REC-EU	0.080	0.180

[14] *Procurement Arrangements not yet signed are marked with an **

Project Team - EU staff	0.220	0.403
Project Team - EU Common Expenses	0.050	0.150

WP_TABLE 1 WORK PROGRAMME 2022 BUDGET SUMMARY

Budget Summary of the 2022 Work Programme - Amendment 1

Budget article		First amendment to the Work Programme Commitment appropriations (EUR)
3 1	ITER construction including site preparation	571,098,271.67
3 2	Technology for ITER	4,554,435.39
3 3	Technology for Broader Approach & DEMO	31,200,234.01
3 5	External Support Activities	31,900,653.05
3 6	Other Operational expenditure	5,923,039.35
Total Title III of the Budget		**644,676,633.47**
4 1	ITER construction from ITER host state contribution	161,256,701.70
4 2	Activities linked to ITER Organization	13,641,005.22
4 3	Other earmarked expenditure	
Total Title IV of the Budget		**174,897,706.92**
Total amount available for the operational expenditure		**819,574,340.39**

Work Programme		2022 Work Programme Commitment appropriations (EUR)		
		Grants	Procurement	Cash
3 1 + 4 1 + 4 2 + 4 3	Expenditure in support of ITER Construction	259,028.00	406,093,894.25	339,643,056.33
	Sub total ITER construction + RF		**745,995,978.58**	
3 2	Design and R&D in support of ITER, not credited		4,554,435.39	
	Sub total technology for ITER		**4,554,435.39**	
3 3	Expenditure in support of Broader Approach		28,853,242.22	2,346,991.79
	Sub total Technology for Broader Approach and DEMO		**31,200,234.01**	
3 5	External Support Activities		31,900,653.05	
	Sub total External Support Activities		**31,900,653.05**	
3 6	Other Expenditure		5,923,039.35	
	Sub total Other Expenditure		**5,923,039.35**	
Totals Operational Expenditure		***259,028.00***	***477,325,264.27***	***341,990,048.12***
		819,574,340.39		

WP_Table 1 . Work Programme Budget Summary

WP_TABLE 2 INDICATIVE VALUE OF FINANCIAL RESOURCES FOR THE ACTIONS IN WP2022

Action #	Action	Budget WP2022	Budget WP2022 Amendment 1	Δ (Am.1 - Original)
1	Magnets	5,887,034	9,150,636	3,263,602
2,3,4,10*	Main Vessel*	112,527,825	112,267,781	-260,043
5	Remote Handling	16,691,822	14,760,269	-1,931,553
6	Cryoplant & Fuel Cycle	8,479,232	9,564,511	1,085,279
7	Antennas and Plasma Engineering	4,354,175	6,377,355	2,023,180
8	Neutral Beam and EC Power Supplies and Sources	32,305,159	5,930,058	-26,375,101
9	Diagnostics	21,342,879	23,351,224	2,008,345
11	Site and Buildings and Power Supplies	226,426,063	235,627,259	9,201,196
12	Cash Contributions	308,004,235	336,778,962	28,774,727
13	Technical Support Activities	28,237,365	34,000,960	5,763,595
14	Broader Approach	41,372,873	31,765,324	-9,607,549
	Total	**805,628,663**	**819,574,340**	**13,945,678**

* The Sub-actions 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 - 2022 MAIN PROCUREMENT ACTIVITIES (PER ACTION)

Action		Type of contract	Signature
Magnets			
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Vacuum Vessel			
CA12048	Commitment and Task Order Signed - F4E-OMF-789-02-05 for the Option 1 for 1 VV Resident Inspector	SC-PServ	Q3
CA12932	Commitment signed for TO#04 F4E-OMF-1159-01-01-04 for Support on Project Controls	SC-PServ	Q1
CA12766	Commitment and Task Order Signed - F4E-OMF-789-01-41 for 1 VV Resident Inspectors	SC-PServ	Q1
CA12834	Commitment and Task Order Signed - F4E-OMF-789-BEL-A22 for 1 VV Resident Inspectors	SC-PServ	Q3
CA12592	Commitment and Task Order Signed - F4E-OMF-789-01-39 for Option 1 for 1 VV Resident Inspectors	SC-PServ	Q4
CA12982	Commitment and Task Order Signed - F4E-OMF-XX-XX-2022 Engineering Support for the VV Programme (2022-2023)	SC-PServ	Q4
CA12983	Commitment & TO signed for F4E-OMF-1153-01-XX for Mechanical Analysis Support for VV	SC-PServ	Q4
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
In Vessel- Blanket			
CA11700	TO 8 for FwC BCM (OMF-1080) - Procurement of 316L ITER grade raw material	SC-PSupply	Q4
CA08364	Contract for Procurement of Standard Parts	PSupply	Q4
CA05646	TO 1a for FwC BCM (OMF-1080) - Contractor #01	SC-PSupply	Q4
CA12616	TO 1a for FwC BCM (OMF-1080) - Contractor #02	SC-PSupply	Q4
CA13120	TO 02 OPE-319-01 High Heat Flux Testing (Mockups)	SC-PSupply	Q4
CA08358	TO 02 Procurement of CuCrZr - LOT 1	SC-PSupply	Q1
CA11610	TO 02 Procurement of CuCrZr - LOT 2	SC-PSupply	Q1
CA13072	Task Order Resources - Docs Management #1 #2 22/23	SC-PServ	Q3
CA11699	TO 7 for FwC BCM (OMF-1080) - V-Band Flanges, Helicoflex and circlips kits	SC-PSupply	Q4

CA09864	Task Order Resources - PM Support (Junior) 22/23	SC-PServ	Q3
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
In Vessel- Divertor			
CA00883	OMF-1139-01-01 Signed for IVT Pre-Series Production	SC-PSupply	Q4
CA08813	OPE-1112 Contract for Pins Sleeves and Links of CB series	PSupply	Q4
CA13289	TO-05 OMF-319-01 signed for HHF Tests for Stage 2 Prototypes -IVT	SC-PServ	Q3
CA10924	TO-04 OMF-1082-01Signed for the Provision and Qualification of Test Bench and UT Qualification Blocks for IVT Series	SC-PSupply	Q1
CA11897	TO-XY OMF-1159-01 Signed for Senior Mechanical Engineer Support for CB Series Stage 2	SC-PServ	Q3
CA10810	TO-08.01 OMF-1159 signed for NDE Engineer - IVT	SC-PServ	Q4
CA10808	TO-56.01 OMF-1159 signed for Documentation Management Support - IVT	SC-PServ	Q4
CA09605	TO-48 OMF-0937-01 Signed for Resident Inspector for WTO-Welding	SC-PServ	Q1
CA11704	TO-44 OMF-0937-01 for Resident inspector for CSC - NDT (replaces TO-22)	SC-PServ	Q1
CA09606	TO-50 OMF-0937-01 Signed for Resident Inspector for WTO-NDT	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Remote Handling			
CA11774	CON for Final Design of MCS for NBRHS	PSupply	Q4
CA11689	Task Order Signed for Final Design Phase 2 for IVVS	SC-PSupply	Q4
CA07449	Task Order (383-01-05) Signed for Final Design Phase 1 for IVVS	SC-PSupply	Q2
CA11591	TO for Engineering Insourcing Contract Control Sys 2022	SC-PServ	Q4
CA11776	Task Order for Engineering Insourcing Contract NBRHS 2022 - TS-01, JL Fernandez, Hyo Hwan	SC-PServ	Q4
CA11757	Task Order for Engineering Insourcing Contract (TS-3) CPRHS 2021	SC-PServ	Q2
CA10629	Task Order for Engineering Insourcing Contract DRHS 2022 - M. Tineo, C. Peregrin	SC-PServ	Q4
CA13230	Task Order (Esteyco) Collars BLT VOS captive components	SC-PServ	Q4
CA09116	TO for Engineering Insourcing Contract #10	SC-PServ	Q2

CA11758	Task Order for Engineering Insourcing Contract DRHS 2022	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Cryoplant and Fuel Cycle			
CA12544	REMS TKM TO: Value engineering	SC-PServ	Q3
CA12878	TO for Engineering Support in Equipment Qualification and Integration (2022-2023)	SC-PServ	Q1
CA10704	I&C Leak Detection	SC-PSupply	Q3
CA11759	Technical support CPFC -TCP	SC-PServ	Q3
CA12976	TO #1 for Documentation Management Support (All CP&FC)	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Antenna and Plasma Engineering			
CA01421	TO signed for Manufacturing of Isolation Valve prototypes and FDR documentation	SC-PSupply	Q3
CA13239	Task Order Signed for Engineering Support for the Antennas Unit (2022-2024) - Part I	SC-PServ	Q4
CA11077	Task Order 02 signed for Support to Owner	SC-PServ	Q2
CA13248	Task Order 04 signed for Support to Owner	SC-PServ	Q3
CA13250	Task Order 05 signed for Support to Owner	SC-PServ	Q2
CA12001	Option A Signed for mm-wave testing of RF components	SC-PServ	Q2
CA13254	Task Order 7 Signed for Provision of ECH expertise	SC-PServ	Q4
CA11957	Contract Signed for RF Load Refurbishement	PSupply	Q2
CA13237	Task Order Signed for In-Sourcing Fabrication Expert (Senior) (2022-2024)	SC-PServ	Q4
CA13220	Task Order Signed for Additional Support for Antennas Unit (2022-2024)	SC-PServ	Q4
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Neutral Beam and EC Power Supplies and Sources			
CA01674	Specific Contract signature for- TO#05 MITICA CODAS, Interlock and Safety	SC-PSupply	Q3
CA12500	Task Order 2 Signed for I&C Interfaces with ECPS	SC-PServ	Q4

CA13044	Contract signature of OMF-1159 for systems Engineering Support for ECPS	SC-PServ	Q3
CA12944	TO for Magnetic Measurement OMF-1082-1 of NBI PMS	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Diagnostics			
CA10813	Task Order signed for manufacturing of Feedthroughs	SC-PServ	Q4
CA10695	Task Order Signed for Bolometers Bolometer DIV/VV Cameras (and VV Platforms) Design	SC-PServ	Q3
CA13045	Task Order Signed for in-source personnel under OMF-1159	SC-PServ	Q2
CA11886	Compound uncertainty related to include four projects in one framework contract (OMF-1126)	PServ	Q4
CA10652	Task Order Signed for Procurement and delivery of Bolometer Software	SC-PServ	Q3
CA13116	Increase value of ADP#3 (Group 2 issues) - DNO#XXXX	SC-PServ	Q2
CA13335	Contract Signed for Raw Material Supply for WAVS EP12 - Lot 2	SC-PSupply	Q2
CA11920	Contract Signed for Raw Material Supply for WAVS EP12	SC-PSupply	Q2
CA10336	Task Order signed for Bolometers bespoke hardware preliminary design	SC-PServ	Q3
CA05658	Task Order Signed for Development of Mfg Specs for PP Cameras	SC-PServ	Q3
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Test Blanket Module			
CA08657	TO 02 signed for Ancillary Systems WCLL PD	SC-PServ	Q4
CA06814	Task Order Signed for Preliminary Design of TBMs set	SC-PServ	Q2
CA06844	TO 03 Signed for HCPB Ancillary Systems PD	SC-PServ	Q2
CA06840	Task Order Signed for Preliminary Design of TBMs set	SC-PServ	Q3
CA12842	TO 1 for System Engineering Management support (implementation - WCLL)	SC-PServ	Q3
CA12843	TO 1 for System Engineering Management support (implementation - HCPB)	SC-PServ	Q3
CA12885	TO 1 signed - Technical Support for the WCLL TBM set - Part 1	SC-PServ	Q2
CA06843	TO 04 Signed for HCPB Ancillary Systems PD	SC-PServ	Q4

CA07113	TO 06 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			
CA09311	TB20 - Commitment for Contract for B14 Doors Manufacturing / Installation. Including Options and Contingencies	PSupply	Q4
CA12014	TB21 - TO#01 Commitment for B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04)	SC-PSupply	Q4
CA12007	TB11 - TO#11 B11/B74 Services procurement (except passive piping / HVAC&FID) from (TB04) and continuation of TB11 Scope	SC-PSupply	Q3
CA13340	TB20 - Commitment for Contract for B14 Doors Manufacturing / Installation (Increase of Raw Material)	PSupply	Q4
CA11128	TB11 - TO#10 Commitment for Completion works Contract, Including Bldg. 62 (TB04)	SC-PSupply	Q1
CA12712	TB11 - TO#10 Commitment for Completion works Contract, Including Lift Lobby doors	SC-PSupply	Q1
CA13290	TB21 - TO#01 B11/B74 Re-allotment partial omission of Tokamak Options 1 & 2 from (TB04) (Increase of Raw material)	SC-PSupply	Q4
CA12364	TO#02 for AFC-1224 for Legal Representation during adjudication proceedings (TB04) LS	SC-PServ	Q4
CA12405	TB22 - Commitment for Secondary structural works - TO#01 Lot B	SC-PSupply	Q4
CA13175	TO 02 OMF-1116-01 for Nuclear safety I&C Execution design of the tokamak Complex first phase (TB04) TSS Jacobs	SC-PServ	Q2
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Supporting Activities			
CA08977	2022 Commitments and Budget Reserves for Legal Services charged against Operational Budget	SC-PServ	Q2
CA06461	Commitment 2022 - Global transportation of HEL NON-EU ITER components	SC-PServ	Q4
CA11299	Correction of premium on the basis of building values declared	PServ	Q3
CA10632	Third Party Liability insurance 2020-2025	PServ	Q4
CA06034	TO for Embedded Control Data Access and Communication 2022	SC-PServ	Q4
CA06463	TO 101 - Third Party Services for the CELs & CLs shipped by other DA	SC-PServ	Q2
CA12807	TO 100 for KO-DA 1 HEL VV sector #08	SC-PServ	Q1
CA11300	Option Faulty design	PServ	Q3
CA06462	TO for Management fees 2023	SC-PServ	Q4

CA10756	ICT - Commitments 2022 for Software maintenance fees (Software licences specific to the ITER project)	SC-PServ	Q1
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A
Broader Approach			
CA10371	Supply of JT-60SA actively cooled Divertor NHF elements	PSupply	Q4
CA10370	Supply of JT-60SA actively cooled Divertor cassettes	PSupply	Q4
CA10369	Supply of JT-60SA actively cooled Divertor HHF elements Stage 1	PSupply	Q2
CA11991	CON Supply of the Centrifuge Accelerator for JT-60SA Pellet Launching System (Replace OPE-1102)	PSupply	Q2
CA12863	CON for Supply of FILD Hardware	PSupply	Q3
CA10697	Contractual activities for Pellet Injector - Test Laboratory with IPP	PSupply	Q3
CA11578	WP#1: Upgrade of the LIPAc Control system: TO MPS upgrade	SC-PSupply	Q2
CA10435	TO02 for the maintenance of RFPS	SC-PSupply	Q3
CA11810	On site LIPAc Control System support TOXX	SC-PServ	Q3
CA12639	ECRH Set of vacuum pumping components	PSupply	Q4
Provision for amendments, claims, reimbursement, indexation and late interest		N/A	N/A

Table 3 . Main procurement activities per action

WP_TABLE 4 – PLAN FOR GRANTS

2022 GRANTS

Grant Agreements Reference	Expected date of Signature	Forecasted value to be committed	Duration	Counterpart (Leader Company)	Short Description
F4E-GRT-0901	Q2 2022	€ 100,000	12 months	VTT Technical Research Centre of Finland Ltd	Remote Handling: GRT-901 Amendment for RDA Improvements
F4E-GRT-0974	Q1 2022	€ 13,200	12 months	Tuotekehitys Oy Tamlink	Remote Handling: Amendment #163870 for extension of duration with 12 months
F4E-GRT-0974	Q3 2022	€ 20,000	6 months	Tuotekehitys Oy Tamlink	Remote Handling: Amendment for additional work for GRT-974
F4E-FPA-327SG07	Q2 2022	€ 66,340	0 month	ENEA	Diagnostics: Deviation #04 for Additional support for engineering analysis - SDR #166947
F4E-FPA-393SG05	Q2 2022	€ 59,488	2.5 months	DTU	Diagnostics: Amendment 4 for FPA-393-SG05 - DN 167631: increase duration and cost
Total		€ 259,028			

ON-GOING GRANTS[15]

Grant Agreements Reference	Actual date of Signature	Committed Value	Duration	Counterpart (Leader Company)	Short Description
F4E-FPA-327-07 (PMS-DG)	20/02/2020	€2,011,797.00	50 months	Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile-ENEA	Development of the Final Design and Prototyping
F4E-FPA-328-07 (PMS-DG)	19/12/2016	€213,734.00	27 months	Wigner Research Centre for Physics, Hungarian Academy of Sciences	Prototype Testing And Updating Of Design Documentation
F4E-FPA-364-06	22/10/2018	€1,390,426.00	42 months	Max-Planck-Gesellschaft zur Forderung der Wissenschaften e.V. — Max-Planck-Institut fur Plasmaphysik (IPP)	Development of the Design and Critical Prototyping
F4E-FPA-375-02	12/07/2013	€984,080.00	87 months	Instituto Superior Tecnico	Coordination Support Office
F4E-FPA-375-04	27/07/2015	€977,401.00	44 months	Instituto Superior Tecnico	R&D And Prototyping For In-Vessel Components (PPR Gaps 4 & 6)
F4E-FPA-375-05	30/09/2015	€735,830.00	57 months	Instituto Superior Tecnico	R&D For In-Port-Plug Components (PPR Gaps 3&5)
F4E-FPA-375-06	26/03/2019	€429,362.00	22 months	Instituto Superior Tecnico	Design of PPR In-Vessel Sub-System and Testing
F4E-FPA-384-04 (DG)	28/11/2017	€394,444.00	37 months	Max-Planck-Gesellschaft zur Forderung der Wissenschaften e.V. — Max-Planck-Institut fur Plasmaphysik (IPP)	Open Call For Proposals: Framework Partnership Agreement: Diagnostic Development and Design: Bolometers
F4E-FPA-384 (DG)-05	30/07/2018	€1,498,654.00	36 months	Max-Planck-Gesellschaft zur Forderung der Wissenschaften e.V. — Max-Planck-Institut fur Plasmaphysik (IPP)	Development of the Design and Prototyping
F4E-FPA-393 (DG)-05	23/05/2018	€1,306,364.00	39 months	Danmarks Tekniske Universitet	Development of the Design and Critical Prototyping
F4E-FPA-407-04 (DG)	22/09/2017	€4,317,928.00	48 months	Commissariat à l'énergie atomique	Development Of The Design And Prototyping: Equatorial Visible/Infrared Wide Angle Viewing System

[15] Any 2021 Grant that was included in the original WP2021 but was not signed by the cut-off date of 31st March 2021 is not reflected in this table. Grants that were not known when the original WP2021 was drafted and that would be signed following a related WP2021 amendment are not listed neither.

F4E-FPA-408 (DG)-04	19/04/2018	€3,982,402.38	31 months	Forschungszentrum Julich Gmbh	F4E-FPA-408-SG04 Development Of The Design And Prototyping Of The Core-Plasma Charge Exchange Recombination Spectrometer
F4E-GRT-154	17/11/2011	€812,138.26	118 months	Forschungszentrum Julich Gmbh	Hih Heat Flux of FW Mock-ups before and after Irradiation including Transportation
F4E-GRT-553	09/07/2014	€2,562,993.00	89 months	Ecole Polytechnique Federale de Lausanne	Design, Development and Validation of the European Gyrotron
F4E-GRT-0901-01	09/03/2018	€1,505,442.00	51 months	VTT Technical Research Centre of Finland Ltd	Development And Integration Of 3D Machine Vision, Hlcs Modules And Genrobot at DTP 2
F4E-GRT-0974-01	20/12/2018	€249,986.00	28 months	Tuotekehitys Oy Tamlink	Prototyping And Testing Of Hydraulic Digital Valves For The Divertor Remote Handling System
Total		**€23,372,981.64**			

WP_Table 4 . Plan for grants[16]

[16] The Commission guidelines require to produce two additional tables covering Service Level agreement and Contribution Agreements. These are not displayed since F4E has no Service Level agreement nor Contribution Agreements under operational expenditure.

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 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
P Serv - Contract	3	5	3	6	2	3
P Supply - Contract	2	11	9	1	6	2
Pserv - Specific Contracts	23	44	43	31	31	87
PSupply - Specific Contracts	3	10	8	3	10	2

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 WP2022.
- When a call for tender is not defined yet, the call is indicatively assigned to 6 months before the signature of the contract.
- For the specific contract, as they do not have call for tender, the table refers to its signature date.

ESSENTIAL SELECTION, AWARD CRITERIA AND UPPER FUNDING LIMITS FOR GRANTS

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

Essential Selection Criteria

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

Essential Award Criteria

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

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

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

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

Upper funding Criteria

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

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

List of Tables