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 2016 WORK PROGRAMME OF FUSION FOR ENERGY

The Governing Board,

Having regard to the Statutes annexed to the 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], and in particular Articles 6(3)(d) and 11 thereof;

Having regard to Council Decision N° 791/2013 of 13 December 2013 amending decision 2007/198/EURATOM establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it[2]

Having regard to the Financial Regulation of Fusion for Energy[3] adopted by the Governing Board on 22 October 2007, last amended on 25 November 2011[4] (hereinafter "the Financial Regulation"), and in particular Title III thereof;

Having regard to the Implementing Rules of the Financial Regulation[5] adopted by the Governing Board on 22 October 2007, last amended on 11 December 2013[6] (hereinafter "the Implementing Rules"), and in particular Title III thereof;

Having regard to the comments and recommendations of the Administration and Management Committee and the Technical Advisory Panel;

Whereas:

(1) The Director should, in accordance with Article 8(4)(c), draw up an annual work programme;

(2) The Governing Board should adopt the work programme.

Has adopted this decision:

Article 1

The 2016 Work Programme of Fusion for Energy annexed to this Decision is hereby adopted.

Article 2

This Decision shall have immediate effect.

1 OJ L 90, 30/03/2007, p. 58
2 OJ L 349, 21/12/2013 p.100-102
3 F4E(07)-GB03-11 Adopted 22/10/2007
4 F4E(11)-GB21-10c Adopted 25/11/2011
5 F4E(07)-GB03-12 Adopted 22/10/2007
6 F4E(13)-GB28-14.2 Adopted 11/12/2013

Done at Barcelona, 2 December 2016

For the Governing Board

Joaquin Sanchez
Acting Chair of the Governing Board

For the Secretariat of the Governing Board

Romina Bemelmans
Secretary of the Governing Board

Contents

1. EXECUTIVE SUMMARY

This Work Programme 2016 (WP16) offers an overview of the objectives of EU's Joint Undertaking for ITER and the Development of Fusion Energy (F4E) for the 2016 and also identifies the financial decisions for the actions that will have to be carried out in 2016 with the available budget.

It covers the work on both the ITER and the Broader Approach according to the tasks entrusted to the organization.

As for ITER, the EU is part of this large project involving a total of seven large countries bringing together seven parties that represent half of the world's population – the EU, Russia, Japan, China, India, South Korea and the United States.

The task of F4E is to discharge EU obligations to deliver its share of in-kind components and cash contributions to the ITER project, about 45% of the total value of the project in the construction phase.

This work is carried out under the coordination of the Central Team of the ITER Organization and it creates many challenges both from the technical and from an organizational point of view.

As for the Broader Approach, the EU activities are carried out in the frame of the agreement, concluded with Japan, consisting in activities which complement the ITER project and accelerate the realisation of fusion energy. Both parties contribute equally financially. The European resources for the implementation of the Broader Approach are largely volunteered by several participating European countries (Belgium, France, Germany, Italy, Spain and Switzerland).

The 2016 objectives, the main milestones and the allocation of the human resources provide a good idea of the complexity of the tasks to be carried throughout the year and of the technical challenges they entail.

As for ITER, 2016 is mostly focussed on the following activities:

- Magnets: performance of the Cold Test (at 77K) of the first Toroidal Field (TF) Coils Winding Pack. For the Poloidal Field (PF) Coils signature of the main contracts and the adaptation works of the PF Building will be completed. This will allow the delivery of the tools for the Double Pancake Manufacturing and the start of the winding activities on site.
- Main Vessel: production activities will have started for 5 of the 7 sectors and this will represent a huge increase of workload for both supplier and F4E requiring an additional effort on increasing efficiency and streamlining coordination at AMW. The main technical challenges are related to the control of distortions during the fabrication process, in order to guarantee the compliance with the final tolerances of the VV.
- Blanket System: progress with the manufacturing of the full-scale prototypes according the schedule and continue the First Wall pre-qualification programme with the High Heat Flux testing of the remaining First Wall semi-prototypes.
- Divertor: Progress in the manufacture of the cassette bodies (CB) full-scale prototypes, completion of the Inner Vertical Target (IVT) pre-qualification mock-ups, high heat flux testing of the IVT components as well as release of the competition for the manufacture of up to two full size IVT prototypes.
- Remote Handling: Remote Handling: follow up and coordination of the major suppliers for the RH systems (Cask and Plug Remote Handling System, Divertor Remote Handling System, Neutral Beam Remote Handling System and In Vessel Viewing Systems) during preliminary design, with particular focus also on the complementary cross cutting technological developments performed through other contracts/grants; ensure procurement of the individual packages and harmonisation between them.
- Vacuum Pumping and Fuelling: completion of final design and start of manufacturing for Warm Regeneration Lines and tendering for MITICA Cryopump and Front End Cryodistribution System.
- Tritium Plant: completion of preliminary design of the Water Detritiation System "Main" and Signature of the contract for the holding and feeding Water Detritiation System tanks procurement.
- Cryoplant: Completion of manufacturing, performance of factory acceptance tests and deliveries to site for the LN2 plant and Auxiliary Systems components.
- Electrical Power Supply and Distribution: start of the installation works for electrical distribution, with as main challenge, the connection to the RTE (400 kV) grid. Install the first Load Centres and start the building 36 works construction.

- Buildings and Civil Infrastructures: start of the level B1 civil works of the Tokamak Building. The main TB02 cranes will be installed in the Assembly building. Packages of construction design of the Tokamak Complex building services will be delivered for Construction Design review.
- Ion Cyclotron Heating and Current Drive: The activity for design (mainly via framework contract) and prototyping for the ICH antenna will continue in 2016.
- Electron Cyclotron Heating and Current Drive: for the Upper Launcher the management of changes stemming from the state of flux of main interfaces (plug environment, including nuclear issues) and the technical complexity and diversity of the components of the launcher; for EC Power sources (gyrotrons) a hold point is placed to evaluate the experimental results from the CW gyrotron prototype and related qualification activities in view of the series production for ITER; for EC Power Supplies, after the design and prototyping phase in 2015, the first PS set will be manufactured in during 2016, when the factory tests are planned; for the EC Control System activity consists in the clear definition of the interfaces.
- Diagnostics: A significant number of contracts for engineering analysis, manufacturing and testing of prototypes will be signed in support of the design of Diagnostics systems. The procurement procedures for the manufacturing of several diagnostics components to be delivered to IO-CT will start during 2016, including among others cables, clips, connectors and feedthroughs for Tokamak electrical services, ex-vessel transmission components for the Plasma Position Reflectometry, and several magnetics sensors and platforms (magnetics and bolometers). During 2016, the signature of a framework contract for the production of the build-to-print drawings and manufacturing specifications and a contract for the design and manufacturing of Core-Plasma Thomson Scattering diagnostic system are also foreseen.
- Test Blanket Systems: Execution of the 1st phase of the Preliminary Design of the TBM Sets and of the Ancillary Systems and associated R&D activities, publication of the calls for tender for the completion of the Preliminary Design and of the Final Design of the TBM Sets and of the Ancillary Systems. Publication of the call for tender for the framework contract for the Prototypical Mock-up (PMU) and the Qualification Mock-up (QMU) of the TBM.
- Neutral Beam Heating and Current Drive: Signature and follow-up of the contracts for components for the NBTF Facility, in particular for the MITICA Beam Source and the SF6 Handling Plant. Signature of PA 5.3.P4.EU.01 HNB (Vessels, Drift Duct, Fast Shutter, PMS), PA 5.3.P4.EU.02 for HNB BLV Exit Scraper, and PA 5.3.P5.EU.01 HNB ACC Coils is expected pending provision of documentation by IO.
- Radiological and Environmental Monitoring System (REMS): Preliminary design of Personal Access Control Building (PACB).

Most of the work will consist in the follow-up of the procurement contracts for the manufacturing of the European components. The contract to be placed in 2016 will further increase the amount of work in progress in all areas and F4E staff will have to face and solve many technical issues due to the complexity of the manufacturing.

As for Broader Approach, 2016 is mostly focussed on the following activities:

- Satellite Tokamak (JT-60SA)**:** 2016 activities will be focused on manufacture and testing of JT-60SA Toroidal Field coils and structures, and transportation to Japan Port of Entry, assembly or support of assembly of various components under European responsibility (at Naka site), provision and installation of power supplies in Naka, support for installation and testing of Cryoplant in Naka and transportation and testing the cryostat vessel body cylindrical section.
- IFMIF-EVEDA Project: transportation, installation and commissioning of LIPAc components. Among the components to be shipped to Japan in 2016, there several remaining key elements produced for the RF Power Systems and the Medium Energy Beam Transport as well as the full system for the Radiofrequency Quadrupole and the Cryoplant.
- International Fusion Research Centre: complete last year of operation of supercomputer Helios, implement Demo activities and deliver software for REC.

The work in this area is at an advanced stage and the activities foreseen in 2016 aim at further progressing toward the completion of the three projects.

2. INTRODUCTION TO THE ANNUAL WORK PROGRAMME

2.1 Main Assumptions

ITER Project: following assumptions shall be considered as the basis of the Work Programme 2016:

- The F4E schedule used for the preparation of this document is as of end of September 2015.
- Following the instructions given by the ITER Council, ITER Organization (IO) and all Domestic Agencies (DA) are carrying out an exercise to bring as much as possible reality into the schedule of the project by taking into account the accumulated delays and any other constraint that the Parties may have (i.e. budget, manpower, etc.). The result of this exercise will have to be submitted to the ITER Council in November 2015 to decide on a revised date for the first plasma. The planning of this exercise has foreseen that all DAs had to provide their input for their part of the schedule. F4E has carried out its part of the work and critically reviewed its schedule.
- Credit values allocated to the objectives may be subject to change over the year 2016 due to their current re-adjustment.
- The realistic schedule exercise carried out by F4E takes into account:
    - the latest input and developments of the schedules from the F4E suppliers;
    - 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 to take into account bottlenecks in specific areas where staffing is not sufficient to grant a prompt process of the work;
    - the available yearly budget for the work on the EU in-kind procurements;
    - the most realistic assumptions on the 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 (DWS) to take into account any possible delay in the delivery of items to F4E that can cause delays to the EU in-kind procurements;
- In order to achieve an improvement of the quality of the PAs that will be signed in 2016, an effort is in progress in the project to better identify the requirements that are linked to the specific procurement. IO has also been called to contribute to this effort by propagating the requirements from the project level down to the level of the PA, where they interface with the DAs. Then F4E will take over for the propagation of the PA requirements down into the different procurement contracts.
- The schedules from the F4E suppliers, taking into account the agreed fabrication routes and showing the real development of the work, are being reviewed every month and the main data, once analysed, integrated into the overall F4E schedule in Primavera.
- 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 Implementing Rules.
- 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 the Framework Partnership Agreement (FPA), in order to streamline and channel R&D funding, improve its effectiveness and reduce administrative burden to beneficiaries and F4E alike.
- Procurements which encompass scope within the domain of both F4E and contracting authorities, or for which a very close coordination between F4E and other entities is needed, will be implemented whenever appropriate through the Joint Procurement procedure.
- 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.
- The revenue from the Reserve Fund are provisional and depend on the authorisation of “changes to contracts” given by IO Director General.

Regarding the WP2016 for Broader Approach, the main assumptions are that this is to be coherent with the individual BA Projects' Work Programmes and Project Plans as approved by the Broader Approach Steering Committee and by further adjustments made at the 16th Steering Committee of 21st April 2015.

2.2 Definitions

1. The 2016 Work Programme follows the EU Commission guidelines on common format for the annual work programme anticipating the requirements for the new Financing Regulation expected to be applicable to F4E from early 2016.
2. Work Programme activities are “coherent actions with objectives and resources” and equivalent to the F4E Work Breakdown Structure (WBS) level 2. When deemed needed for a better understanding of the activities, additional levels have been added under the activities.
3. Each activity contains:
    a. General overview, current status and challenges for the year 2016.
    b. Link with the ITER Project multi-annual objectives:
        i. The milestones that appear in both Work Programme and F4E Project Plan Annex IV are identified as “PP”, while the ones relevant only for the work programme are identified as “WP”. The link to the Project Plan is established through the activity ID.
    c. Assigned human resources in the year 2016; it includes all tasks and activities which are performed for the benefit of an identified WBS element.
    d. Financing Decision for each F4E WBS level 2, with the elements established by the Article 53 of the F4E Implementing Rules, includes:
        i. Scope of the procurements/grants and cash expenditures foreseen to be financed under the budget 2016
        ii. It includes provisions, even if not explicitly mentioned, for payment of liquidated damages, late payment interests and other financial compensations that F4E may be obliged to pay under its contracts.
        iii. It includes provisions for amendments to ongoing contracts covered by a previous financing decision(s) in accordance with the Implementing Rules, either directly or negotiated, if cumulative value of all amendments to a contract does not exceed 20% of the price of the initial contract. Aggregated value of the amendments will not exceed in 2016 2.0% of the sum of running contracts as planned at the date of WP2016 first issue.
        iv. It includes provisions for, even if not explicitly mentioned, urgent general support tasks as cost/risk analysis, engineering support/analysis, I&C develop and support, quality assurance and quality surveillance, transportation, material characterization activities as needed. These tasks will be mainly implemented through specific contracts under existing framework contracts (see list in section 6.4 - List of Framework Contracts and Framework Partnership Agreements).
        v. F4E has foreseen that some activities under the Work Programme 2015 will be implemented under the Global Commitment scheme in 2015 (GC2015). As the exact amount of the expenditure is not known when the Global Commitment is made or when the Work Programme 2015 (or its amendments) is prepared, therefore provisions for complementary expenditures are made available in WP2016 in the specific WBSs to fulfill the needs as in the relevant award decisions. The list of the contracts currently foreseen to be implemented under GC2015 scheme is available in section 6.7 – List of Procurement procedures GC2015.
        vi. Main Procurement Initiatives[7] to be launched during the year 2016; the list is based on the current information at the time of writing of the Work Programme and could be subject to changes. During the implementation of the work programme activities, F4E may 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 WP2016. Negotiated procedures under Article 100 of the F4E Implementing Rules will not be included in this list given that this information cannot be available at the time of writing of the Annual Work programme. A change to this list shall be considered as a non-substantial for the purposes of the Article 53 point 4 of the F4E Implementing Rules if not affecting the available budget for 2016.

[7] Defined as procurement procedures with budgeted amount or ceilings higher than 1 million Euros to be launched in the year 2016

vii. The foreseen time of publication of calls, invitations 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 (N/A in the Work Programme) as no formal publication will take place. 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).

viii. Certain activities have been moved from previous years into WP2016 due to changes in the overall planning and priorities: these items are included under the relevant WBS in the 2016 Work programme. It is understood that the inclusion of these items in WP2016 cancels and supersedes any corresponding item in a previous year's WP, unless otherwise specified in this document.

ix. Additional activities for ITER Project, upon the approval of the relevant PCR by the ITER Organization Director General or his delegates in the frame of Reserve Fund Management Plan, will be implemented under the budget line 3.6

4. The Reserve Fund (RF) to be received from ITER IO for the implementation of changes in existing contracts will consist in additional revenue. In the case that the description of the specific activity is already listed in the Work Programme, if the RF contribution to it is larger than 10 M€ (in-year value), F4E will seek approval of a specific financing decision by the Governing Board (written procedure or amendment). In the case that the description of the specific activity is not yet listed in the Work Programme, F4E will seek approval of a specific financing decision by the Governing Board (written procedure or amendment) in the case that the RF contribution to that activity is larger than 1 M€ (in-year value).
5. The use of the Grant Unique Beneficiary instrument will be fully justified and summary of justifications are available in the section 6.9 – Summary of Justifications for Unique Beneficiary Grants.
6. Procurement Arrangements list is available in the F4E Project Plan (F4E_D_2VCYRL) in the section "ITER PROCUREMENT ARRANGEMENTS", Table 2.
7. 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. The list of the FWCs and FPAs that will be on-going at the end of 2015 is available in section 6.4. List of Framework Contracts and Partnership Agreements
8. Equivalence F4E OBS to F4E WBS level 3 is available in section 6.5; For ITER project the equivalence between the F4E WBS level 2/3 and ITER WBS is available in section 6.6.
9. Some of the Work Programme activities refer to provision for recurrent activities with the same ultimate objective of supporting the final achievement either of the design (e.g. CAD support, engineering analyses, etc.), the manufacturing process (e.g. QA/QC Inspectors, engineering support for deviations analyses, CE marking, etc.) as requested in ITAs/PAs, or the site support services (access control and security, Facility Management Services, etc.). Therefore the description in term of financing decision will be similar over the years.

3. ITER PROJECT

EU.01.11 ITER – Magnets

WBS: EU.01.11	Magnets	WP ref: WP16/11/01

TOROIDAL FIELD (TF) COILS

General Overview

The scope of the Procurement Arrangement includes the supply of 10 out of 18 superconducting TF Coils used to produce a magnetic field around the torus. The TF coils will provide a total static field of 5.3 T at the plasma axis for confinement and operation. This means a peak field of ~12 T at the inner leg, thus requiring the use of Nb3Sn strand in the conductor and cooling by supercritical He (4.5 K). These magnets are built with the Wind, React & Transfer technique. The total weight of each coil is about 300 tons. One addition spare TF coil will be produced by Japanese Domestic Agency (JADA).

Current Status

All major contracts for production of TF Coils have been signed. Production of Radial Plates is on-going with 32 (over 70) Radial Plates delivered so far to Winding Pack manufacturer. The first ever prototype of the Double Pancake (part of the Winding Pack) has been successfully completed. Production of Double Pancakes is progressing well with 38 (over 70) Double Pancakes (DP) windings completed, 28 DPs transferred into the Radial Plates and 7 DPs fully impregnated and ready for the stacking of the first Winding Pack. Contract for Cold test and Coils Case Insertion is on-going with qualification of the main processes and procurement of the facilities and tools.

Challenges for the next year

In 2016 stacking and the completion of the first Winding Pack will be performed. The commissioning of all facilities and tools necessary for insertion process will be executed in parallel. After successful completion of tests required for a shipment the Winding Pack will be delivered to Coil Case Insertion contractor where will be unpacked and prepared for a Cold Test. Later in the 2016 the first Cold Test in the 77K will be performed.
A delay of more than 6 months has been announced by JADA for the delivery of the TFCS: this is going to be a big issue as it will require expensive storage of the Winding Packs (which will be ready more than 6 months earlier) and it will force the coil insertion supplier to be on hold for more than 6 months. This is likely to delay some of the intermediate milestones as the supplier might find financially more efficient to delay installation of some tooling rather than install and pay it before needed and have it on hold for 6 months. This would also reduce extra costs for us.

POLOIDAL FIELD (PF) COILS

General Overview

The scope of the Procurement Arrangement includes the production of five PF Coils (PF2-PF6). The PF coils will operate up to a peak field in the order of ~6-7 T, thus requiring the use of NbTi strand in the conductor and cooling by supercritical He (4.5 K). These magnets will be built with the Wind and Insulate technique. Four PF coils (PF2 to PF5) will be manufactured in a building provided by F4E in a location adjacent to the ITER site, while the lower coil PF6 will be provided to F4E by ASIPP - the Chinese Institute under a collaboration agreement. The total weight of each coil with support clamps is in the range of 200-400 tons. The upper and smallest coil PF1 will be provided by RFDA.

Current Status

Almost all major contracts have been signed during 2013-2015. The last two major contracts - Manufacturer (MFR) and Cold Test Facility (CTF) are in the final tendering phase and are planned to be awarded in 2015 and at the beginning of 2016 respectively. Preparation of the main winding tooling for all PF Coils is progressing well both in Europe and in China having the tooling in their facilities by the end of the year. The adaptation of the PF Coils Building in Cadarache for production of the PF Coils (offices, workshop area) is almost ready. Construction of the external storage building was initiated. The design of the impregnation and all the additional tooling started in the second half of this year.

Challenges for the next year

At the beginning of 2016 the kick-off PF Coils Manufacturer (MFR) contract and Signature of the Cold Test Facility (CTF) contract will take place. The adaptation of the PF Coils Building and construction of External Storage Building in Cadarache shall be completed in 2016. The commissioning of the Winding Tooling and qualification of all PF Coils, winding of the first Double Pancakes in Europe (PF5) and in China (PF6) will start in the same year .The impregnation tooling and the other tools required for Double Pancake manufacture will be delivered and installed.

ANNUAL OBJECTIVES

TF COILS

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU11.6A.13980	PP	Delivery of 760m TF Conductor for Double Pancake 5 of TF Coil #1	CAS 1.75000 kIUA	25/02/2016	Certificate of Acceptance (CoA) approved
EU11.1A.27641	PP	IO Approval to Insulate, impregnate and Cure TF Winding Pack #11 (ATPC)	ATP cleared by IO	03/03/2016	ATP clearance confirmation
EU11.1A.22380	PP	Coil Insertion Facility Ready	Commissioning report approved by F4E	11/11/2016	Contract Deliverable # 29 Annex B 255FVW v10.1 Related to delivery of TFCS from JADA

PF COILS

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU11.3A.40 120	PP	Cold Test Engineering Study and Facility Construction	Contract Signature	31/03/2016	Not applicable
Fusion for Energy suppliers responsibility					
EU11.3B.01 980	PP	Start Qualification of PF Coils	Hold Point Clearance (HPC) of all Relevant Deliverables related to first qualification component	17/03/2016	Manufacturing and Inspection Plan Quality Plan Tooling Design Final Report Tooling Manufacture and Qualification Final Report Manufacturing Drawings
EU11.6C.02 15	PP	Delivery of PF conductor (UL7) for Manufacturing of Double Pancake # 4 of PF Coil#6	CAS 0.93604 kIUA	11/05/2016	Certificate of Acceptance (CoA) approved

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 36.46 FTE.

FINANCING DECISION
Procurement actions
ITER Project actions in response of PAs and ITAs
For all the Magnets systems the procurement actions during the year 2016 will be focused on support the on-going main contracts for the TF Coils and PF Coils manufacturing. They will include provisions for characterization of the Nb3Sn strands samples, engineering support analysis (electromagnetic and mechanical analysis), quality assurance inspectors for contract follow-up, transportation and storage. These tasks will be mainly implemented through specific contracts under existing framework contracts (see list for the on-going framework contracts in section 6.4) or release of options of ongoing contracts. In addition an insurance contract for the Toroidal Field Winding Pack during the insertion process will be signed in 2016. During 2016 changes to the on-going magnets contracts will be implemented through amendments in line with the provisions of the Financial Regulation. Additional expenses can be also generated by potential contractual price indexations requested by the suppliers.

Cash contribution	
Scope Description	**Amount**
Amendment for PF6 Manufacturing Contract in China	100.000 euros

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
TF Coils	P Serv	Winding Pack Insurance	Q2/2016	1.1.P1A.EU.01	Y
PF Coils	Specific Contract	Poloidal Field Coils Series production follow-up	Q4/2016	PA 1.1.P3A-B.EU.01	Y

EU.01.15 ITER – Vacuum Vessel

WBS: EU.01.15	Vacuum Vessel	WP ref: WP16/15/01

MAIN VESSEL

General Overview

The European contribution to the ITER Vacuum Vessel (VV) consists in the supply of 7 out of the 9 sectors in which the VV is subdivided. For the supply of these 7 sectors one single Procurement Arrangement was signed between F4E and the ITER IO. This PA is broken down into one main supply contract (F4E-OPE-068, Manufacturing and supply of 7 VV sectors) and a number of much smaller activities, mainly implemented through task orders under framework contracts in the following areas:

- Inspection services;
- Engineering support (CAD & FEM analysis);
- Legal services.

The Vacuum Vessel is presently under fabrication by a consortium of 3 Italian companies: Ansaldo Nucleare, Mangiarotti and Walter Tosto (AMW). Each sector will be built up from four Segments, joined later to form the full Sector to be welded to the ports. As of today, the following sectors: 5, 4 and 3 have been released for manufacturing. The other sectors are planned to be released by October 2015.

Current Status

The complex process of implementation of design changes and definition of parts and welds has been completed in Sector 5 and Sector 4 3D CAD models in the IO Enovia CAD System, and therefore the 3D models are approved for fabrication.
Conceptual and detailed fabrication design, including manufacturing drawings, Top Level Manufacturing Plan, part list, weld list, and inspection assessments, are completed for Sector 5 and approved by F4E, IO and the ANB (Agreed Notified Body) as representative of the French Nuclear Regulatory Body (ASN).
Material suppliers have been qualified according to the French Nuclear code RCC-MR 2007 and delivery of plates and forgings for fabrication is on-going.
Most of the fabrication procedures have been approved and ready to use in production. Qualification of welding procedures is completed for first welds and close to completion for rest of welds.
Jigs and frames needed to support the VV fabrication are ready for the first welds, and the fabrication is on-going for the rest of welds according to the schedule.
A detailed manufacturing strategy and resources study have been completed by the AMW consortium.
Production activities have started including cutting, hot and cold forming of plates, bevelling of welding configurations, machining of forgings and first welds of Sector 5, together with the production control activities, such as dimensional inspections, visual inspections, dye penetrant tests, ultrasounds inspections, radiography, chemical and mechanical destructive testing, etc.

Challenges for the next year

In 2016, production activities will have started for 5 of the 7 sectors and this will represent a huge increase of workload for both supplier and F4E requiring an additional effort on increasing efficiency and streamlining coordination at AMW. The main technical challenges are related to the control of distortions during the fabrication process, in order to guarantee the compliance with the final tolerances of the VV, and the management of the large amount of documentation to be produced and approved, associated to each fabrication step.

BLANKET MANIFOLDS

General Overview

The design of the Blanket Cooling Manifold (BCM) pipes is now practically completed. The design for the standard sectors remains based on 20 pipe bundles (8 for the inboard and 12 for the outboard). For the NBI sectors, the lack of space in the upper port requires the routing of some pipes through the lower ports to feed the additional blanket modules.
The design of the pipe supports is quite complex. The current concept includes the brazing of an alumina layer between the support clamps and the pipe to serve as an electrical insulation.

Current Status

The validation of the brazed pipe support design is currently taking place through an IO-CT contract. The FDR of the BCM system is scheduled in December 2015.

Challenges for the next year

The PA signature in 2016 while the support design is not yet qualified today will be challenging. If everything goes fine, the technical specification for the call for tender for the series production will have to be completed by end 2016.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU15.1A.30 08110	WP	Task order #1 Lot 2 Option #2 for VV resident Inspector #2	Task Order Option signature	07/01/2016	Release of the option by F4E
EU15.1A.30 08170	WP	Task order #2 Lot 1 Option #1 for VV Inspector #1	Task Order Option signature	23/03/2016	Release of the option by F4E
Fusion for Energy suppliers responsibility					
EU15.1A.11 29030	PP	Delivery of Forged Blocks for Sector 4 - Batch 2 from R-Kind	MAD approval for forged blocks from R-Kind for Sector 4	12/02/2016	MAD for forged blocks for sector 4 priority 1
EU15.1A.30 08600	PP	Rails Forgings Sector 5 & Sector 4 Ready for Machining	MAD approval for Rails Forgings Sector 5 & Sector 4	21/04/2016	MAD for rails forgings sector 5 and sector 4
EU15.1A.10 3150	PP	F4E Checked Detailed Manufacturing Design of portion of Sector 3	DCC to supplier for sector 3 PS3 detailed manufacturing design	04/07/2016	DCC to supplier for sector 3 PS3 detailed manufacturing design
EU15.1A.10 6060	PP	Start Fabrication - Sector 4 (Stage 4D)	First fabrication activities on sector 4	12/07/2016	Point clearance of first fabrication activity on sector 4

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 26.97 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

During 2016 changes to the on-going contracts will be implemented through amendments in line with the provisions of the Financial Regulation.

Expenditures under the budget 2016 are foreseen for the following procurement actions:

- Procurement for instrumentation
- Release of the option E of the vacuum vessel contract and other possible amendments to the main contract (OPE-068)
- Price escalation for the main vacuum vessel contract (F4E-OPE-068)
- Support for follow-up inspectors and engineering analyses, CAD, legal support, distributed over all year, mainly to be implemented as specific contracts under ongoing framework contracts (see section 6.4)

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
VV	P Serv	Instrumentation for the 7 sectors	Q2/2016	PA 15.EU.01	Y

EU.01.16 ITER – Blanket

WBS: EU.01.16	Blanket	WP ref: WP16/16/01

General Overview

The overall objectives consist in the supply of 215 panels of the Blanket First Wall.

The ITER Blanket-shield system is the innermost part of the reactor directly exposed to the plasma. Its basic function is to provide the main thermal and nuclear shielding to the Vacuum Vessel and external reactor components. Its concept is a modular configuration mechanically attached to the VV.

The design of the First Wall (FW) Panels in the EU-DA scope of supply considers a maximum surface heat flux of 2 Mega Watt/m2 and is called Normal Heat Flux (NHF). The FW Panels are essentially made of 3 materials: 316L (N) austenitic stainless steel, CuCrZr alloy and beryllium in the form of tiles. No spares are for the time being included in the PA. There are in all about 30 different designs of FW panels due to the need to have various kinds of diagnostics passing though the Blanket FW.

Current Status

The main activities on the Blanket First Wall (FW) are related to the preparation of the First Wall Procurement Arrangement and to the follow-up of the manufacture of the three full-scale prototypes (FSP) in the frame of the contracts F4E-OPE-443 Lots 1-3 (Manufacturing of full scale prototype), part of the ITA-169 on the manufacture and test of Normal Heat Flux FW Full Scale Prototypes. A number of options for these contracts are being released, inter alia, cost containment studies, use of electro-plated/foil copper layer and Beryllium (Be) tile coating. Quality Assurance and Quality Control support through a specific contract over the FWC will be continued for the aforementioned contracts.

In parallel, several semi-prototypes are being submitted to High Heat Flux (HHF) tests in different facilities. The results are so far very good and will likely result in qualifying several Be-CuCrZr alloy joining conditions reducing therefore technical risks for the procurement of the FW.
The In-Vessel Project Team continues the efforts for cost containment. These result in additional mock-ups to be manufactured and tested in 2016 and 2017 aiming at validating cost effective design options.

Challenges for the next year

Main challenges in 2016 consist in achieving planned milestones per the schedule in the manufacturing of the three FSPs, while resolving manufacturing issues, continuing the FW pre-qualification programme with the HHF testing of the remaining FW semi-prototypes and launching the manufacturing of mock-ups to validate the design changes proposed in the cost saving plan.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU.16.01.123275	WP	Storage and recycling of Beryllium coated components.	Contract signed	26/02/2016	Not applicable
EU.16.01.20790	WP	Release of contractual option for the contract F4E-OPE-443 Lot-3 (WP13/16/07 for use of electro-plated/foil copper layer.	Letter releasing the option	01/06/2016	Not Applicable
Fusion for Energy suppliers responsibility					
EU.01.16.01.01.26150	WP	High heat Flux Test (HHF) of FW semi-prototypes and related material qualification tests.	Semi-prototypes successfully tested.	22/11/2016	HHF test report Contract completed

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 12.23 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures for the following procurement actions are foreseen under budget 2016:

- Release of Options under the three on-going contracts OPE-443 Lots 1-3 for the manufacture of full-scale prototypes (FSP) among other for cost containment studies, use of electro-plated/foil copper layer and Beryllium (Be) tile coating. QA support for the aforementioned contracts. Option under the on-going contract OPE-594 for fabrication of additional CuCrZr plates and Options for Ultrasonic Testing.
- Specific contracts for Re-welding and PIE of Irradiated Pipe Specimens (TS)
- Quality assurance and quality control support for the Blanket First Wall on-going contracts

During 2016 changes to the on-going contracts will be implemented through amendments in line with the provisions of the Financial Regulation.

EU.01.17 ITER – Divertor

WBS: EU.01.17	Divertor	WP ref: WP16/17/01

The EU contribution to the procurement of the ITER Divertor includes two procurement arrangements (PA), namely the PA 1.7.1 for the procurement of the Cassette Bodies and the Integration of the Plasma Facing Components (PFCs) and the PA 1.7.2B for the procurement of the Inner Vertical Target (IVT).

The PA 1.7.1 concerns the supply of one cassette assembly prototype, the manufacturing of 54 divertor cassette bodies (CB) plus six spares and the installation of the PFCs. The ITER divertor requires an extensive set of diagnostic systems supplied by the ITER Parties but the integration of the diagnostics onto the CBs is also part of this PA. The integrated cassettes are called cassette assemblies (CAs).The diagnostic to cassette interfaces are frozen but, since the diagnostics design is not completed the procedures for diagnostics integration and their acceptance/qualification tests are not fully defined yet. The Procurement type is "build to print".

The PA 1.7.2B concerns the supply of one inner vertical target prototype, 54 inner vertical targets and 6 spare inner vertical targets. The Procurement type is also "build to print".

Current Status

The Divertor Cassette PA 1.7.1 was signed on 8 May 2012. The CBs manufacturing feasibility is being addressed in the frame of three multiple framework contracts awarded to three companies for the manufacture of full size CB prototypes. The completion of this pre-qualification and readiness for series production is planned in year 2017. The qualification for the CA integration will start beginning of 2017 but the readiness of diagnostics design is not expected before 2018 with diagnostics delivered to integration site by only 2023.

The IVT PA 1.7.2B was signed on 10 March2010. The manufacturing feasibility is being addressed by one company with the manufacture of a full size IVT prototype. Three other companies are being involved in the pre-qualification for the IVT procurement through the fabrication and testing of small scale mock ups. The successful candidates will compete for the subsequent pre-qualification step with the manufacture of up to two full size IVT prototypes. The achievement of the pre-qualification and readiness for series production is planned in 2018.

Challenges for the next year

Main challenges in 2016 consist in the completion of the manufacture of the CB full-scale prototypes and of the IVT pre-qualification mock-ups, the high heat flux testing of the IVT components as well as the release of the competition for the manufacture of up to two full size IVT prototypes. In addition, they include the preparation of the procurement of the CA prototype.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU17.2B.18 140	WP	Performance of High Heat Flux (HHF) of full tungsten small scale mock ups to pre-qualify additional suppliers for the procurement of the ITER divertor Inner Vertical Target.	Contract signed	13/05/2016	Not applicable

EU17.2B.13 0040	WP	Procurement for the Industrialization of full tungsten divertor target via WEST elements	Contract signed	29/07/2016	Not applicable
EU17.01.14 0450	WP	The activity is aimed at the procurement of the integration of the cassette assembly (CA) prototype.	Call for tender launched	08/08/2016	Not applicable
EU147.2B.0 10733	PP	Delivery of the Inner Vertical Target (IVT) Full Tungsten prototype test assembly to the RF-DA Test Facility for High Flux Testing	Delivery at Test Facility	03/10/2016	Delivery note
EU17.2B.17 365	WP	Signature of Stage 2 full size prototype (OMF-567- Qualification of additional suppliers of divertor IVT)	Contract signed	03/11/2016	Not applicable
Fusion for Energy suppliers responsibility					
EU.01.17.2B .18990	WP	Performance of High Heat Flux (HHF) of full tungsten small scale mock ups to pre-qualify additional suppliers for the procurement of the ITER divertor Inner Vertical Target.	Delivery HHF test final report	16/12/2016	HHF test final report

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 12.71 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures for the following actions for the procurement of the Inner Vertical Target are foreseen under budget 2016 credited under the PA 1.7.2B:

- Signature of Stage 2 for the pre-production qualification for the procurement of the ITER full W IVT in the context of the contracts OMF-567 Lots 1-3,
- Procurement for the Industrialisation of the full W – West project,
- Procurement for High Heat Flux (HHF) testing of Divertor components and,
- Quality assurance and quality control support for the Divertor's on-going contracts.

During 2016 changes to the on-going contracts will be implemented through amendments in line with the provisions of the Financial Regulation.

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Divertor	P Serv	Industrialization of the Full-W - WEST	Q3/2016	PA 1.7.2B	Y
Divertor	P Serv	Stage 2 full size prototype - Qualification of	Q4/2016	PA 1.7.2B	Y

		additional suppliers of divertor IVT			

EU.01.23 ITER – Remote Handling

WBS: EU.01.23	Remote Handling	WP ref: WP16/23/01

General Overview

The general scope of this WBS regards the following systems:

- The Divertor Remote Handling, made of a series of movers able to travel from the Transfer Cask System docked to the VV equatorial ports 2, 8 and 14, to the working positions and to remove the 54 divertor cassettes, plus the diagnostic racks and the related primary closure plates
- The Cask and Plug Remote Handling System, also known as Transfer Cask System, made of a fleet of units able to move from Hot Cell to Tokamak Building, dock to the various ports/docking stations, install and remove in-vessel components (i.e. Divertor cassettes, blanket modules, plugs, cryopumps, IVVS, NB) with the in-cask devices.
- The Neutral Beam Remote Handling System, made of series of devices able to operate remotely in the NB cell to perform maintenance tasks on the NB injectors and on the upper Diagnostic tubes.

Current Status

The transition from pre-PA to PA regime has been completed with the signature of CPRHS PA. At the same time, the procurement contracts for procurement-in-kind are being placed. The ones for DRHS and NBRHS have already started. Complementary/preparatory activities in various technological areas are on-going mainly through specific contracts under framework contracts and Grants.

Challenges for the next year

In the frame of the global F4E contribution from ITER Remote Handling, the year of reference will see the signature of the last big procurement contract for Cask and Plug Remote Handling System (CPRHS) that will therefore give the possibility to initiate the preliminary design preparation by means of the 1st task order with the contracted supplier (1st in cascade). Meanwhile, Divertor Remote Handling System (DRHS) and Neutral Beam Remote Handling System (NBRHS) preliminary design will move on and start, respectively, and cross cutting technologies in the area of rad-hard components and control system will be further developed.

Next year the main focus will be the follow up and coordination of the major suppliers for the RH systems, which will be all contracted, in such a way to establish links and synergies among them. At the same time it is needed to take care of the cross cutting technological developments performed through other contracts/grants, in order to ensure procurement of the individual packages and harmonisation between them.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU23.03.901410	PP	Cask & Plug Remote Handling System Procurement	Contract signed	12/04/2016	Not applicable
EU23.05.20130	PP	Preliminary Design first priority items for Neutral Beam Remote Handling System	Contract signed	25/04/2016	Not applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 16.86 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Preliminary design and engineering support activities (such as R&D, control system, test and prototyping) will be carried out for the Remote Handling System PAs. These activities will be implemented mainly through specific contracts under on-going framework contracts. In particular, the Divertor Remote Handling System activities will be carried out mainly through FWC 340 lot1 - Multiple Framework Contracts in cascade for the Development and Supply of the ITER Divertor Remote Handling System (DRHS); Cask and Plug Remote Handling System activities will be implemented mainly under FWC 0577 - Multiple Framework Contracts in cascade for the Development and Supply of the ITER Cask and Plug Remote Handling System (CPRHS); Neutral Beam Remote Handling System activities will be performed mainly under FWC 340 lot3 - Multiple Framework Contracts in cascade for the Development and Supply of the ITER Neutral Beam Remote Handling System (NBRHS).

Furthermore, Engineering support activities and activities belonging to ICARHE program (radiation assessment, studies, prototyping and qualification of Rad Hard components) will be implemented mainly under FWC 633 - Multiple Framework Service Contract in cascade for the Provision of Engineering Support in the area of Remote Handling, and other general support framework contracts (see section 6.4).

Grants and Specific Grants

Scope	Type of procedure	Time of Call	Indicative Amount (Euro)	Budgetary line
Grant for Divertor RH Design and Control System support	Unique Beneficiary[8]	Q1/2016	300,000	31-35

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Remote Handling	Specific Contract	Preliminary design first-priority items for Neutral Remote Handling	Q2/2016	PA 2.3.P5.EU.01	Y
Remote Handling	Specific Contract	Preliminary design second-priority items for Neutral Remote Handling	Q3/2016	PA 2.3.P5.EU.01	Y
Remote Handling	Specific Contract	Initial Scope Evaluation for Cask and Plug Remote Handling System	Q2/2016	PA 2.3.P3.EU.01	Y
Remote Handling	Framework Contract	FWC for Design, manufacturing and Installation for Cask and Plug Remote Handling System	Q2/2016	PA 2.3.P3.EU.01	N.A.
Remote Handling	Specific Contract	GENROBOT Development Phase 2	Q2/2016	PA 2.3.P2.EU.01 PA 2.3.P3.EU.01 PA 2.3.P5.EU.01	Y

[8] Unique experimental facility (according to art.158.b of F4E Implementing Rules), VTT Technical Research Centre of Finland and TUT Foundation (trading as Tampere University of Technology): Unique experimental Facility

EU.01.31 ITER – Vacuum Pumping and Leak Detection

WBS: EU.01.31	Vacuum Pumping and Leak Detection	WP ref: WP16/31/01

General Overview

Vacuum Pumping and Leak Detection comprises five Procurement Arrangements (PA): Warm Regeneration Lines, Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box, Torus and Cryostat Cryopumps, Neutral Beam Cryopumps, and Leak Detection and Localisation.

PA 3.1.P1.EU.01: Warm Regeneration Lines

EU is responsible for the in-kind procurement (Detailed Design PA) of helium gas transfer lines for the warm regeneration system for the cryogenic pumps to be installed on the ITER vacuum vessel, the cryostat, and the neutral beam injector. The scope of supply is well defined, considering that the procurement type is a Detailed Design PA.

PA 3.1.P1.EU.02: Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box

EU is responsible for the in-kind procurement of the front end cryopump distribution Cold Valve Boxes (CVBs) and Warm Regeneration Box (WRB). This Detailed Design PA includes the Cold Valve Boxes (CVBs) for Torus Cryopumps and Cryostat Cryopumps, the CVBs for Heating Neutral Beam (HNB) Cryopumps and Diagnostic Neutral Beam (DNB) Cryopumps, together with the related cryojumpers, and the Warm Regeneration Box. The purpose of the front end cryodistribution system is to transfer the cryogens needed for the operation of the cryopumps so that the cryopanels and thermal shields in the cryopumps can be kept at low temperatures to pump the gases and to remove the heat loads from the surroundings and from the trapping of the gases.

PA 3.1.P1.EU.03: Torus and Cryostat Cryopumps

EU is responsible for the in-kind supply (Built-to-Print PA) of 6 Torus- and 2 Cryostat- Cryopumps (TCP and CCP). These pumps, which are expected to be identical, are used to provide ultra-high vacuum conditions to the Torus and the Cryostat.

PA 3.1.P1.EU.04: Neutral Beam Cryopumps

EU is responsible for the in-kind supply (Build-to-Print PA) of three Heating Neutral Beams (HNB) and one Diagnostic (DNB) Cryopumps, HNBCP and DNBCP respectively. The DNBCP is used for diagnostic purposes while the HNBCP for heating purposes and it is similar, but shorter, than the HNBCP. These cryopumps will be connected to the Neutral Beam boxes to pump the gas fed to the ion sources and neutralizers of the Neutral Beams.

PA 3.1.P3.EU.01: Leak Detection and Localisation System

EU is the responsible for the in-kind supply (Functional Specification PA) of the Leak Detection and Localisation (LDL) system. The leak detection system will mainly consist of commercial off-the-shelf components, which –for the tritium bearing systems- will be installed in glove boxes. Each vacuum system will likely be equipped with a leak detector, and several Residual Gas Analyzers (RGAs) will also form part of the leak detection system.

Current Status

PA 3.1.P1.EU.01: Warm Regeneration Lines

Under PA 3.1.P1.EU.01 there is only one contract which was signed with CRIOTEC in September 2014. Currently, F4E is in the execution phase of the contract. The whole procurement has been tendered.

PA 3.1.P1.EU.02: Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box

The procurement strategy has not been defined yet. Thus, no fraction of the procurement has been already tendered. F4E is, currently, in the pre-PA stage. A preliminary design review took place in December 2014 under IO responsibility. However, the design is not considered at the required level of maturity and so it is not well established yet.

PA 3.1.P1.EU.03: Torus and Cryostat Cryopumps

This PA is expected to be signed in 2018. However, there are some on-going activities related to this future PA: A Pre-Production Cryopump (PPC) is being manufactured under a contract funded by an ITER Task Agreement (ITA). Following the manufacturing and the testing of the PPC, the final design review managed by IO will follow to fully define the TCPs and the related documentation.

PA 3.1.P1.EU.04: Neutral Beam Cryopumps

The procurement strategy of the PA is not defined yet, and no pre-PA task has been launched. The PA is expected to be signed in 2019. A test cryopump (MITICA) will be produced and tested at the RFX MITICA Facility, which will allow minimizing any risk related to the NB Cryopumps. As a result of the Project Change Request PCR-690, the MITICA Cryopump will be shifted to PA 3.1.P1.EU.04 (now MITICA Cryopump is part of PA 5.3.P9.EU.01). A Final Design Review for the MITICA Cryopump took place in November 2013.

PA 3.1.P3.EU.01: Leak Detection and Localisation System

The procurement strategy of the PA is not defined yet. Thus, no fraction of the procurement has been already tendered. However, so far the PA has been divided in two phases: (1) Primary Leak Detection and Localisation and (2) Cryostat Leak Detection and Localisation System to be signed in 2016 and 2017, respectively. IO and EU-DA have agreed that IO will perform the R&D necessary to arrive at a conceptual design of the leak localisation system. This R&D program has experienced some delays. It should include technology demonstration on ITER-like scale. It is necessary to ensure that IO's R&D program advances the technology readiness level of the proposed leak localisation techniques sufficiently to allow for the signature of the Functional Specification PA.

Challenges for the next year

PA 3.1.P1.EU.01: Warm Regeneration Lines

- Final approval of the Final Design Warm Regeneration Lines (WRL)
- Completion of WRL Manufacturing Readiness Review
- Start of Manufacturing of WRLs.

PA 3.1.P1.EU.02: Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box

- Signature of the PA 3.1.P1.EU.02: Front End Cryopump Distribution Cold Valve Boxes and Warm Regeneration Box.
- Start of the Pre-Tendering and Tendering Phase for Manufacturing and Testing of Cold Valve Boxes.

PA 3.1.P1.EU.03: Torus and Cryostat Cryopumps

- Finish of Manufacture of Pre-Production Cryopump, funded by ITA C32TD31FE
- Final assembly of Pre-Production Cryopump, funded by ITA C32TD31FE
- Packing, Shipping and Delivery to TIMO Facility of the Pre-Production Cryopump, funded by ITA C32TD31FE
- Start of the installation and engineering test of the Pre-Production Cryopump in TIMO Facility, funded by ITA C31TD17FE.

PA 3.1.P1.EU.04: Neutral Beam Cryopumps

- Technical and Cost Assessment of the MITICA Cryopump

PA 3.1.P3.EU.01: Leak Detection and Localisation System

- PA 3.1.P3.EU.01 signed, Primary Leak Detection and Localisation (LD&L) System
- Technical and Cost Assessment for Leak Detection and Localisation.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU31.01.110180	WP	HPC – Combined Final Design Review and Manufacturing Readiness Review for Warm Regeneration Lines	CAS: 0.040 kIUA	05/04/2016	Resolution of outstanding issues (design review CHITs) after the Final Design Review
EU31.01.12113	PP	Final Approval of Final Design Warm Regeneration Lines	Final Design Review Meeting held & design endorsed by the Steering Committee.	29/04/2016	Design Review Panel Report issued and Steering Committee decision taken.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 6. 73 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures are foreseen under budget 2016 for the following actions:

- Procurement for Technical Assessment and Cost Estimation for MITICA Cryopump.
- Procurement for Technical Assessment and Cost Estimation for Leak Detection and Localisation

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Vacuum Pumping and Fuelling	P Supply	Manufacturing and Factory Testing of Cold Valve Boxes	Q3/2016	PA 3.1.P1.EU.02	N

EU.01.32 ITER – Tritium Plant

WBS: EU.01.32	Tritium Plant	WP ref: WP16/32/01

General Overview

Tritium Plant comprises three Procurement Arrangements (PA): Isotope Separation System (ISS), Water Detritiation System (WDS) Tanks, and WDS Main System.

PA 3.2.P3.EU.01 Isotope Separation System
EU is responsible for the in-kind supply of the Hydrogen Isotope Separation System, via a Detailed Design Procurement Arrangement. ISS concept is based on the 2001 design which comprises a cascade of four inter-linked packed cryo-distillation columns cooled down to 20-25 K temperature and equipped with 6 equilibrators and various heat exchangers. Exploiting small differences in the boiling temperatures of the six hydrogen molecules, the ISS separates the hydrogen isotopes in the mixtures received from Tokamak Exhaust, Water Detritiation and Neutral Beam Systems and produces specific hydrogen isotopic streams for the Storage and Delivery System and the Water Detritiation System.
PA 3.2.P5.EU.01 Water Detritiation System - Tanks
EU is responsible for the in-kind procurement of part of the Tritiated Water Holding Tanks (TWHT) of the WDS via a Detailed Design Procurement Arrangement. During ITER operation and maintenance, tritiated water generated by various sources and accumulated in amounts beyond the authorized discharge limits will be stored on site and processed in the Water Detritiation System (WDS), which is part of the Tritium Plant. There, this water will be converted into hydrogen and oxygen streams using tritium compatible electrolysers. A part of the so produced tritiated hydrogen isotope mixtures will be sent to the ISS, whereas the main stream is injected into the bottom of the Liquid Phase Catalytic Exchange (LPCE) column where tritium from hydrogen is transferred to liquid water by means of catalytic exchange reactions. The detritiated hydrogen and oxygen will finally be discharged into the environment within the authorized release limits. The scope of this PA is limited to two 100 m3 emergency tanks (ETs) and four 20 m3 Holding Tanks (HT), excluding piping and instrumentation. A Project Change Request PCR-649 is going to be issued by IO in 2015 so as to include additional scope of supply to PA 3.2.P5.EU.01 that before was included in the PA 3.2.P5.EU.01. This scope includes two HL Holding Tanks and two Feeding Tanks.
PA 3.2.P5.EU.02 Water Detritiation System – Main System
EU is responsible for the in-kind procurement (Detailed Design PA) of the Water Detritiation System (WDS). The PA, which is focused in the whole WDS excluding the tanks mentioned before, is expected to be signed in 2017.

Current Status

PA 3.2.P3.EU.01 Isotope Separation System
The procurement strategy of the PA is not defined yet and, therefore, no fraction of the procurement has been already tendered. The PA is planned to be signed in 2020, hence, up to this date the conceptual design will be carried out by IO, whereas the preliminary design will be developed through an ITER Task Agreement (ITA) to come.
PA 3.2.P5.EU.01 Water Detritiation System - Tanks
The procurement of the TWHTs has been performed by means of one contract for final design, manufacturing, delivery and witnessing of on-site installation. The choice to place only one contract for the final design and manufacturing of tanks is based on the outcome of the market survey carried out in 2011. Besides, a small amount contract was placed for quality control of the manufacturing and testing of the tanks in manufacturer's premises. The first part has been already tendered and manufactured: HTs and ETs.
The same procurement strategy is planned for the four smaller tanks, scope of PCR-649.
PA 3.2.P5.EU.02 Water Detritiation System – Main System
Currently, F4E is in the preliminary design of ITER WDS Main, which is developed with an ITER Task Agreement (ITA). Basically, the relevant activities funded by this ITA are the design and R&D work (electrolyser and LPCE column) for development of detailed design of Water Detritiation System.

Challenges for the next year

PA 3.2.P3.EU.01 Isotope Separation System
Initially, the strategy was to develop the conceptual design of the ISS at F4E through an ITER Task Agreement (ITA) in 2016. This strategy, however, was changed and the conceptual design is to be developed directly at IO. Then, there are not significant challenges on this PA for 2016 apart from some support to IO activities when required.

PA 3.2.P5.EU.01 Water Detritiation System - Tanks

- Contract signed for the Procurement of HL Holding Tanks and Feeding Tanks.
- Start of Final Design phase for HL Holding Tanks and Feeding Tanks.

PA 3.2.P5.EU.02 Water Detritiation System – Main System

- Finish relevant activities funded by ITA "Design and R&D work for development of detailed design of Water Detritiation

System": Preliminary Design of ITER Main WDS Stage 1 (excluding tanks).

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU32.05.18 1550	PP	Contract Signature for Procurement of 5m3 and 12m3 (Holding and Feeding) WDS tanks	Contract signature	26/09/2016	Not Applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 4.19 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures are foreseen under budget 2016 for the following actions:

- Procurement of 5m3 and 12m3 Water Detritiation System (WDS) Tanks

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
PS. Tritium	P Supply	Procurement of 5m3 and 12m3 Water Detritiation System (WDS) Tanks	Q2/2016	PA 3.2.P5.EU.01	Y

EU.01.34 ITER – Cryoplant

WBS: EU.01.34	Cryoplant	WP ref: WP16/34/01

General Overview

EU is responsible for the in-kind procurement (Functional Specification PA) of the Liquid Nitrogen Plant and Auxiliary Systems of the ITER cryogenic system. The LN2 Plant and Auxiliary Systems is composed of the LN2 Plant, the 80K loops, the helium storage tanks, the helium purification system, the helium dryers and the heaters. Two 80K loops provide helium at 80K for the following duties: (1) cool the thermal shields of the cryostat, vacuum vessel, cryolines, cryodistribution and cryopumps as well as the magnet gravity supports; and (2) periodically regenerate the cryopumps. As part of the LN2 plant, two nitrogen refrigerators provide the cooling power for: (1) pre-cooling the LHe plant and (2) cooling the 80K loops. They also provide nitrogen in liquid or gaseous form at two temperature levels (300 K and 80 K) for the purification unit, quench tanks and LHe tanks, dryers and nitrogen utility network. The LN2 plant includes liquid and gas storage, a local nitrogen generator to compensate the nitrogen losses, pumps and a vaporiser. Helium storage tanks are designed to store the helium inventory for the ITER machine as well as the necessary helium volume to control the system in all operating scenarios. The helium purification system is designed to recover and clean helium gas. Heaters are designed to provide the necessary heating power to ensure testing and operation of the cryogenics system.

Current Status

This PA was signed on 15 June2011. The chosen procurement strategy is for a main contract covering the engineering, manufacturing, transport, and supervision of installation and testing of the equipment part of the PA scope. The main contract was signed in December 2013 after a pre-engineering phase; Preliminary Design Review and Final Design Review took place in September 2014 and July 2015, respectively. The manufacturing phase started early 2015 with the Manufacturing Readiness Reviews (MRRs) of the Long Lead Items (compressors, heat exchangers, tanks, etc.). About 85% of the procurement has been tendered. Within this fraction, about 70% have been ordered (the options account for the 15% difference).

Challenges for the next year

- Procurement of rotating equipment, static equipment, plant and piping, instrumentation, electrical and ALAT Modules.
- Package integration 80K He Loops and LHe Plant.
- Manufacture, Factory Acceptance Test, Packing and Shipping, and delivery of 80K Loops.
- Manufacture, Factory Acceptance Test of LN2 Plant.
- Packing, shipping, and delivery of all equipment. Definition of the logistic strategy (transport included in the initial commitment of the main contract with Air Liquide, F4E's main supplier).
- Execution of Option 1 for installation of liquid nitrogen plant and auxiliary systems.
- Implementation of Option 3 Engineering Support tasks.
- Implementation of Option 4 Industrial HMI.
- Implementation of Option 12 Additional storage
- Contract signed for Quench line for LN2 Plant and Auxiliary Systems
- Contract signed for LHe Tank Platform

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU34.01.14 350	WP	HPC – IO approval for Factory Acceptance Test LIN Tanks	CAS 0.235 kIUA	28/07/2016	Criteria fulfilled for LIN Tanks Factory Acceptance Test, and associated documentation approved.
EU34.01.21 530	WP	HPC – IO approval for Factory Acceptance Test GHe Storage Tanks	CAS 1,570 kIUA	16/08/2016	Criteria fulfilled for GHe Storage Tanks Factory Acceptance Test, and associated documentation approved.
EU34.01.16 138	WP	HPC – IO approval for Factory Acceptance	CAS 0.392 kIUA	19/08/2016	Criteria fulfilled for He Dryers Factory Acceptance Test, and

		Test He Dryers			associated documentation approved.
EU34.01.13 070	WP	HPC – IO approval for Factory Acceptance Test 80 K Loop 2	CAS 1.177 kIUA	25/08/2016	Criteria fulfilled for 80 K Loop 2 Factory Acceptance Test and associated documentation approved.
EU34.01.15 710	WP	HPC – IO approval for Factory Acceptance Test He Purifier	CAS 0.471 kIUA	23/09/2016	Criteria fulfilled for He Purifier Factory Acceptance Test, and associated documentation approved.
EU34.01.12 170	WP	HPC – IO approval for Factory Acceptance Test LN2 Plant Refrigerator 2	CAS 2.984 kIUA	10/10/2016	Criteria fulfilled for LN2 Plant Refrigerator 2 Factory Acceptance Test, and associated documentation approved.
EU34.01.10 800	PP	Delivery 80K Loop 1 by EU-DA to ITER Site	80K Loop assembled, tested and delivered to ITER Site	24/10/2016	80K Loop 1
EU34.01.14 810	WP	HPC - IO approval for Factory Acceptance Test Quench Tanks	CAS 0.785 kIUA	03/11/2016	Criteria fulfilled for Quench Tanks Factory Acceptance Test, and associated documentation approved.
EU34.01.13 850	WP	HPC - IO approval for Factory Acceptance Test LHe Tanks	CAS 0.235 kIUA	03/11/2016	Criteria fulfilled for LHe Tanks Factory Acceptance Test, and associated documentation approved.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 9.62 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures are foreseen under budget 2016 for the following actions:

- Implementation of options (inter alia installation of the Baseline Equipment at the ITER Site, Engineering support tasks, additional storage, installation of Liquid Nitrogen Plant and Auxiliary System: Complements to Options 1 and 9, etc.), and potential price revision for the main Cryoplant contract F4E-OPE-376.
- Provision for additional activities regarding Installation of the LN2 Plant and Auxiliary Systems
- Contract for LHe tank platform
- Contract for Quench line for LN2 Plant and Auxiliary Systems.

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Cryoplant	P Supply	LHe tank platform	Q2/2016	PA 3.4.P1.EU.01	Y
Cryoplant	P Serv	Provision of utilities, consumables, assistance for test & Commissioning of LN2 Plant & Auxiliary Systems	Q3/2016	PA 3.4.P1.EU.01	N

EU.01.41 ITER – Electrical Power Supply and Distribution

WBS: EU.01.41	Electrical Power Supply and Distribution	WP ref: WP16/41/01

General Overview

In the frame of the ITER in-kind contribution, Europe provides the detailed design, part of the procurement, and the installation of the electrical power distribution. F4E is supported by an Architect Engineer Contractor in its missions of delivering the detailed design, procurement activities, contract management and supervision of construction

The Electrical Power Supply and Distribution procurements to be provided by EU are listed here below.

PBS	EU obligation	Other DA involved/remarks
COIL POWER SUPPLY & DISTRIBUTION (Pulsed power electrical network PPEN which supplies the magnets converters and the additional heating and current drive systems)		
PBS 41.P1	Alternative current distribution system	CN, KO and RF are involved in other parts of the PPEN (Converters, Reactive Power Compensation & Harmonic Filter System, Switching Network & Discharge circuit)
STEADY STATE ELECTRICAL POWER NETWORK (SSEN, which supplies the auxiliaries systems; the Tokamak, the Cooling Water System, the Cryoplant and safety relevant loads being its main client)		
PBS 43	High Voltage, Medium Voltage and Low Voltage supply	US is involved in the procurement of components (75%)

Current Status

The three main contracts, Architect Engineer, TB04 (Buildings Services for Tokamak Complex and surrounding buildings) and TB06 (Electrical power distribution supply, installation and commissioning), are in place. The Construction Design for the electrical distribution has been delivered and is under Design Review. The Final Design for building 36 (Min Alternating Current Distribution Building) has been delivered and is under review.

The procurement for Electrical Distribution buildings 44-47 is forecasted for 2016.

Challenges for the next year

In 2016 the installation works for electrical distribution will start, with as main challenge, the connection to the RTE (400 kV) grid.

The other challenges are to install the first Load Centres and to start the building 36 works construction.

In terms of procurement, following redefinition of the procurement strategy for the Emergency Power Supply Distribution to be concluded in 2015, the procurement for Electrical Distribution buildings 44-47 should be proceeded in 2016.

ANNUAL OBJECTIVES

Milestone ID/Objectives	Milestone Objective type	Scope Description	Achievement criteria/CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility (contract execution)					
EU41-43.1A.40100	PP	IO approval of Detailed Assembly and Installation Design for SSEN & PPEN	Hold Point Release	28/04/2016	Detailed Assembly and Installation Design for SSEN & PPEN
EU41-43.113410	PP	Delivery of PBS 43 LC 03	Delivery	13/12/2016	PBS 43 LC 03
EU41-43.115610	PP	Delivery of PBS 43 LC 14	Delivery	16/12/2016	PBS 43 LC 14
EU41-43.113210	PP	Delivery of PBS 43 LC 02	Delivery	23/12/2016	PBS 43 LC 02

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 8.06 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures under the budget 2016 are foreseen for the following procurement actions.

- The contract for Design and Build for Electrical Distribution buildings 44-47 (TB13) is forecasted in 2016
- Options of existing Buildings contracts (inter alia TB 06), and changes to the ongoing contracts in relation with PCRs and input data delays will be implemented through amendments to the ongoing contracts.

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Power Supplies and Distribution	Design and Build	TB13[9] - Reduced scope to Design & Build the Distribution Buildings and Equipment	Q1/2016	4.1.P1A-8B.EU.00 4.1.P8A-8C.EU.01	Y

[9] Contract shared between WBS EU.01.41 and WBS EU.01.62

EU.01.51 ITER – Ion Cyclotron Heating and Current Drive

WBS: EU.01.51	Ion Cyclotron Heating and Current Drive	WP ref: WP16/51/01

General Overview

The overall objectives consist in the supply of the European part of the Ion Cyclotron Heating System (ICH).
The entire ICH system includes: two IC Antennas (Antenna N1 procured by the EU, procurement of Antenna N 2 by the EU pending resolution of Project Change Request (PCR) 400), the Ion Cyclotron Main Transmission Line (procured by the US) and the Ion Cyclotron Radio Frequency power sources (procured by IN).

Current Status

The second phase of the design of the antenna, aimed at producing the antenna final design for the ITER Final Design Review (FDR) is implemented with a Framework Contract (FWC) which was signed in 2014.
The Faraday Screen (FS) Small Scale Mock-Ups (SSMU) were successfully tested for 15,000 cycles at the design load of 3.5 MW/m2. The SSMUs were also tested for higher heat flux in disruptive tests. Post-mortem analysis to determine causes of failure are on-going.
The specific contract of the design FWC, which includes general design management support, review of the requirements and introduction of the requirements in the DOORS database, is on-going. Further specific contacts for components design are foreseen for 2016. Preparation for prototyping activities is also foreseen for 2016.

Challenges for the next year

The main challenge in 2016 will be to be able to plan the scope of work for the design specific contracts in an environment of changing interfaces and overall boundary conditions variability.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU51.01.13 5220	PP	Design and analysis of Faraday Screen bar	Signature of Specific contract	02/05/2016	Not applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 5.80 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures are foreseen under budget 2016 for the following actions:
Design and prototyping of the ITER Ion Cyclotron Heating antenna or for preparation of procurement for the final design review

EU.01.52 ITER – Electron Cyclotron Heating and Current Drive

WBS: EU.01.52	Electron Cyclotron Heating and Current Drive	WP ref: WP16/52/01

ELECTRON CYCLOTRON UPPER LAUNCHER

General Overview

F4E is in charge of the in-kind procurement of 4 Electron Cyclotron Upper Launchers (in-vessel plug and ex-vessel system) and of the ex-vessel system of the Electron Cyclotron equatorial Launcher.
At the moment the launcher is in the final design phase, and F4E has been subcontracted the majority of the design, prototype and qualification work by IO, financed by a number of ITAs (ITER Task Agreements).

Current Status

The main activities on-going at the moment are related to general mechanical design, prototype procurement and testing (focussed on Protection Important Components (PICs), i.e. components with a nuclear safety classification) and on consolidation of the technical baseline, configuration management and requirements identification and verification. Specifically, in 2015 we have completed the qualification of the diamond disk suppliers, prepared for the diamond window prototype and qualification, started the isolation valve qualification as well as continuing with the design and system engineering activities.

Challenges for the next year

The main challenges in the Launcher work are twofold: the management of changes stemming from the state of flux of main interfaces (plug environment, including nuclear issues) and the technical complexity and diversity of the components of the launcher, requiring a range of special and “rare” skills and suppliers. These two challenges impact on schedule, acquisition of specific expertise and suppliers. The ITA-supported work is very beneficial for F4E to prepare properly for the industrial phase and manage the risks related to some of these challenges.

ELECTRON CYCLOTRON GYROTRONS, POWER SOURCES AND POWER SUPPLIES

General Overview

F4E is in charge of the in-kind procurement of 6 RF Sources (gyrotrons) producing each 1 MW of power at 170GHz at CW for the Electron Cyclotron (EC) system of ITER. The other Parties supplying gyrotrons are Russia, Japan and India with 8, 8 and 2 units, respectively, for a total of 24 gyrotrons (24 MW) to be installed in ITER. The gyrotrons for ITER are procured on the basis of the functional specifications that go beyond the present gyrotrons installed in the existing facilities. It is currently planned that the PA will be signed in Jan 2017.
The F4E contribution for EC Power Supplies concerns the final design, fabrication, delivery, installation and commissioning of 8 out of the 12 power supply sets as required by the EC Radio Frequency Sources (gyrotrons) of ITER. The main task of the EC power supplies is to transform the electrical power from the 22kV PPEN grid to regulated direct current and voltage that ITER will need to generate the electromagnetic waves in the gyrotrons. The 5.2.P4.EU.01 PA was signed in May 2012.

Current Status

F4E is in the validation phase of the development programme of the 1MW gyrotron for ITER, which is carried out in collaboration with the EGYC Consortium (KIT, CRPP, HELLAS, CNR, ISSP and USTUTT) and the industrial partner Thales Electron Devices, and takes advantage of the development and production of the 1MW, CW gyrotron for W7X. The manufacturing and experiments with a short pulse gyrotron and cavity mock-ups were successfully performed by the end of 2014 and beginning of 2015, whereas the validation tests with the 1MW CW gyrotron prototype are planned for the end of 2015 and 2016. The final design of the HV ECPS was finalized and approved by the end of 2014 and the qualification phase will be finalised within the 2015.

Challenges for 2016

A hold point for EC Power sources is placed along the track of F4E project plan in September 2016 to evaluate the results, the market situation and the procurement strategy in view of the series production for ITER, which will start after a final qualification/ industrialization phase and final design of all components and auxiliaries included: gyrotron tube, superconducting magnet, Matching Optics Units, cooling manifold, control and protection system, supporting systems, etc. The EU obligations include the final design, manufacturing and factory testing of components, delivery and acceptance testing. For EC Power Supplies, after a qualification phase in 2015, the HV units of the first PS set will be manufactured in 2015 and 2016, when the factory tests are planned. Additional procurement lines related to the same PA are for the Instrumentation & Control layer interfacing between the PS HV units and the upper ITER I&C system and support to F4E for the technical monitoring of the industrial design and fabrication activities, which is being executed through separate F4E contracts.

ELECTRON CYCLOTRON CONTROL

General Overview

F4E is in charge of the in-kind procurement of the Electron Cyclotron Plant control System (ECCS) and of the Upper Launcher Subsystem Control Unit (UL-SCU).
At the moment the control system is at the stage of conceptual design. F4E has taken the technical lead already in the preparation

of the Conceptual Design Review which was performed and approved without any major chit.

Current Status

The main activities on-going at the moment are related to the collection and consolidation of the requirements. A prototype of the most critical hardware component is also being developed and tested.

Challenges for the next year

The main challenge in the EC Control System activity consists in the clear definition of the interfaces. An interesting opportunity comes instead from the synergies with the development of the control system for the ECT-Falcon facility which will allow testing extensively the concepts developed for the EC Plant Controller.

ANNUAL OBJECTIVES

ELECTRON CYCLOTRON UPPER LAUNCHER

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU52.01.30 5110	PP	Waveguide prototype development and qualification	Contract signature	06/07/2016	Not applicable
EU52.01.22 1210	PP	Procurement of Mechanical Prototypes for the EC Upper Launcher	Framework Contract signature	24/10/2016	Not applicable

ELECTRON CYCLOTRON POWER SOURCES AND POWER SUPPLIES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU52.04.23 010	WP	Release of Options for the Contract Procurement of Body PS & MHVPS (Main Contract)	Release of options	16/02/2016	Not applicable
EU52.04.20 640	WP	Framework Technical Follow-up BPS & MHVPS	Contract Signature	02/11/2016	Not applicable
EU52.03.11 7170	WP	GRT Design & Development of EU 1MW CW Gyrotron Prototype - 3rd Phase	Contract Signature	23/12/2016	Not applicable
Fusion for Energy suppliers responsibility					
EU52.03.10 778	PP	Development of EU 1MW CW Gyrotron Prototype for ITER	Completion	13/09/2016	Exit Criteria
EU52.03.22 165	PP	Packing and Shipping of He-free Magnet II	Shipping	26/10/2016	Delivery Note
EU52.04.12 575	PP	Final Set #1 (1 Unit of Main HV Power Supply) Completed at Supplier Site	FAT completion	07/11/2016	FAT Report

ELECTRON CYCLOTRON CONTROL

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU52.05.50 0370	WP	Design & Prototype of ECCS incl. FAT and SAT tools	Specific contract signature	21/03/2016	Not applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 12.78 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

The main thrust of the Electron Cyclotron Upper Launcher is to continue the design work towards the final design and carry out supporting prototypes and qualification. The design work is carried out under a long-term grant, already in place, and includes design, analysis and support to the preparation of documentation for Final Design reviews. The prototype and qualification programme focuses on the diamond window unit, the Isolation valve and in initiating the waveguide prototype activities.

Expenditures for procurement actions are currently planned for the amendment for the 2nd EU Gyrotron Prototype (EU 1MW CW Gyrotron Prototype), the contract for a feasibility study to repair the ASG Superconducting Magnet, the specific contract for procuring the Gyrotron cooling system, the contract for transportation of the EU 1MW CW Gyrotron Prototype from KIT Karlsruhe to CRPP Lausanne, specific contracts for inspectors to control Gyrotron Superconducting Magnet and ECPS production phases, specific contracts for support engineering and qualification activities, release of options and amendment for the contract of Body PS & MHVPS (Main Contract), and the signature of the Framework for Technical Follow-up of the Procurement of Body Power Supply & Main High Voltage Power Supply.

Concerning the EC Control System the main activities will regard the development of the conceptual design of the EC Upper Launcher SCU and the design and prototyping of the EC Plant Controller, including FAT and SAT tools. A preliminary analysis of the CE plant Safety System will also be performed.

Grants and Specific Grants

Scope	Type of procedure	Time of Call	Indicative Amount (Euro)	Budgetary line
Grants for Design & Development of EU 1MW CW Gyrotron Prototype - 3rd phase	Unique Beneficiary[10]	Q3/2016	1,200,000	31

[10] EGYC Consortium: technical competencies, according to art.158.b of F4E Implementing Rules.

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
H&CD.EC UL	Framework Contract	Setup and Operation of the EC components test facility (FALCON)	Q4/2016	ITA C52TD44FE	N.A.
H&CD.EC UL	Framework Contract	Procurement of Mechanical Prototypes for the EC UL	Q2/2016	PA 5.2.P1B.EU.02	N.A.
H&CD.EC UL	Framework Contract	Engineering Support Build-to-Print EC UL	Q3/2016	PA 5.2.P1B.EU.02	N.A.

EU.01.53 ITER – Neutral Beam Heating and Current Drive

WBS: EU.01.53	Neutral Beam Heating and Current Drive	WP ref: WP16/53/01

General Overview

F4E is in charge of the in-kind procurement of the Neutral Beam (NB) Sources (2 Ion Sources and 1 Accelerator producing negative ion beams); the NB Beam Line Components (2 Neutraliser, 2 Residual Ion Dump and 2 Calorimeter), the NB Confinement and Shielding (2 vessels, 1 passive magnetic shielding, valves), 2 sets of NB Active Correction and Compensating Coils, the NB Assembly for the two ITER injectors and the NB Power Supplies.
The finalisation of the ITER NB injectors has required the establishment and operation of the NB Test Facilities (NBTF) at RFX-Padua. The test facility is composed of two main test beds: SPIDER, a full size Ion Source with beam extraction at 100 kV, and MITICA, a full size ITER injector capable of operating at full performances (1 MV, 40 A at the grounded grid in D, 3600 sec).

Current Status

The establishment of the NBTF at RFX-Padua is progressing for many components with the SPIDER vacuum vessel delivered at the site, the NBTF vacuum and gas injection system and cooling plant, the SPIDER Ion Source and Extraction Power Supplies, and SPIDER High Voltage Deck and Transmission Line in installation phase at the site. Several contracts aimed to provide with other specific components for the NBTF are on-going (Control and data acquisition, SPIDER and MITICA diagnostics, MITICA vacuum vessel, MITICA ISEPS, High Voltage Deck and Bushing. Other contracts that will provide the NBTF with components are in the final phases before signature (Acceleration Grids Power Supplies planned to be signed in Oct 2015, Grounded Related Power Supplies planned to be signed in Dec 2015, NBTF Assembly Framework planned to be signed on Jan 2016, and SF6 gas handling plant planned to be signed in Feb 2016. The activities for designing components outside the NBTF (valves, exit scraper, etc.) have been finalised in July 2015.

Challenges for 2016

On the top of the below identified objectives for 2016, the main challenge of the year will be the signature of the 3 PAs: PA 5.3.P4.EU.01 HNB (Vessels, Drift Duct, Fast Shutter, PMS), PA 5.3.P4.EU.02 for HNB BLV Exit Scraper, and PA 5.3.P5.EU.01 HNB ACC Coils. Their signature is depending on the time schedule from preparation to finalisation and approval of those PAs mainly driven by IO.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU53.TF.17 310	PP	Procurement for SF6 System for MITICA	Contract Signature/ CAS 0.16	16/02/2016	Contractual Documentation
EU53.TF.07 4100	WP	MITICA Beam Source	Specific Contract Signature/CAS 0.48	21/04/2016	Contractual Documentation
EU53.TF.50 154	WP	SPIDER Diagnostics 2 (FWC - NBTF Diagnostics)	Specific Contract Signature	06/05/2016	Contractual Documentation
EU53.TF.15 5900	WP	Procurement of NBTF SPIDER Control 3	Specific Contract Signature	16/05/2016	Contractual Documentation
EU53.TF.04 220	WP	PRIMA Assembly (FWC - Assembly)	Specific Contract Signature/ CAS 0.18	24/05/2016	Contractual Documentation
EU53.CA.00 215	WP	NBTF Work Programme 2017	Contract Signature	21/12/2016	Contractual Documentation
Fusion for Energy suppliers responsibility					
EU53.TF. 13290	WP	HPC - SPIDER Vessel - Accepted	IO Acceptance/CAS 0.32	14/01/2016	Acceptance Data Package
EU53.TF.15 110	WP	Manufacturing and Testing Completed -	FAT completion	25/01/2016	Acceptance Data Package

		SPIDER Interlock			
EU53.06.02 320	WP	HPC - Final Documentation Set Accepted and Ownership of SPIDER ISEPS Transferred to IO	IO Acceptance/0.5	09/02/2016	Acceptance Data Package
EU53.TF.02 360	WP	HPC - SPIDER Vacuum and Gas Injection Plants - Accepted	IO Acceptance/0.24	24/02/2016	Acceptance Data Package
EU53.TF.15 270	WP	Manufacturing and Testing Completed - SPIDER & PRIMA Safety	FAT completion	09/03/2016	Acceptance Data Package
EU53.TF. 22540	WP	HPC - SPIDER CODAS - Accepted	Contract completion/0.95	15/03/2016	Acceptance Data Package
EU53.TF.20 880	WP	HPC - SPIDER TL - Accepted	Contract completion/CAS 0.2	28/04/2016	Acceptance Data Package
EU53.TF.02 195	WP	Approval of Acceptance Test - SPIDER Cooling Plant	SAT completion/ CAS 1.12	30/05/2016	Acceptance Data Package
EU53.06.03 280	WP	HPC - First Design Report of MITICA AGPS & GRPS Accepted	IO Acceptance/1.4	06/06/2016	Acceptance Data Package
EU53.TF.19 230	PP	Manufacturing and Testing Completed - MITICA Vacuum and Gas Injection Plants	FAT completion	04/08/2016	Acceptance Data Package

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 21.56 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

The procurement procedures currently planned to be completed within 2016 are the release of options for HV Deck1 & Bushing, and Cooling Plant MITICA and SPIDER Experiments, the signature of the Task Order for NBTF SPIDER Control, the specific contract - SPIDER Diagnostics (FW Contract - NBTF Diagnostics), the framework for NBTF Assembly and the consequent specific contract for PRIMA Assembly (FWC - Assembly), the specific contract for MITICA Beam Source, the contract for SF6 System for MITICA, the Task Order for NBTF Site Supervision and Support, the task order for QA Inspectors and for engineering activities within the NB area.

Cash contribution

Scope Description	**Amount (Euros)**
This cash contribution to the Consorzio RFX corresponds to the 2017 NBTF Work Programme and amendment of the 2016 NBTF WP implementing the agreement on the Neutral Beam Test Facility on credited and not-credited budget lines. The commitment for the activities will be implemented after the F4E approval of the NBTF 2017 Work Programme and after the F4E approval of the amendment of the 2016 NBTF WP. The main activities that will be performed in 2017 are: • Preparation for the exploitation of the SPIDER and MITICA test beds SPIDER commissioning and operation	8,400,000

• MITICA components integration • R&D activities and procurements for demonstration activities finalised to the verification and optimization of NB components; • Modelling and physics studies directly related to the development of the components for the NB system; • Support to F4E in the preparation and follow-up of procurements contract and project integration; • Provision of NBTF Host services like: technical support during installation, construction supervision, licensing and safety, insurance, procurement of balance of plants, consumables and other supplies and services necessary for construction, integration and operation; • Provision of site facilities to Third Parties, as applicable.	

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Neutral Beam Test Facility	Specific Contract	PRIMA Assembly (FWC - Assembly)	Q1/2016	5.3.P9.EU.01	Y
Neutral Beam Test Facility	Specific Contract	MITICA Beam Source	Q1/2016	5.3.P9.EU.01	Y
Neutral Beam Test Facility	P Supply	SF6 System for MITICA	Q3/2015	5.3.P9.EU.01	Y
Neutral Beam Test Facility	P Supply	Procurement for MITICA Beam Line Components	Q2/2016	5.3.P9.EU.01	N
Neutral Beam Test Facility	Specific contract	Exec 2D drawings +Writing TS for Components Outside NBTF (NB Vessels, Fast Shutter, PMS, ACCC, Exit Scraper)	Q4/2016	5.3.P4.EU.01 / 5.3.P5.EU.01	N

EU.01.55 ITER – Diagnostics

WBS: EU.01.55	Diagnostics	WP ref: WP16/55/01

General Overview

The Diagnostics on ITER are measurement systems allowing evaluation of the parameters of the plasma and first wall. They provide key information to protect the machine from damage, to allow the plasma to be controlled and for physics studies.

Europe is responsible for around one quarter of the ITER Diagnostics, including several systems which are essential for first plasma operations. Europe's scope of supply includes 11 distinct Diagnostic systems; Tokamak electrical services (cables, feedthroughs and connectors on the ITER vessel); design integration of diagnostics into 7 ports housing 22 diagnostic systems from Europe, IO and five other Domestic Agencies; and supply of 5 port plugs.

Following a decision of the F4E Governing Board in March 2011, Europe is providing most systems to functional specifications from IO. The only exception is the magnetic sensors, which are typically provided to detailed design specifications

Current Status

Framework partnership agreements were signed for most of the diagnostics systems involving more than 28 EFLs and Industry in 12 EU countries.

The identification, analysis and documentation of requirements & interfaces, and flow-down to system-level have been completed for most systems, which are now in the process of revisiting conceptual design solutions and analysing architecture options for optimisation against requirements, cost and schedule, together with the process of thoroughly justify and document baseline design solution and demonstrate manufacturability and compatibility with cost and schedule constraints

Significant advancement has also been done on Diagnostics Integration, including development of DSM (Diagnostics shield modules) designs, production of detailed manufacturing sequences for requirements-optimised architecture in 2 different technologies for DSMs and development of PIC electrical feedthroughs for port plugs.

On Magnetics Diagnostics, design has significantly evolved for all EU sensors, including completion of the final design for Fibre-Optic Current Sensors and Continuous External Rogowski (CER). Manufacture of CER started in 2015, which is the first EU Diagnostics delivery to IO-CT.

Challenges for the next year

Design will progress during 2016 for Diagnostics systems mainly inside the existing FPAs to a level where manufacturability and compatibility with cost and schedule constraints can be demonstrated with the subsequent signature of the Annex B of the corresponding PA (note that most Annex B will be signed during 2016 and early 2017). A significant number of contracts for engineering analysis, manufacturing and testing of prototypes will be signed in support of the design.

The procurement procedures for the manufacturing of several diagnostics components to be delivered to IO-CT will start during 2016, including among others cables, clips, connectors and feedthroughs for Tokamak electrical services, ex-vessel transmission components for the Plasma Position Reflectometry, and several magnetics sensors and platforms (magnetics and bolometers)

During 2016, the signature of a framework contract for the production of the build-to-print drawings and manufacturing specifications and a contract for the design and manufacturing of Core-Plasma Thomson Scattering diagnostic system are also foreseen.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU55.01.10 7690	PP	End of Technical Support During Continuous External Rogowski Integration at ITER Site	CAS 0.00277 kIUA	03/03/2016	Not applicable
EU55.15.20 2560	PP	Framework Contract Signed for Manufacturing Design (Build-to-Print Dwgs & Specifications)industrial expertise	Contract signed	17/06/2016	Not applicable
EU55.01.30 0325	PP	Contract Signed for Analysis Software Algorithm Design	Contract signed	06/07/2016	Not applicable

EU55.15.202450	PP	Signature of Grant for Development and Design of Mirror Lifetime Optimisation	Grant signed	10/11/2016	Not applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 23.08 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

In order to efficiently deal with the above explained challenges for the next and following years, Diagnostics team will launch procurements during 2015 mainly covering:

- Design and R&D for Low Field Side Collective Thomson Scattering
- Design and R&D for Bolometers Diagnostic
- Procurement of Vacuum Vessel Mounted Platforms for Vacuum Vessel Mounted Bolometer Cameras
- Design and R&D for Plasma Position Reflectometry
- Manufacture of Captive Ex-Vessel Transmission Components for Plasma Position Reflectometry
- Design and R&D for Pressure Gauges Diagnostic
- Design and R&D for Core-Plasma Charge Exchange Recombination Spectrometers
- Design and R&D for Radial Neutron Camera and enabling of the Gamma Spectrometer
- Design and manufacture for Core Plasma Thomson Scattering
- Design and R&D for Tokamak Services (mainly feedthroughs and divertor RH connector)
- Manufacture of several in vessel components (mainly cables, clips and connectors and feedthroughs)
- Design and R&D for Equatorial Visible/IR Wide-Angle Viewing System
- Integration design of diagnostics into ITER ports
- Irradiation and post-irradiation testing of diagnostic components and assemblies
- Procurement of Prototypes & Test Equipment
- Qualification and Supply of port plug structures
- Support on the production of Diagnostics build-to-print design specifications and industrial expertise
- Procurement of I&C Integrator services for all EU supplies
- Contracts for the manufacturing of several Magnetic diagnostics components and software
- Development and design of Mirror Lifetime Optimisation
- Engineering support for Diagnostic components
- Contracts for technical support from final design to commissioning for the different Diagnostic Systems

Grants and Specific Grants

Scope	Type of procedure	Time of Call	Indicative Amount (Euro)	Budgetary line
Design activities for the Low Field Side Collective Thomson Scattering diagnostic.	Specific Grants	n/a	32,000,000	3.1
Design activities for the Core-Plasma Charge Exchange Recombination Spectrometer Diagnostic	Specific Grants	n/a		3.1
Design activities for the Equatorial Visible-IR Wide-Angle Viewing System Diagnostic	Specific Grants	n/a		3.1
Design activities for the Bolometer Diagnostic	Specific Grants	n/a		3.1

Design activities for the Tokamak Electrical Services	Specific Grants	n/a		3.1
Design activities for the Radial Neutron Camera - Gamma Spectrometer Diagnostic	Specific Grants	n/a		3.1
Design activities for the Plasma Position Reflectometry Diagnostic	Specific Grants	n/a		3.1
Design activities for the Pressure gauges Diagnostic	Specific Grants	n/a		3.1
Development and Design of Mirror Lifetime Optimisation	Call for proposal	Q2/2016		3.1

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Port Plug design, testing and diagnostic integration	Specific Contract	Task order for preparatory design of the 5 ports under EU scope of supply and R&D on electrical feedthroughs	n/a	PA 5.5.P2.EU.01	Y
Qualification and Supply of Upper and Equatorial Port Plug Structures	Specific Contract	Task order for Qualification and Supply of Upper and Equatorial Port Plug Structures under IO FWC	n/a	PA 5.5.P2.EU.01	Y
Core-plasma Thomson Scattering	P Supply	Contract for design and manufacture of the Core-plasma Thomson Scattering	Q1/2016	PA 5.5.P2.EU.01	Y
Magnetics Diagnostic	P Supply	Contract for Design and Prototyping of Bespoke Instrumentation Hardware	Q2/2016	PA 5.5.P2.EU.01	Y
Magnetics Diagnostic	P Serv	Contract for Analysis Software Algorithm Design	Q1/2016	PA 5.5.P2.EU.01	Y
Magnetics Diagnostic	P Supply	Contract for outer vessel coils	Q3/2016	PA 5.5.P2.EU.01	N
Magnetics Diagnostic	P Supply	Contract for inner-vessel coils	Q2/2016	PA 5.5.P2.EU.01	Y
Magnetics Diagnostic	P Supply	Contract for the manufacturing of the Inner-Vessel HF sensor and Permanent Platforms	Q4/2016	PA 5.5.P2.EU.01	N
Magnetics Diagnostic	P supply	Contract for the manufacturing of RH Platforms for In-Vessel Discrete & HF sensors & Divertor Toroidal sensors	Q4/2016	PA 5.5.P2.EU.01	N

Bolometers Diagnostic	Specific Contract	Task order for the irradiation testing of bolometer sensor prototype and electrical connections	n/a	PA 5.5.P2.EU.01	Y
Bolometers Diagnostic	P Supply	Contract for the Design and Manufacturing of VV-Mounting Platforms for VV-Mounted Bolometer Cameras	Q3/2016	PA 5.5.P2.EU.01	N
Plasma Position Reflectometry	P Supply	Manufacture of Captive Ex-Vessel Transmission Components	Q4/2016	PA 5.5.P2.EU.01	N
Tokamak Services	P Supply	Procurement and Delivery for cables, clips and connectors (In-Vessel Components)	Q3/2016	PA 5.5.P2.EU.01	N
Tokamak Services	P Supply	Design and Procurement for Feedthroughs	Q2/2016	PA 5.5.P2.EU.01	N
Diagnostics	Framework Contract	Framework contract for the support on the production of Diagnostics build-to-print design specifications and industrial expertise	Q1/2016	PA 5.5.P2.EU.01	Y
Tokamak Services	P Serv	Long term contract for technical support on Tokamak Services	Q3/2016	PA 5.5.P2.EU.01	Y
Low Field Side Collective Thomson Scattering	P Serv	Long term contract for technical support on Low Field Side Collective Thomson Scattering diagnostic.	Q3/2016	PA 5.5.P2.EU.01	Y
Core-Plasma Charge Exchange Recombination Spectrometer	P Serv	Long term contract for technical support on Core-Plasma Charge Exchange Recombination Spectrometer	Q3/2016	PA 5.5.P2.EU.01	Y
Equatorial Visible-IR Wide-Angle Viewing System	P Serv	Long term contract for technical support on Equatorial Visible-IR Wide-Angle Viewing System	Q3/2016	PA 5.5.P2.EU.01	Y
Bolometer Diagnostic	P Serv	Long term contract for technical support on Bolometer Diagnostic	Q3/2016	PA 5.5.P2.EU.01	Y
Radial Neutron Camera - Gamma Spectrometer	P Serv	Long term contract for technical support on Radial Neutron Camera - Gamma Spectrometer Diagnostic	Q3/2016	PA 5.5.P2.EU.01	Y
Plasma Position Reflectometry	P Serv	Long term contract for technical support on Plasma Position Reflectometry	Q3/2016	PA 5.5.P2.EU.01	Y

		Diagnostic			
Pressure gauges	P Serv	Long term contract for technical support on Pressure gauges Diagnostic System	Q3/2016	PA 5.5.P2.EU.01	Y

EU.01.56 ITER – Test Blanket

WBS: EU.01.56	Test Blanket	WP ref: WP16/56/01

General Overview

The overall objectives consist mainly in the supply of two Test Blanket Module Systems (TBM) to the ITER Site, namely the Helium Coolant Lead Lithium (HCLL) and the Helium Coolant Pebble Bed (HCPB) with ancillary systems, data acquisition systems and Support to installation.
The execution of both TBM Arrangements signed with ITER IO is funded 100% by the EU.
The TBM shall be tested from the beginning of ITER operation, after the Phase Assembly II.

Current Status

Following the conclusion of the Conceptual Design Review (June 2015), activities are dedicated in priority to the resolution of the chits raised by the panel (propagation of new Defined Requirements; capacity of the HVAC in Port Cell #16 with regard to Tritium permeation from TBM Systems; etc.).

The signature of pending procurement (contracts/specific contracts) is foreseen before the end of 2015, in particular the procurement of ~25 tons of EUROFER, irradiation campaign of EUROFER samples, and the start of Preliminary Design activities of the TBM Sets and of the Ancillary Systems.

In R&D two FPAs on modelling development will be signed while other activities, as mentioned above, will continue as planned.

Challenges for the next year

In 2016 the Test Blanket Module (TBM) activities will mainly focus on the Preliminary Design of the TBM Sets, the Ancillary Systems, the Maintenance Support Tools and the Data Acquisition Control System toward the preparation of the Preliminary Design Review meeting foreseen for mid-2018.

Concurrently the R&D activities will continue mainly in EUROFER irradiation and characterization, modelling, functional material, integrated tests, and standardization of welding procedures specifications for the TBM box.

Moreover will start the preparation of new Framework Contracts for the continuation of the design activities whose completion is foreseen in 2020 and for the development of the Prototypical Mock-up (PMU) and the Qualification Mock-up (QMU) of the TBM.

Among the various challenges to be faced it is worth to highlight the timely publication of the call for tender of the Framework Contracts for the completion of the Preliminary Design and of the Final Design of the TBM Sets and of the Ancillary Systems in order to guarantee that their signature will be reached on time before the termination of the currently on-going Framework Contracts.

Analogously the timely issue of the call for tender of the FWC for the development of the PMU and QMU is essential being its outcome linked to the manufacturing of the TBM.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU56.01.41 0030	PP	Conceptual Design Review Steering Committee decision	Document approved in F4E IDM	03/03/2016	Documentation in F4EIDM
EU56.01.10 6000	PP	Published Call for Tender for TBM Sets Finalisation of Preliminary Design, Final Design & Finalisation of Final Design	Call for Tender Publication	01/07/2016	Tender documentation
EU56.01.12 18470	PP	Published Call for Tender for Helium Cooling Systems Finalisation of Preliminary Design, Final	Call for Tender Publication	01/07/2016	Tender documentation

		Design, Finalisation of Final Design & Procurement			

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 17.36 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions not in response of PAs or ITAs

The scope of the procurement actions foreseen to be implemented under budget 2016:

- Support from an Authorized Notified Body for TBM and Ancillary Systems preliminary design.
- Preliminary design of TBM Sets, Ancillary Systems and Maintenance Equipment.
- Welding Procedures Specifications and validation for TBM box assembly.
- TBS Safety and radwaste analysis and neutronics and Hazards in support of TBM Sets, Ancillary Systems and Maintenance Equipment Preliminary Design activities.
- Handling and storage of EUROFER.
- Development of specific sensors prototypes.

Grants and Specific Grants

Scope	Type of procedure	Time of Call	Indicative Amount (Euro)	Budgetary line
Continuation of EUROFER Database and engineering data maintenance for the RCC MRx standard and certifications.	Grant - Unique Beneficiary[11]	Q1/2016	3.850.000	32
Additional analysis on Tritium Migration Modelling using ECOSIMPRO platform.	Grant - Unique Beneficiary[12]	Q4/2016		32
R&D activities in support of the Preliminary Design of the TBM Sets and of the Ancillary Systems as well as Functional Material Characterization and Sensor Technologies will continue for all 2016. Analogous support will be provided through modelling and simulation activities.	Specific Grants	Q1-Q4/2016		32

[11] Unique Beneficiary CEA, high degree of specialization at the terms of the Article 158 of the F4E Implementing Rules

[12] Unique Beneficiary Consortium formed by: Centro de Investigaciones Energeticas. Medioambientales y tecnologicas (CIEMAT) Empresarios Agrupados Internacional S.A. (EE.AA), high degree of specialization at the terms of the Article 158 of the F4E Implementing Rules

The activities for the qualification and validation tests of EUROFER samples will continue for all 2016.	Specific Grants	Q1-Q4/2016		32
A Call for Tender for the validation of the EUROFER Design Methodologies and Design Code is planned to be published in the 4th Quarter of 2016.	FPA - Open call for proposals	Q4/2016		32

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
TBM	Framework Contract	Continuation of the Preliminary Design and the Final Design of the TBM Set	Q3/2016	N.A. (TBMA)	N.A
TBM	Framework Contract	Continuation of the Preliminary Design, the Final Design and possibly the Procurement of all the Ancillary Systems (using lots)	Q3/2016	N.A. (TBMA)	N.A.
TBM	Framework Contract	Continuation of the Preliminary Design, the Final Design and possibly the Procurement of the Data Acquisition Control System	Q4/2016	N.A. (TBMA)	N.A.
TBM	Framework Contract	Fabrication and testing of a TBM Qualification Mock-up and a Prototypical Mock-up including the validation of the related welding procedures.	Q4/2016	N.A. (TBMA)	N.A.

EU.01.57 ITER – Remote Handling In Vessel Viewing System

WBS: EU.01.57	Remote Handling In Vessel Viewing System	WP ref: WP16/57/01

General Overview

The Remote Handling In-Vessel Viewing System (IVVS) composed by six identical units (plugs), each one composed basically of the following components:

- IVVS probe, capable of performing the laser-based in-vessel viewing and metrology, connected to, and fed by, its deployment system;
- IVVS Deployment system, capable of moving the IVVS along the tube from the parking position up to the various working positions;
- Housing structure, including an end flange closing the VV port and equipped with feed-troughs for the various services given to the IVVS probe and deployment system (signals, electrical power); the housing tube is also provided with heating cables for baking purposes (to be confirmed);
- The related control system;
- Spare parts (to be defined).

Current Status

The selection of the IVVS supplier (though OMF 383) is on-going following the complex tender that involves the preparation of a business case (an IVVS-relevant technical study) by the bidders. While preparing the awarding and signature of the contract, complementary works are being performed on IVVS requirement preparation on one hand, and on IVVS optical and interface studies on the other hand, plus some actualised neutronic studies being IVVS an in-vessel component.

Challenges for the next year

The year of reference will be devoted to a robust start of In Vessel Viewing System (IVVS) preliminary design by means of the procurement contract (OMF 383 - Multiple Framework Service Contract in cascade for the Development and Supply of the ITER In-Vessel Viewing and metrology System). Meanwhile, some preparatory design and prototyping activities presently running (through a task order within OMF 272 - Multiple Framework Service Contract in cascade for the provision of Engineering Support in the area of Remote Handling) will provide further background to the IVVS supplier.

A smooth and swift start of IVVS preliminary design is expected next year, in order to be able to tackle vigorously the various technological and design issues.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU57.01.20 130	PP	Initial Scope Evaluation for IVVS Signed	Specific contract signed	07/03/2016	Not applicable
EU57.01.50 025	PP	Preliminary Design for IVVS Signed	Specific contract signed	01/11/2016	Not applicable

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 7.07 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Preliminary design and engineering support activities (such as R&D, control system, test and prototyping) will be carried over for this Remote Handling System PA. These activities will be implemented mainly through specific contracts under on-going framework contracts. In particular, preliminary design activities will be mainly implemented under the Multiple Framework Service Contract in cascade for the Development and Supply of the ITER In-Vessel Viewing and metrology System.

Furthermore, Engineering support activities will be implemented mainly under the new Multiple Framework Service Contract in cascade for the provision of Engineering Support in the area of Remote Handling and other general support framework contracts (see section 6.4)

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
Remote Handling	Specific contract	Preliminary Design for IVVS	Q2/2016	PA 5.7.P1.EU.01	Y
Remote Handling	Specific Contract[13]	GENROBOT Development Phase 2	Q2/2016	PA 5.7.P1.EU.01	Y

EU.01.62 ITER – Buildings and Civil Infrastructures

WBS: EU.01.62	**Buildings and Civil Infrastructures**	**WP ref: WP16/62/01**

General Overview

In the frame of the ITER in-kind contribution, Europe provides the detailed design and the construction of the buildings and site infrastructures. F4E is supported by an Architect Engineer Contractor in its missions of delivering the detailed design, procurement activities, contract management and supervision of construction.

The Buildings and Civil Infrastructures procurements to be provided by EU are listed here below:

PBS	EU obligation	Other DA involved
	SITE	
PBS 61	Site infrastructures related to the buildings	No
	REINFORCED CONCRETE BUILDINGS	
PBS 62	All the "nuclear" buildings, including the Fire protection system, the HVAC system, the cranes, lifting and mechanical equipment	No
	STEEL FRAMED BUILDINGS	
PBS 63	All the non-nuclear buildings, including the Fire protection system, the HVAC system, the cranes, lifting and mechanical equipment	No
	LIQUID AND GAS DISTRIBUTION NETWORKS	
PBS 65	Potable water, Fire protection water, Hot water, Compressed Air, Demineralized Water, Breathing Air, Nitrogen, Helium (gas)	No

Current Status

All support contracts, Architect Engineer, Support to the Owner and Health and Safety / Legal inspection are in place since 2010. The main construction contracts are in place. The current status of procurement of contracts placed or in tendering phase is summarized in the table below:

Tender Batches	Contract Status	Signature Date/ Contractor	Phase status
Architect Engineer	In execution	Apr 2010 / ENGAGE	Design and construction follow-up
TB00 Tokamak SIP (Excavation Support structure, Seismic Isolation Basement, Upper Basemat –B2 and Assembly Hall slab)	Complete	May 2010 / GTM	Complete
TB01 Site adaptation works	Complete	Jul 2011 / COMSA	Complete
TBAP Galleries and drainage network around Tokamak	Complete	Jul 2012 / COMSA	Complete

[13] Contract shared between the WBS EU.01.23 and WBS EU.01.57

TB02 Tokamak Cargo lift and Tokamak/Assembly Hall cranes	In execution	Jun 2013 / NKM/REEL	Design and manufacturing
TB03 Civil engineering and finishing works for Tokamak Complex and surroundings Buildings	In execution	Dec 2012 / VFR	Design and Construction
TB04 Mechanical, HVAC, Electrical and Handling Equipment supply and installation for Tokamak complex, Assembly Hall and surrounding Buildings	In execution	Jul 2013 / OMEGA	Design
TB05 Design & Build for Magnet Power Conversion Buildings (32-33) and Reactive Power Control Buildings (38)	In execution	Nov 2013 / FERROVIAL	Design and Construction
TB06 Electrical power distribution supply, installation and commissioning	In execution	Dec 2014 / FERROVIAL	Design and assembly
TB07 Design & Build for Cold Basin & Cooling Towers (67), Pumping stations (68) and Heat exchangers (69)	In execution	Oct 2013 / FERROVIAL	Design
TB16 Site infrastructure works	Call for tender ongoing	Dec 2015	Tendering

Civil works in the Tokamak Complex are progressing; the level B1 works have started in the Diagnostic building. The construction of 8 other auxiliary buildings is under progress. Regarding building services, the Final Design for the Tokamak Complex is currently under Design Review.

Challenges for the next year

In 2016 the level B1 civil works of the Tokamak Building will start. The main TB02 cranes will be installed in the Assembly building. The construction design of the Tokamak Complex building services will be delivered for Construction Design review. Other milestones for the building's design and construction are the ones defined in the section Annual Objectives.

ANNUAL OBJECTIVES

Milestone ID/Objectives	Milestone Objective type	Scope Description	Achievement criteria/CAS received	Forecast achievement date
EU62.05.28119	PP	NPC - Notice to Commence work of Hot Basin & Cooling Towers 67 (TB07)	No CAS associated to these milestones	12/01/2016
EU62.02.6006610	WP	HP - EU Submission of Construction Design for L3 level - B11, 14, 74 (Concrete Outline)		24/02/2016
EU62.05.28719	PP	NPC - Notice to Commence work of HRS Water Treatments + Heat Exchangers 64, 69 (TB07)		01/04/2016
EU62.02.6006660	WP	HP - EU Submission of Construction Design for L4 level - B11, 14, 74		31/05/2016
EU62.05.28419	PP	NPC - Notice to Commence work of CW Pumping Station 68 (TB07)		15/06/2016
EU62.05.24209	PP	NPC - Notice to Commence construction of Main AC Distribution Buildings (36)		16/06/2016
EU62.05.272560	PP	NPC - Notice to Commence construction of Bus-Bar Bridges (between B32 &74)		25/08/2016
EU62.02.6006710	WP	HP - EU Submission of Construction Design for L5 level - B11, 14, 74		09/09/2016
EU62.05.65420	PP	NPC - Notice to Commence Assembly Hall cranes Installation		27/09/2016

EU62.05.490	PP	IPL > Site Services Building (61) RFE (RFE #17)	2.31	04/11/2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 36.97 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Expenditures under the budget 2016 are foreseen for the following procurement actions:

- Changes to the ongoing construction contracts in relation with PCRs and input data delays which will be implemented through amendments to the ongoing contracts in line with the provisions of the Financial Regulation
- Options of the Ongoing Buildings contracts as follows:
  - TB04, options 17B and 18 B (cables and cable trays)
  - TB05, option 9 (Integrated commissioning)
  - Other contract options if needed depending on the evolution of the procurement strategy
- TB13 - Reduced scope to Design & Build the Emergency Distribution Buildings and Equipment
- Site Security and Reception Services for the ITER Site, Engineering counter-expertise for structural and geotechnical design and works execution, Facility management (Worksite common services), mainly to be implemented through specific contracts under ongoing framework contracts.

Cash Contribution

Scope Description	**Amount (Euro)**
Cash Contribution for Site cooperation agreement and host agreement of F4E Suppliers at Cadarache The Agreement on ITER Site collaboration between the ITER Organization (IO) and Fusion for Energy (F4E) set out the terms and conditions under which F4E and IO may share certain goods and services available at the ITER Site (including electrical power, water and facilities on site) and the Host Agreement between the IO and F4E set out the terms and conditions under which IO provide support to F4E with equipment and/or IT, Mail & Landline services.	3,500,000

Main Procurement initiatives

F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
Buildings & Site infrastructure	P works	TB13 - Reduced scope to Design & Build the Distribution Buildings and Equipment	Q1/2016	6.2.P2.EU.05	Y
Buildings & Site infrastructure	P works	TB 12 – Design & Construction of Buildings 24, 34, & 37	Q2/2016	6.2.P2.EU.05	N
Buildings & Site infrastructure	P works	TB 11 – Final Construction Works (Completion)	Q4/2016	6.2.P2.EU.05	N

EU.01.64 ITER – Radiological and Environmental Monitoring

WBS: EU.01.64	Radiological and Environmental Monitoring	WP ref: WP16/64/01

General Overview

EU is responsible for the in-kind procurement of the Radiological and Environmental Monitoring System (REMS). The primary functions of REMS are to provide health and radiological monitoring for workers as well as area environmental monitoring for the public and, thus, to assist in the protection against ionizing radiation during ITER operations and decommissioning. ITER-REMS shall cover the following safety functions during normal operations, including maintenance, as well as off-normal events, incident and accident: (a) health and radiological monitoring for workers, (b) environmental, and (c) tritium process control.

Current Status

The REMS PA was originally a single Functional Specification Procurement Arrangement. In the frame of the PA signature preparation, a cost assessment was performed and the overall conclusion was that REMS PA was impacted by considerable over-costs. IO and EU-DA agreed that as a first step a PA restricted to the design would be signed with the aim to come up with an optimized configuration in terms of procurement and so a more reasonable cost. For this reason it was decided to divide the original PA in two PAs:

- PA 6.4.P1.EU.01: Limited to the design (preliminary and final) of the REMS. This PA was signed in September 2013.
    - Preliminary design of the Tokamak Complex was finished at the end of July 2015.
    - A cost assessment for REMS Tokamak Complex is expected to start at the end of 2015, and will be valuable so as to define the scope of the Tokamak Complex.
    - Preliminary design for the Personal Access Control Building is expected to start at the beginning of 2016.
    - Preliminary design for the Hot Cell Complex should start once the design of the complex reaches enough stability to allow the REMS development (expected in 2016).
- PA 6.4.P1.EU.02: Including the REMS systems, sub-systems and components procurement, delivery, assembly, testing and commissioning. This PA has not been signed yet.

Currently, it is envisaged to amend the REMS Design PA (PA 6.4.P1.EU.01) in order to include the manufacturing, procurement, delivery, installation, testing and commissioning of the items of equipment needed for the 1st Plasma and Assembly Phase II.

Challenges for the next year

Start of development of Preliminary Design of Personal Access Control Building (PACB).

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy suppliers responsibility					
EU64.01.11 0130	WP	HPC – IO approval for Preliminary Design Review PACB of REMS.	300 IUA	13/09/2016	Preliminary design completed and associated documentation delivered.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 3.53 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

REMS Preliminary Design of Personal Access Control Building (PACB) through the signature of a specific contract.

EU.01.66 ITER – Waste Management

WBS: EU.01.66	Waste Management	WP ref: WP16/66/01

General Overview

EU is responsible to provide Waste Management System which fulfils the functional requirements established during the conceptual design and to demonstrate that such requirements and the derived acceptance criteria are met. Waste Management Systems includes: (1) Radwaste Building Process Equipment for Low and Intermediate level short-lived solid, and liquid radwaste (Type-A radwaste based on the French Nuclear Waste Classification); and (2) Site Services Building Process Equipment, including equipment devoted to the treatment and storage of toxic and non-toxic-non-radioactive wastes.

Current Status

This is a Functional Specification PA, which has not been signed yet. The signature of this PA is on-hold because there is a disagreement between IO and F4E on how to proceed with this PA. The scope of supply is not well defined. As for example, the conceptual design provided by IO in 2013 needs to be reworked because new requirements (such as detritiation of solid waste) have been added.

Until 2015 the baseline was to swap this PA with the HC Extension Construction. Lately, it was decided by EU-DA senior management to stop the swapping activity. However, there is not any final decision on it yet. Up to now, the procurement strategy has not been drafted also because the PA scope has not been agreed. Nothing has been tendered so far except a minor amount for cost assessment.

Challenges and objectives for the next year

- Reach an agreement between EU-DA and IO on how to proceed with this PA: swapping, or not.
- In case EU-DA keeps the responsibility for the procurement of this PA:
  - Start of Waste Management Systems Preliminary Design phase.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 1.80 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Contract signature for the Waste Management Systems Preliminary Design should start.

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
ES.WT	Specific Contract	Waste Management Systems Preliminary Design	Q2/2016	PA 6.3.P1.EU.01	Y

EU.01.CC ITER – Cash Contribution

WBS: EU.01.CC	Cash Contribution	WP ref: WP16/CC/01

General Overview

Cash Contribution to ITER IO

In accordance with the ITER Agreement, the financing of the ITER Organization in ensured through contributions made to IO in the form of cash (10%) or in kind (90%) from Members.
In-cash contribution to IO for the management of ITER and research and development and participation to the ITER fund are shared among the ITER Members in proportion to each Member's share of common expenses during the various phases of the ITER project (EU share during the construction phase is 45.46%). Contribution in cash are payable in Euros.
Cash contributions from ITER Members to IO are determined annually, based on estimates of the IO budget for the following year. The final figure is approved or modified by the ITER Council.

Cash Contribution to Japan

According to the ITER Agreement, there is a transfer of procurement responsibility from EURATOM to Japan under the supervision of the ITER Organization. This is financed through a cash contribution from EU to Japan paid by F4E. Initially, all payments were carried out following the acknowledgment by ITER IO of the achieved milestone and the associated credit. Currently, F4E provides a yearly payment based on the forecasted milestones achievement for that specific year. An update of the schedule of payments is provided by the Japanese Domestic Agency (JA DA) twice a year. An extra contribution to Japan of 75,000,000 Euros (2014 value) will be provided by EU (through F4E) as a consequence of the settlement agreed in January 2014.

Current Status

Cash Contribution to ITER IO

Up to end of 2015, about 528 million Euros will be paid by EU to ITER IO.

Cash Contribution to Japan
Up to end July 2015, about 88% of the cash contributions to Japan have been already committed, with the exception of the extra contribution of 75 million Euros.

Challenges for the next year

Cash Contribution to ITER IO

A cash contribution of about 121.5 million Euros is foreseen to be committed in 2015 for being paid in 2016. A cash contribution of about 166.6 million Euros is foreseen to be committed in 2016 for being paid in 2017.

Cash Contribution to Japan
A new commitment of about 25.6 million Euro and payments for a total of approx. 80 million Euros are foreseen in 2016.

ANNUAL OBJECTIVES

The multi-annual objective 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 earned by the JA DA for those components transferred by the EU to them.

The current plan provides an indicative estimate of the involved budget (in MEuro):

	2016	2017	2018
Cash to IO – Commitments*	166.64	163.57	180
Cash to IO – Payments*	144.3	165.3	172
Cash to Japan - Commitments	25.6	0	37.1
Cash to Japan - Payments	80	14.1	5.6

* including estimated contribution to Reserve Fund

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 0.92 FTE.

FINANCING DECISION

Cash contribution	
Scope Description	**Amount**
Cash Contribution to ITER IO	166,640,000 Euros
Cash Contribution to Japan for the signature of the PA 3.2.P4.JA.01. Atmospheric Detritiation System	15.1 kIUA (25,650,000 Euros)

EU.01.ES ITER – Technical Support Services

WBS: EU.01.ES	Technical Support Services	WP ref: WP16/ES/01

General Overview

The Technical Support Services Unit supports the ITER Department's Project Teams (and to a limited extent the BA department) by providing them with technical expertise in the key domains of engineering and fusion technologies. The Unit is covering the following areas of expertise:

- Design office activities (mechanical and schematics);
- Analysis : Mechanical, Structural Dynamics, Civil engineering, Fluid Dynamics, Electro Magnetism , Nuclear Analyses;
- Design Codes and Standards;
- Instrumentation and Control;
- Metrology.

Moreover, specific activities related to the production of nuclear data are carried out. Validated nuclear data for radiation transport and activation calculations are required to improve predictive capabilities in support of the nuclear design of fusion facilities.

Current Status

The matrix structure in place in the ITER department is now in place. The support to the Project Teams in the technical areas listed above is provided either involving internal staff when specific skills or reactivity is needed or through specific contracts. To this end, a series of Framework Contracts have been signed or renewed recently.

Design Office :

The bulk of the activity consists in maintaining CAD and Engineering data management systems implemented earlier, to check the CAD data quality wherever they come from, to manage the CAD data exchange with both the IO and F4E suppliers, to support the F4E TROs in specifying the CAD works to be subcontracted, to carry out local mechanical configuration control and occasionally to perform in-house mechanical design;

Analysis:

The activities focus on providing technical support in the area of computational analysis to the development of the ITER design as well as to the F4E procurement contracts by placing and following up service contracts to qualified companies as well as internal analysis activity. Most of the analysis efforts have been so far dedicated to the Vacuum vessel, Magnets and Building design. Specific efforts have been done in the area of nuclear analysis aiming at checking the heat load on magnets and the ITER facility radio protection status.

Design Codes and Standards:

F4E follows the developments and the application of standard codes (e.g.; ASME, RCC-MR) to the design of the key ITER mechanical components (e.g.; vessel, buildings and magnets);

Nuclear Data:

F4E has been contributing to the development of improved nuclear data, its processing, benchmarking and experimental validation, including respective models and tools development. Furthermore, the development of TBM nuclear instrumentation is an integral part of the experimental activities. Two consortia consisting of several EFLs and research institutes provide the unique and broad expertise to successfully develop nuclear data for fusion technology applications.

Instrumentation and Control

The direct support provided to F4E Project Teams on Instrumentation and Control areas, according to the strategy and maturity of each ITER Plant System includes requirements management and formalisation, participation and organization of design reviews, review of design documents from Plant System suppliers and selection process. The specific support to F4E Project Teams aiming at fostering a common approach for the integration of Plant Systems into ITER Central I&C Systems, in discussion and consensus with ITER groups is performed through two Framework Contracts allowing outsourcing activities.

Metrology:

The generic requirements related to Metrology have been defined, in liaison with the IO metrology group and in coordination with F4E and IO RO's.

The group supports the F4E Project Teams in the definition of a metrological strategy and in the preparation of technical specifications and follows up the project activities related to metrology. in particular, to support the Project Teams and suppliers in the preparation of uncertainties reports, to support the Project Teams in the verification of supplier metrological procedures, to participate to the assessment of Non Conformities related to metrology, to witness geometrical survey campaigns when needed, to carry out independent geometrical survey when needed, and to participate to all the relevant project progress meetings.

Challenges for the next year

One of the 2016 challenges will be to match the needs of the project teams with limited human resources complemented by out sourced resources accessible through the signed frame work contracts.

A large fraction of the resources will be dedicated to the support of the critical systems: Buildings, Vacuum vessel and Magnets.

The Design Office will have to train an increasing number of F4E contractors' staff so that the design work is done according to the ITER standard as to allow an efficient integration. The management of the mechanical configuration will remain a top priority. The internal design activities will be restricted to short notice studies or linked to the design of the Blanket First Wall.

Many analysis related to Safety Important Structures or Components will be carried out (internally or outsourced) which require beyond outstanding technical skills a high level of quality and traceability. The expected creation of an Integrated Project Team responsible for the Nuclear Shielding Design will require the allocation of many resources internal and external in the areas of nuclear analysis and project integration.

An increasing number of metrological inspections at F4E suppliers' premises will have to be conducted in order to support the follow up of the Project Teams contracts. From 2016 on, Metrological support will be help the Site & Buildings Project Team to follow up of the building construction.

In the framework of the improvement of the Nuclear data, a new Framework Partnership Agreement shall be established to continue a mid-term collaboration in support to ITER, DEMO and DONES projects possibly beyond 2020. Nuclear detector techniques will be further tested at ITER-relevant harsh conditions and future testing in JET (2019) planned.

With respect to Instrumentation and Control activities, the support to the building instrumentation will remain a top priority.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date
EU.ES.03.19550	WP	Instrumentation and control integration service	Contract launched	09/08/2016
EU.ES.02.54980	WP	Nuclear Data experimental activities and measurement techniques	Contract signed	22/04/2016
EU.ES.01.21180	WP	Support in the area of integration, operation, maintenance, and other technical areas within short notice	Contract signed	06/05/2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 11.24 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

For all the TSS areas of expertize the procurement actions during the year 2016 will be focused on support contracts for the F4E ITER Department project teams and relevant task orders. They will include inter alia the support in critical items like Buildings, Vacuum Vessel, Magnets, etc. In section 6.4 is available the list of the main General Support Framework Contracts that will be ongoing in 2016 and support these activities.

A Service Level Agreement with JRC Ispra focussing on the topics below will be signed and started in 2016.

- Expertise and advanced modelling in structural dynamics.
- Margin assessment of the support of safety important components through experimental tests.
- Survey activity regarding European standards applicable to transportation.

Grants and Specific Grants				
Scope	**Type of procedure**	**Time of Call**	**Indicative Amount (Euro)**	**Budgetary line**
Nuclear Data improvements and development of tools Nuclear Data experiments and measurement techniques	Specific Grants	Not applicable	350,000	32
Development of Nuclear Data Files (2015-2019)	Partnership Agreement/Unique Beneficiary[14]	2015 Q4	Not applicable	32

Main Procurement initiatives					
F4E Area	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
Design Office	Framework Contract	Provision of CAD Design Support - General Mechanical Design	Q4/2015	Multiple	NA
I&C and CODAC	Framework Contract	Provision of Cubicles assembly services	Q4/2016	Multiple	NA
I&C and CODAC	Framework Contract	Provision of Instrumentation and Control Integration Services	Q3/2016	Multiple	NA

[14] Unique Beneficiary: Consortium for Nuclear Data Development and Analysis, for technical competence at the terms of the Article 158 of the F4E Implementing Rules

EU.01.MF ITER – Materials and Fabrication Technologies

WBS: EU.01.MF	Materials and Fabrication Technologies	WP ref: WP16/MF/01

General Overview

The Materials and Fabrication group of the Technical Support Services Unit supports the ITER Department's Project Teams (and to a limited extent the BA department) by providing them with technical expertise in the domains of Materials Science, Materials Technologies and Manufacturing Processes. The group supervises the development and qualification of material, collect material data and qualify joining technologies. It mays support the materials procurement on demand.

Current Status

The activities in this area include characterisation and assessment of materials data under ITER operational conditions via irradiation campaigns, testing at cryogenic, room and elevated temperatures, thermal fatigue testing, assessment of corrosion parameters and development of welding technologies. Assessments of materials data are performed by non-destructive testing, mechanical and physical characterisation of materials and joints. The activities are linked with R&D, qualification and validation of series production stages of various EU-ITER and JT-60SA subsystems. As several ITER systems entered manufacturing phase during 2014, there is a significant increase in the materials follow-up support for the project teams.

Challenges for the next year

One of the 2016 challenges will be to match the needs of the project teams with limited human resources complemented by out sourced resources accessible through the signed frame work contracts.

A large fraction of the resources will be dedicated to the support of the critical systems: ITER Vacuum vessel, ITER in-vessel components and ITER and JT60 SA Magnets.

The development of additive manufacturing technologies for the construction of near net-shape components in austenitic stainless steel will remain a challenging objective for 2016.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date
EU.MF.01.1223120	WP	Provision of Destructive and Non-Destructive Testing of Materials at Room and Elevated Temperature	Contract signed	04/01/2016
EU.MF.01.1224220	WP	Provision of Engineering Support on Joining and Non Destructive testing techniques for production of ITER Components	Contract signed	11/03/2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 3.08 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Task orders are planned to be implemented by all F4E Project WBSs for the following activities:

- Joining Technology and non-destructive testing
- Materials irradiation and post irradiation characterization
- Material characterization at cryogenic temperatures
- ITER specific raw material: Provisions for small quantities of ITER specific raw materials
- Material characterization at room/elevated temperatures
- Material Manufacturing: Provision of Manufacturing Services using Hot Isostatic Pressing
- Material Manufacturing: Development of additive technologies

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
Materials	Framework Contract	Provision of Engineering Support on Joining and Non-destructive testing techniques for production of ITER Components	Q3/2015	Multiple	Not Applicable

EU.01.NS ITER – Nuclear Safety

WBS: EU.01.NS	Nuclear Safety	WP ref: WP16/NS/01

General Overview

The Nuclear Safety group of the Nuclear Safety and Quality Unit (NSQ) is responsible to ensure that the nuclear safety aspects are correctly implemented and managed in the realization of the European in-kind procurement for ITER. Integrated in the ITER Department, it is responsible for providing support to the project teams, and supervises their activities, in the domain of Nuclear Safety.

Current Status

In the field of Nuclear Safety, the NSQ Unit will interact with the Project teams and with the IO Nuclear Safety team to ensure that the Safety requirements are properly understood and propagated, and that the technical solutions presented to the Safety Regulator are achievable.

In this field of activities, in March 2015, a new Unit has been created and the following missions have been assigned :

- Support F4E Project Teams in all aspects related to Safety and in particular Nuclear Safety. Provide clarification (or interpretation when needed) for Nuclear Safety definitions and propose positions for key Nuclear Safety issues; Support the review of F4E PA documentation, the writing and review of F4E technical specifications;
- Control that the nuclear safety requirements and the corresponding regulations are dutifully applied in all F4E activities and adequately transmitted within F4E supply chain and report periodically to the Head of Department and the QM;
- Provide advice on the classification of Protection Important Components (PIC) and Activities (PIA). Prepare guideline documents for design activities under F4E supervision. Check that all PIAs are being followed and reported for all F4E project teams;
- Assist F4E PTs to produce definitive records of the demonstration and reporting to IO of individual system Safety Requirements;
- Interact as required with IO Safety team and liaise with IO other safety officers;
- Review and follow Non Conformities (NCR) and Deviation Requests (DR) which have an impact on PIC / SIC components, review them periodically with IO Nuclear Safety unit, perform regular audits of the F4E (NCR and DR) system to check the screening process has been correctly applied;
- Implement, promote and support in the ITER department a strong nuclear safety culture. Organize regularly trainings in the field of Nuclear Safety and Nuclear Codes and Standards for F4E Contractors and Sub-Contractors;
- Perform specific studies (if required and to complement what is done by F4E contractors) in Hazard Analysis of components being designed under F4E supervision, including techniques such as Fault Tree Analysis, FMEA, HAZOP for PIC components;
- Implement R&D activities in support of ITER licensing, if needed.

In 2015, the related action plan, to raise as soon as possible the resources to the appropriate level in order to fulfil these missions assigned, has been provided, but is not implemented yet (currently, 1 FTE working in nuclear safety).

Due to the resources not all in place yet, only a limited support could have been provided to the different project teams, and not all the assigned missions have been fulfilled. Nevertheless, around 1,200 documents have been reviewed in 2015 up to know to assess the compliance of F4E and F4E suppliers' activities with the nuclear safety regulations and IO requirements.

Challenges for the next year

Numerous analyses related to safety-important structures, systems and components shall be carried out (internally or outsourced) by F4E to assess integration and coherence, together with the compliance of F4E and F4E suppliers activities (in design and manufacturing) with clear obligations coming from the French nuclear legislation. Therefore it will require high-level and hands-on senior expertise in nuclear safety issues.

The main challenge for 2016 is to start to develop this credible expertise in nuclear safety within F4E, by setting up the correct resources (both internal and external with contracts), in order to be able to develop the in-house nuclear safety analysis capacity and to fulfil F4E obligations as a main actor in the supply chain, in full compliance with nuclear regulations.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date
EU.NS.01.22740	WP	Provision of Support for Nuclear Safety	Contract signed	23/06/2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 1.84 FTE.

FINANCING DECISION

Procurement actions

Nuclear Safety Support to the ITER Project WBSs will be provided mainly through specific contracts under the ongoing framework contracts

Main Procurement initiatives

F4E systems	Type of Contract/ Agreement	Scope description	Time of call	PA reference	In the budget 2016?
Nuclear Safety	Framework Contract	Support for Nuclear Safety	Q2/2016	Multiple	Not Applicable

EU.01.PE ITER – Plasma Engineering

WBS: EU.01.PE	Plasma Engineering	WP ref: WP16/PE/01

General Overview

The main activities of Plasma Engineering (PE) are in the following topical areas: plasma control, scenario development, plasma-wall interaction and plasma operation. The PE group provides a horizontal support within F4E to different procurements (for instance blanket, coils and TBMs). Plasma Engineering addresses in general the analysis and definition of the requirements (including loads definition and verification) coming from the interface with the plasma and is involved in the study of the impact of design changes on the ITER machine performance and operation.
The PE scope includes also specific activities requested by ITER-Central Team by means of ITER Task Agreements (ITAs) in the areas of competence of the group.
Furthermore PE supports F4E in managerial/strategic decisions and in the interaction with technical and scientific committees (TAP, STAC and other relevant committees).

Current Status

The PE group is carrying out several activities in the field of plasma operation. The main open contracts regard the assessment of the fuelling needs in ITER scenarios, the evaluation of loads due to mitigated disruptions, the effect of magnetic field asymmetries due to ferromagnetic materials.

Challenges for the next year

A relevant part of the PE activity responds to (often urgent) requests and hence is difficult to plan in advance.

Next year the PE group is going to focus on transversal activities in support to F4E procurements and in particular for the Electron Cyclotron and Ion Cyclotron heating systems. Conversely the activity related to ITAs is likely to be reduced due to ITER-Central Team budget constraints.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
Fusion for Energy responsibility					
EU.PE.501010	WP	Engineering support to PE and Antennas	FWC signed	10/03/2016	Not applicable
Fusion for Energy suppliers responsibility					
EU.PE.104066	PP	First Progress Report for Contract for Development of an EFIT like real time plasma boundary reconstruction code	Report approved by F4E	30/03/2016	First progress report

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 3.79 FTE.

FINANCING DECISION

Procurement actions

ITER Project actions in response of PAs and ITAs

Engineering support to EC and IC heating systems. Engineering and Physics Analysis Supporting the EC system Final Design. Plasma engineering analyses in support to F4E procurement.

ITER Project actions not in response of PAs and ITAs				
Transversal activities in support to F4E in response to request from F4E management of technical committees.				
Grants and Specific Grants				
Scope	**Type of procedure**	**Time of Call**	**Indicative Amount (Euro)**	**Budgetary line**
Analysis in support of Plasma Engineering and antennas including load specifications revision	Open Call	Q3/2016	300,000 Euro	3.1
Analysis and simulations of plasma operations, plasma machine interfaces and actuators	Open Call	Q3/2016		3.1

EU.01.PM ITER – Programme Management

WBS: EU.01.PM	ITER Programme Management	WP ref: WP16/PM/01

SYSTEM ENGINEERING AND CONFIGURATION MANAGEMENT

General Overview

The main scope of this area is to develop both Configuration Control and Configuration Management activities according to Quality Assurance requirements - including managements of Deviation Requests (DR), Non Conformities (NC) and Project Change Requests (PCR) – and System Engineering tools and processes.

Current Status

An agreement has been reached in 2015 with IO in terms of future collaboration for the setup of a common methodology.

Challenges for the next year

Task orders of the existing framework will be placed in support of the activities of systems engineering and configuration management. A new framework will be lunched in the first quarter of 2016 in support of the same area but with an enlarged scope to cover: harmonize F4E and ITER IO methodology.

TECHNICAL INTEGRATION

General Overview

Technical Integration plays an essential role to define and coordinate cross-system design activities of the F4E procurements and to systematically manage transversal engineering requirements and activities like commissioning or maintenance.

Current Status

Technical Integration is currently limited to the evaluation and propagation of changes (PCRs) and to the participation in relevant Task forces (i.e. Port Plug, Stress Tests inter alia).

Challenges for the next year

The main goal is to fully develop a Technical Integration area in F4E by regularizing the Technical Integration and Coordination Board and setting up the resources (both internal and external with contracts).

ASSEMBLY INTEGRATION AND VALIDATION (AIV)

General Overview

This area is in charge of F4E internal coordination and is counterpart of IO on the efforts related to the set-up of common policies, procedure, instructions, plans, etc. and the future approval of supplier's documentation required to start AIV activities onsite.

Current Status

A follow up of AIV documentation being prepared by ITER IO and F4E evaluation/assessment of Assembly related contracts performed.

Challenges for the next year

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

QUALITY ASSURANCE, QUALITY CONTROL AND CE MARKING

General Overview

The Quality Assurance & Quality Control group of the Nuclear Safety and Quality Unit (NSQ) is responsible to ensure that the quality aspects are correctly implemented and managed in the realization of the European in-kind procurement for ITER. Integrated in the ITER Department, it is responsible for providing support to the project teams, and supervises their activities, in the domains of Quality Assurance and Quality Control.

The CE Marking group of the Nuclear Safety and Quality Unit (NSQ) is responsible to ensure that the CE Marking obligations coming from the European Directives are correctly implemented and managed in the realization of the European in-kind procurement for ITER. Integrated in the ITER Department, it is responsible for providing support to the project teams, and supervise their activities, in the domains of CE marking.

Current Status

In the field of Quality Assurance (QA), the NSQ Unit will control that the F4E QA processes are properly followed in the development of the different ITER projects and in line with the F4E Quality Management Policy.

In the field of Quality Control (QC), the NSQ Unit will support the Project teams in the follow-up and control of the activities performed by the F4E contractors.

In this field of activities, in March 2015, a new Unit has been created and the following missions have been assigned :

- Liaise with project teams on QA and QC topics ensuring that the F4E Quality Management System (QMS) is duly implemented within the department and through the supply chain. Advise the Department managers and responsible officers on quality matters. Support the review of project documentation for QA aspects;
- Support the Department teams on quality activities such as monitoring, audits, documentation review, conformance processes, etc. Perform monitoring, audits and assessments of the QMS implementation within F4E and its suppliers contributing to the F4E Annual Quality Audit Plan;
- Monitor the Department QA/QC activities. Identify QMS implementation problems and opportunities for improvement and propose relevant changes to the QMS;
- Closely monitor the nonconformity control process implementation within the Department;
- Implement and manage the required framework contracts to provide workshop/site inspectors, and any potential third party inspection, needed by the project teams during their manufacturing phase;
- Liaise with IO QA representatives on areas where the IO QA requirements have or could have a significant impact on the Department activities (including the Supplier Quality Requirements). Represent the Department in the IO/DAs integrated Safety & Quality Asurance Working Group (SQAWG);
- Represent the Department in the QA Coordination Board (QACB) meetings, which main goals are to collect, analyse, and consolidate management information taking into account the input received from the Project Team/Unit Managers but also from the Broader Approach and Administration departments;
- Organize regularly trainings, of operational QA to the project teams and the F4E Contractors of PIC.

In 2015, the related action plan, to raise as soon as possible the resources to the appropriate level in order to fulfil the assigned missions, has been provided but it is not implemented yet (currently, 4 FTE to cover the QA missions, 0 for the QC missions).

In the field of CE marking, the NSQ Unit will provide coordination for the ITER Department and analyse F4E duties in terms of CE marking for the components to be delivered by the EU-DA.

Due to the resources not all in place yet, only a limited support could have been provided to the different project teams, and not all the assigned missions have been fulfilled. Nevertheless:

- Around 3,500 documents have been reviewed in 2015 up to now by F4E QA officers to assess the compliance of F4E suppliers' activities with the procedures in force in F4E.
- 11 formal audits have been already performed in F4E suppliers premises by F4E certified QA auditors, according to F4E 2015 annual audit.
- For CE marking, 41 assessments on individual components or systems (to be delivered by F4E) concerning the obligations coming from European directives have been provided to the different project teams.

The Unit is in charge to support the F4E project teams in their assessment of the compliance with harmonised EN / European standards, in the frame of applicable EU legislation, for the structures, systems and components delivered by EU-DA.

Challenges for the next year

The two main challenges are for the Quality Assurance and Quality Control:

• to develop in F4E an appropriate capacity in Quality Assurance assessment, by setting up the resources (both internal and external with contracts), to be able to regularize and streamline the different activities related to quality assurance, currently dispersed in F4E;

• to create a new group in Quality Control that will able to fulfil the missions assigned, thanks to proper resources allocation, and especially to create in F4E a centralized and coordinated inspection capacity able to assess, far ahead of the final delivery acceptances, the risk of non-compliance with technical or regulatory requirements of products to be delivered by F4E suppliers

• to coordinate all workshop/site inspectors needs from the project teams according to their actual manufacturing phases

One of the main challenges for 2016 will be to collect all the reference missing documentation to continue to assess, one PBS after the other, the compliance with CE marking directives & regulations (mainly the Construction Product Regulation, the Machinery Directive, the Low Voltage Directive and the Electromagnetic Compatibility Directive).

ANNUAL OBJECTIVES

SYSTEM ENGINEERING AND CONFIGURATION MANAGEMENT

Milestone ID/ Objectives	Milestone Objective type	Scope Description	Achievement criteria /CAS received	Forecast achievement date	Relevant Deliverables
EU.PM.3023850	WP	Provision of Support for Configuration Management and Systems Engineering - Barcelona and Cadarache	Contract signed	30/03/2016	EU.PM.3023850

TECHNICAL INTEGRATION

Milestone ID/Objectives	Milestone Objective type	Scope Description	Achievement criteria/CAS received	Forecast achievement date
EU.PM.3024880	WP	Provision Of Support for Technical Integration	Contract signed	30/03/2016

QUALITY ASSURANCE, QUALITY CONTROL AND CE MARKING

Milestone ID/Objectives	Milestone Objective type	Scope Description	Achievement criteria/CAS received	Forecast achievement date
EU.01.PM.01	WP	Provision for Site Inspectors	Contract signed	Q4/2016
EU.01.PM.01	WP	Provision of Support for Quality Assurance and Quality Control, inspectors	Contract signed	Q4/2016
EU.01.PM.01	WP	Provision for CE marking analysis	Contract signed	Q4/2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 2.15 FTE.

FINANCING DECISION

Procurement actions

Support to the F4E Project teams for:

- Configuration Management and Technical Integration areas. The scope of this financial decision includes a support to the Project teams during the different phases of PAs implementation.
- Quality Assurance, Quality Control and CE marking. The scope of this financial decision includes a support to the Project teams during the different phases of PAs implementation.

These activities will be mainly implemented through specific contracts under the ongoing framework contracts

Main Procurement initiatives					
F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
Configuration management and System Engineering	Framework Contract	Provision of Support for Configuration Management and Systems Engineering - Barcelona and Cadarache	Q1/2016	Multiple	NA
Technical integration	Framework Contract	Provision Of Support for Technical Integration	Q1/2016	Multiple	NA
Quality	Framework Contract	Provision for Site Inspectors	Q2/2016	Multiple	NA
Quality	Framework Contract	Provision of Support for Quality Assurance and Quality Control, inspectors	Q2/2016	Multiple	NA

EU.01.TR ITER – Transportation

WBS: EU.01.TR	Transportation	WP ref: WP16/TR/01

General Overview

This activity reflects 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.

Current Status

Implementation agreement with the supplier signed. Necessary conventions with the French authorities put in place. Several transports mainly proceeding from NON EU DAs already performed in 2015, of which around 10 Heavy Exceptional Loads (HEL's) in 2015. For example US drain tanks and US transformers.

Challenges for the next year

Continue to ensure the follow up of transportation activities for HEL, CEL and CL by the release of related TOs. Have an agreement on tariffs in place. Besides all non EU loads, transport the EU HEL's in 2016, being Assembly hall Crane beams and huge tanks and compressors for the EU Cryoplant project 34.01

ANNUAL OBJECTIVES

Following general support activities will be carried out during the next 3 years:

- Signature of the specific contracts under the ITER Global Logistics Framework Contract for the transportation of ITER Components according to the needs identified by F4E (for EU components) and other Das during the relevant year
- Provide all support needed for the security of the transports

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 5.79 FTE.

FINANCING DECISION

Procurement actions

Expenditures for the Global Transportation of EU and Non-EU DAs ITER In Kind components (from Fos/Marignane to Cadarache). Mainly to be implemented through specific contracts under the Global Logistics Framework Contract with IO.

Additional scope is linked to the security services related to the transports.

4. BROADER APPROACH PROJECTS

EU.BA.01 Broader Approach – Common Activities

WBS: EU.BA.01	Broader Approach - Common Activities	WP ref: WP16/BA/01

General Overview
The overall objectives consist in the coordination of Broader Approach activities.

Current Status
Since the signature of the framework contract for the transport of BA deliverables in January 2013, 14 Task Orders have been placed for the 3 BA projects.
The framework contract for the support of on-site activities was signed in June 2015, and so far one Task Order has been signed. Further Task Orders will follow in 2016.
To support the PA-implied monitoring several pieces of equipment have been purchased, to be used e.g. hydraulic jacks and a gas leak detector.

Challenges for the next year
In WP16 the activities cover general support and management of the two existing framework contracts for all three BA projects (actual transport and activities on site are covered under the specific BA projects). Technical support of a general nature for PA monitoring is also covered under this WBS. Furthermore support is provided for the management of inputs for meetings, such as the BA Steering Committee.
For both framework contracts the coordination and support activities have to run smoothly and in a timely manner to help the implementation of the activities. For the PA monitoring area also fast reaction is needed, as the items should usually be available within a short period of time.

ANNUAL OBJECTIVES

Area	Scope Description
Transportation	Transport of BA project deliverable, usually to Japan Port of Entry (PoE).
On-site Activities	Common activities and framework activities relating to on-site activities of all BA projects, where not covered under specific projects.
PA Monitoring	Purchase and deployment of equipment as needed to support PA-implied contract monitoring.
Legal costs	Legal support for all BA projects.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 6.29 FTE.

FINANCING DECISION

Procurement actions

BA Project actions in response of PAs

Expenditures are foreseen under the budget 2016 for support on: Health &Safety for On Site Activities, Assembly onsite activities and legal activities, mainly to be implemented as specific contracts under the ongoing Framework contracts. In addition some minor costs for monitoring PAs also appear here, e.g. purchase of equipment for support.

EU.BA.02 Broader Approach – Satellite Tokamak (JT-60SA)

WBS: EU.BA.02	Satellite Tokamak (JT-60SA)	WP ref: WP16/BA/02

General Overview

The overall objectives consist in the contribution to the early realization of fusion energy by supporting the exploitation of ITER and research towards DEMO by addressing key physics issues associated with these machines, in particular by designing, constructing and operating a device:

- capable of confining break-even equivalent class high-temperature deuterium plasmas lasting for a duration longer than the timescales characteristic of plasma processes;
- Pursuing full non-inductive steady-state operation with high plasma beta close to and exceeding no-wall ideal stability limits.
- Establishing ITER-relevant high density plasma regimes well above the H-mode power threshold.

The primary reference for the Satellite Tokamak Programme is the Project Plan yearly revised and submitted for endorsement to the BA Steering Committee (see BA SC 16-8.5).

The general list and description of all activities related to the Satellite Tokamak Program (STP) (JT-60SA) for the year 2016 is contained in the corresponding STP WP2016 recommended by the STP Project Committee on the 27 October 2015 and approved by the BA Steering committee on 2 Dec 2015 (ref BA-STP-PC-17-7).

The STP WP2016 contains all the activities and relative milestones. So all what is going to be done and achieved by EU and JA is listed in the WP2016 including the expected dates for creditable milestones and the corresponding credit. The EU activities include activities performed by the EU VCs (France, Italy, Germany, Spain and Belgium) and directly by F4E for the purpose of providing components and services forming the overall EU contribution to STP.

The WP2016 covers the planned achievement of several important EU milestone including the completion of the fabrication, cold test, pre-assembly delivery on site of 8 TF coils, the completion of the commissioning of the Cryoplant, the delivery and installation of the Switching Network Units and part of the Superconducting Magnets Power Supplies, the completion, test and delivery of a large fraction of the High Temperature Superconducting Current Leads(HTSCLs) , the completion of the cryostat and its transport to Japan.

On the basis of the AoC established between F4E and the EU VC Designated Institutions F4E retains the overall technical coordination and management of the activities through its antenna in Garching and the JT-60SA Unit.

This requires F4E to implement specific actions for R&D, validation of design, quality control, supervision of organisation and safety of onsite activities at JT-60SA site also including common activities with JAEA.

F4E retains the direct responsibility of specific activities and namely:

- All transport to Japan (either directly contracted or reimbursed to the EU VC DI)
- The direct contracting and supervision of the installation of a large share of the JT-60SA Power Supplies
- The contribution to the fabrication of the two TF spare coils and ancillary components and services for the TF coils assembly on-site

Current Status

The current status of the STP is contained in the document Overview of the Present Status of STP 'Submitted to the STP PC on 27 October 2015 and to the BA Steering Committee on the 2 Dec 2015.

The JA contributions are being delivered on time, or even ahead of time. It is noted that JAEA has completed the installation of the lower PF coils, and of 340 degrees of the vacuum vessel, is progressing on schedule for the fabrication of the balance of the PF coils and of the central solenoid. Moreover a number of ancillary systems and buildings necessary to the EU contributions have been made available on time. JAEA has also managed successfully the complex logistics of the transport of exceptional loads of the GHe Cryoplant from the port of entry of Hitachi and the JT-60SA Site in Naka.

The EU contributions is also progressing vigorously .In 2015 important milestones have been achieved (and credited) including the completion of the installation, test and acceptance of the Quench Protection System (the emergency safety dump for the energy of the JT-60SA Superconducting magnets), the installation on site and start of the commissioning of the supercritical Helium Cooling system.

In 2015 F4E in collaboration with CEA and ENEA has been implementing strong actions to limit the delays on the delivery of the TF coils which are now on the critical path of the project. The delivery of the TF casings (the primary cause of delay) is now running on schedule and 7 TF coil casings have been delivered (will be 8 within Dec 2016). The first two TF coils out of 18 needed (one produced by CEA/ALSTOM and one from ENEA/ASG) have been delivered to the Cold Test Facility at CEA Saclay). The Cold Test Facility at CEA Saclay has completed his commissioning in September 2015 and has started the cold test of the first TF coil at 4 K nominal current (25.7 kA).

In the meantime the fabrication and testing of the TF coils High Temperature Superconducting Current Leads (produced by KIT, Germany) has been successfully completed and all the 6 units have been delivered to JT-60SA site. The fabrication of the PF coils HTSCL and their testing is also progressing well thanks to the doubling of the capacity of the CultKA Facility in Karlsruhe that is now able to test 4 units in parallel.

Challenges for the next year

In the following table all the main objectives are detailed with their deliverables and expected results, but it is important to note that, due to the collaborative nature of the BA STP Project, the deliverables/results listed and the corresponding credits are not corresponding to activities exclusively implemented by F4E, but include and incorporate results and deliverables achieved by the EU Voluntary Contributors).
The total amount of credits expected to be received by the EU in 2016 amounts to 66.649 kBAUA (corresponding to 45.188 million Euros @ 2005 currency)

The direct contribution of F4E is concentrated in the following activities:

i) General Engineering Support

ii) Coordination and H&S monitoring for EU Activities at JT-60SA Site

iii) Transport and Delivery of TF coils and accessories

iv) Transport and Installation of the SNUs

v) Transport of the SCMPSs

vi) Transport of the Cryostat Vessel Body Cylindrical Section

vii) Transport of the PF/CS HTSCLs

viii) Procurement of the TF casing for the 2nd Spare Coil

ix) EU contribution to the Joint Fund for common expenses relative to Integrated Commissioning and Initial Operation

x) Implementation of the procurement of the ECRH Power Supplies

ANNUAL OBJECTIVES

Objective	Objective Type	Scope Description	CAS received	Forecast achievement date	Relevant Deliverables Expected results
EU.BA.02.01 Satellite Tokamak (JT-60SA) Common Activities	WP	Common activities required to support JT-60SA activities, not covered under specific WBS sub elements of JT-60SA.	Expected total credit to EU: 1832 BAUA	Dec 2016 1832 BAUA	Disbursement of the EU share of the common fund for the integrated commissioning and initial operation
EU.BA.02.02 - Toroidal Field Magnet	WP	Manufacture and testing of JT-60SA TF coils and structures, and transportation to Japan PoE.	Expected total credit to EU: : 39098 BAUA	Dec 2016 1844 BAUA	First TF coil test completed
				Dec 2016 34576 +1398 BAUA	Transportation to Japan Port of Entry of 8 TF coils.+ Gravity Supports

				Oct 2016 1280 BAUA	Transport and Acceptance of CS&EF current leads nr. 1-10 at Naka site
EU.BA.02.03 - Assembly	WP	Assembly or support of assembly of various components under European responsibility, at Naka site or in Europe prior to shipment, where not covered under individual subprojects.	Expected total credit to EU: : 442 BAUA	June 2016 (442 BAUA)	First TFC and OIS pair pre-assembled together: Start of onsite machining of splice plates
EU.BA.02.04 Power Supply (PS)	WP	Provision and installation of power supplies in Naka	Expected total credit to EU: 11668 BAUA	June 2016 (2832 BAUA) Dec 2016 (1062 BAUA)	SNU - Approval of Report of Factory Test and SNU delivery to JA PoE
				Feb 2016 (3213 BAUA) Mar 2016 (1606 BAUA) Dec 2016 (1606 BAUA)	SCMPS - Report on Factory Tests + Delivery on Port of Entry in Japan of power supplies units related to TF, EF2, EF3, EF4 and EF5 coils and their Final Acceptance Tests
				April 2016 (230 BAUA)	RWMPS Approval of First Design Report
				May 2016 (1119 BAUA)	ECPS the approval of the First Design Report
EU.BA.02.05 Cryogenic System	WP	Support for installation and testing of cryoplant in Naka.	Expected total credit to EU: 3186 BAUA	Oct 2016 (3186 BAUA)	Cryogenic System - Acceptance test of Cryogenic System finished
EU.BA.02.07 Cryostat	WP	Transportation and testing the cryostat vessel body cylindrical section	Expected total credit to EU: 10433 BAUA	Dec 2016 7824 BAUA + 2609 BAUA	CVB Cylindrical Section Factory Test Complete – Transport and final acceptance in Naka

All these outputs contribute to the assembly and commissioning of JT-60SA, in particular of the superconducting magnet power supplies, toroidal field magnet, and cryostat. In addition under this heading F4E staffs supervise/contribute to the commissioning of the European cryogenic plant, TF coil testing, TF coil structural elements and pre-assembly and current lead manufacture.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 9.89 FTE.

FINANCING DECISION

Procurement actions

In line with the objectives indicated above, the main new F4E procurement actions during the year 2016 focus on transportation of components to Japan as well as on-site installation activities and their support. All activities performed at in response to established PAs and AoCs.
In addition commitments are foreseen under the budget 2016 for:

- Additional expenses for the TF magnet Conductor cable jacketing
- Opportune procurement of materials, accessories and spare parts and services needed during assembly and integrated commissioning and not provided by voluntary contributors
- Magnet Engineering and R&D Supply Including design, R&D and third party inspections
- In-Kind contribution to JT60SA integrated commissioning and initial operation

Cash contribution

Scope Description	**Amount**
EU contribution to the Joint Fund for common expenses relative to Integrated Commissioning and Initial Operation	1,200,000.00 EUR
Power Supply transports reimbursement (Switching Network Units)	133,000.00 EUR
Reimbursement of the transportation of the French contribution of the Superconducting Magnet Power Supply	150,000.00 EUR

EU.BA.03 Broader Approach – IFMIF-EVEDA Project

WBS: EU.BA.03	IFMIF-EVEDA Project	WP ref: WP16/BA/03

General Overview

The aim of the IFMIF/EVEDA Project is to produce an integrated engineering design and develop the technology for a high intensity, high fluence neutron source for fusion. The F4E activities in this project are mainly aimed to ensure the EU contribution to the IFMIF/EVEDA sub-projects, which are:

- Linear IFMIF Accelerator Prototype (LIPAc): For this sub-project, F4E is coordinating the achievement of the deliverables committed by the EU Voluntary Contributor and is responsible for the transport to Japan of the subsystems manufactured as key elements of the deliverables. In executing this transportation responsibility, F4E has issued and will continue to issue Specific Contracts within an existing Framework Contract for transporting the Injector, the Medium Energy Beam Transport (MEBT) line, the Radiofrequency Quadrupole, the High Energy Beam Transport (HEBT) line and Beam Dump, and the RF power system to Japan. In addition, a contract will be placed for technical; support assembly of the SRF accelerator stage ("Cryomodule") on site.
- Lithium Target Facility: For this far advanced sub-programme, only long time erosion/corrosion experiments in LIFUS6 are still to be conclusively concluded by September 2016. These missing activities are conducted and financed by ENEA as EU Voluntary Contributor. F4E is coordinating the activities between ENEA and the Project Team at Rokkasho. No procurement activities are performed by F4E.
- Test Facilities and IFMIF Engineering Design: Both sub-projects have been successfully accomplished in 2015 (Test Facilities) and 2013 (Engineering design), respectively. No more procurement activities are performed by F4E.

Current Status

Till end of 2015, 6 European experts are working at the IFMIF/EVEDA Project Team based on a Secondment Arrangement signed between F4E and JAEA of which 5 Secondment Arrangements are backed by a Back-to-Back Arrangement between F4E and Institutes of the Voluntary Contributors. The sixth expert is the Project Leader and a F4E staff member. Their mission-out-of-Japan are covered by the cash contribution as well as their IT hardware.

The F4E part is responsible for the transport of the systems for the Linear IFMIF Prototype Accelerator (LIPAc) from the site of their acceptance tests in Europe to the Japanese port of entry, The injector system and major elements of the RF high power systems. In 2015, also a framework contract was placed with Bureau Veritas Japan to have a F4E On-Site Representative permanently at Rokkasho site starting with deuteron beam operation and the thereby required work in controlled areas.

An accelerator expert is contracted for 3 years to provide consultancy for engineering and R&D support during installation of LIPAC components during set-up, assembly and commissioning.

Challenges for the next year

Among the LIPAc components to be shipped to Japan in 2016, there several remaining key elements produced for the RF Power Systems and the Medium Energy Beam Transport as well as the full system for the Radiofrequency Quadrupole and the Cryoplant. The latter transport will be organised by the Voluntary Contributor for the Cryoplant and then costs will be compensated by F4E in the form of cash contributions. Also in 2016, a F4E On-Site Representative will be permanently ensured at Rokkasho site by Bureau Veritas Japan based on specific contracts for the framework contract. The expert will be following up the F4E safety and health aspects and support the technical coordination of the European contributions.

The accelerator expert who was contracted in 2015 for 3 years will provide consultancy for engineering and R&D support during installation of LIPAC components explicitly for Radiofrequency Quadrupole installation and commissioning.

ANNUAL OBJECTIVES

Milestone ID/ Objectives	Objective type	Scope Description	CAS received	Forecast achievement date	Relevant Deliverables
EU.BA.03.01 IFMIF/EVEDA Project Common Activities	WP	Common activities required to support IFMIF/EVEDA activities, not covered under specific WBS sub-elements of IFMIF/EVEDA.	Expected total credit to EU: 600 BAUA	Dec 2016	Disbursement of the EU share of the common fund and of the common expenses of the Project Team (e.g. missions).
EU.BA.03.02 LIPAc Activities	WP	Part of Delivery of Components of the Linear IFMIF Prototype Accelerator (LIPAc) to Rokkasho, i.e. transportation to Japan PoE.	No credits to F4E, Total of credits allocated to Institutes of Voluntary Contributors for Delivery of RF	Last Transport: Q3 - 2016	Acceptance Note from JAEA of Transport

			system, RF Quadrupole: 21600 BAUA		
EU.BA.03.02 LIPAc Activities	WP	Installation and commissioning of Linear IFMIF Prototype Accelerator (LIPAc)	Credit for contribution to Installation and Commissioning Phase A: 110 BAUA.	June 2016: 110 BAUA).	Approval of Report on Installation and Commissioning Phase A by Project Leader
EU.BA.03.02 LIPAc Activities	WP	Contribution to Procurement Agreement PA AF04 (Crymodule of SRF Linac)	Credits for F4E 880 BAUA Total of credits allocated for Delivery and Assembly of Cryomodule of SRF Linac: 3000 BAUA	Call for tender: Q4/2016 Contract signature Q1/2017	Approval of Report on Acceptance and Delivery Report of Cryomodule of SRF Linac by Project Leader
EU.BA.03.01 IFMIF/EVEDA Project Common Activities	WP	Coordination of Work from Designated Institutes of EU Voluntary Contributors to Validation of Lithium Target Facility	No credits to F4E, Total of credits allocated to Institute of Voluntary Contributors for Erosion/corrosion experiments in LIFUS6: 1220 BAUA	September 2016	Approval of reports documenting the Erosion/Corrosion experiments and their results and credit allocation to deliverables (PA LF03)

These outputs contribute mainly to the assembly and commissioning of LIPAc, a major European contribution to the IFMIF/EVEDA project.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 10.79 FTE.

FINANCING DECISION

Procurement actions

The main procurement actions during the year 2016 focus on LIPAc commissioning and its support in Rokkasho.
Expenditures are foreseen under the budget 2016 for:

- Transportation to Japan: Accelerator Facility RF Power System, Radiofrequency Quadrupole, High Energy Beam Transport line & Dump , Medium Energy Beam Transport line.
- On-site-support engineering and health and safety support for LIPAc
- Service contract for the Cryomodule assembly
- Engineering support activities for LIPAc

Cash contribution

Scope Description	**Amount (Euro)**
Cash contribution to IFMIF/EVEDA project to maintain project team common expenses (e.g. missions).	225,000.00 EUR

Main Procurement initiatives

F4E systems	**Type of Contract/ Agreement**	**Scope description**	**Time of call**	**PA reference**	**In the budget 2016?**
IFMIF	P Serv	Cryomodule assembly (IFMIF)	Q4/2016	PA AF10-EU-WP04	Y

EU.BA.04 Broader Approach – International Fusion Research Centre

WBS: EU.BA.04	International Fusion Research Centre	WP ref: WP16/BA/04

General Overview

The IFERC activities include three sub projects - DEMO Design and R&D activities, establishment and operation of a Computer Simulation Centre (CSC), and establishment and operation of a Remote Experimentation Centre (REC):

- Remote Experimentation Centre (REC): F4E is in charge of all procurements needed to deliver the EU in-kind contribution. These include providing software for remote experimentation, overseeing the usage of a cash contribution to Japan for the REC hardware, and testing the systems on an EU Tokamak.
- Computational Simulation Centre: for this sub-project the task of F4E is to ensure the coordination between the EU Voluntary contributor and the JAEA team. No procurement activities are performed by F4E.
- DEMO Design and materials R&D: for this sub-project the task of F4E is to ensure the coordination between the EU Voluntary contributors, EUROfusion, and the JAEA team. No procurement activities are performed by F4E.

The detailed list and description of all activities related to the IFERC Project for the year 2016 is contained in the corresponding IFERC WP 2016 recommended by the IFERC Project Committee on 1 October 2015 and to be approved by the BA Steering committee on 2 Dec 2015 (ref BA-IFERC-PC-17.13))

Current Status

Currently IFERC projects are mature and in some cases coming to completion. The Computational Simulation Centre (CSC, operating the Helios supercomputer, fully provided by voluntary contribution) will terminate its operation at the end of 2016 It will start its last cycle of projects in November 2015. The DEMO subproject continues under the collaboration with EUROfusion, with a number of DEMO relevant research areas covered by the EUROfusion work packages. The Remote Experimentation Centre (REC) is the only sub-project fully implemented with F4E budget. A series of contracts is planned for developing software enabling the EU users to participate in the JT-60SA. Tests from Rokkasho REC with EU tokamaks are also planned. In summary the current activities are:

- Ad-hoc expenses for site activities and insurance.
- Remote Experimentation Centre (REC) procurements and further design requirements development.
- Computational Simulation Centre (CSC) exploitation: Operation, maintenance and minor upgrades of Helios supercomputer
- DEMO design and materials R&D

Challenges for the next year

In general, for IFERC the challenge for 2016 is to develop an extension of the activities of IFERC until the end of 2019 with a very limited amount of credits, which should support the IFMIF-EVEDA project, and prepare for possible collaborations after the BA period.

For the CSC, the challenges are

- to perform the final small upgrade of Helios, consisting in the installation of a small partition of many-core processors, which will complete the first extension performed in 2014; these extensions aim to encourage the CSC users to adapt their codes to the next generation of supercomputers
- to ensure the orderly termination of CSC operation at the end of 2016, and the recovery of data by users

For the DEMO activities, the challenges are

- to reinforce the collaboration with EUROfusion
- to merge the materials research activities into the DEMO design planning

For the REC subproject the challenges are

- to place the necessary contracts for the completion of the REC software
- to follow up the usage of the EU cash contribution to Japan for the provision of the REC hardware.

ANNUAL OBJECTIVES

WBS	Objective type	Scope Description	Achievement criteria/CAS received	Forecast achievement date	Relevant Deliverables Expected results

EU.BA.04.03	WP	Computational Simulation Centre (CSC): Operation, maintenance and upgrades of supercomputer Helios	Expected credit to EU: 6318 BAUA	December 2016 (will complete 97820 BAUA)	Final report of Operation and dismantling 2016
EU.BA.04.04	WP	DEMO Design and materials R&D activities: Develop design rules, databases for DEMO design	Expected total credit to EU: 1000 BAUA	December 2016	Annual reports of activities
EU.BA.04.02	WP	Remote Experimentation Centre: Preparation and establishment of a remote experimentation centre for ITER, to be tested on for example JT-60SA.	Expected total credit to EU: 1560 BAUA	December 2016	Annual reports of activities

These outputs contribute mostly to the development of the REC system in Rokkasho, as well as the operation of the CSC, and the development of design rules and material databases for DEMO.

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 5.69 FTE.

FINANCING DECISION

Procurement actions

The main procurement actions during the year 2016 focus on provision and commissioning of REC components in Japan as well as continued support to CSC.
During 2016 changes to the ongoing contracts will be implemented through amendments in line with the provisions of the Financial Regulation.

5. F4E PROGRAMME MANAGEMENT

EU.PM.PM – F4E Programme Management

WBS: EU.PM.PM	F4E Programme Management	WP ref: WP16/PM/02

PROGRAMME MANAGEMENT

General Overview

The overall objectives consist in support to the organization and to the Units in three main domains: Operational Budget, Project Control and Programme Management.

As for the operational budget the activities concern mainly the preparation of the budget and its management and reporting according to the needs of the units, the liaison with the stakeholders for the provision of the funds and with ITER IO for the provision of the EU cash contribution.

The Project Control activities cover the needs in the areas of planning, reporting, costing and risk. Support is provided in all these areas to the Units with interfaces to the ITER Organization as it is required by the work. Both reporting and risk activities span also over the whole organization to ensure a correct monitoring of the work and tracking of milestones and actions.

As for Programme Management, the activities concern the preparation and the support to the Units in the implementation of the work programme and in the administrative tracking of ITER Task Agreements (ITA) and Procurement Arrangements (PA), the preparation and update of the internal project plan, the liaison with Japan concerning the EU cash contributions and the support to the Units on dual use (export control) topics.

Task orders of existing framework contracts are placed in support of activities in these areas. Also in the year of reference the activities will be focussed on providing such kind of support.

In addition the WBS EU.PM.PM covers as well the operational expenditures of administrative nature.

Current Status

As for the planning, a realistic project schedule was developed with ITER IO-CT to be presented for approval at the ITER Council in November 2015. An Estimate cost at completion (EAC) was developed at WBS Level 6 (contracts) including the identification of specific cost risks.

The technical risk logs were migrated to the Oracle environment and linked to the Primavera activities.

As for the dual use activities, the execution of a specific contract with an external company has allowed to progress on the definition of the Internal Compliance Programme. In 2015 the dual use tracker (IT tool) has been deployed to support the process.

Routine activities have been carried out in all areas (i.e. operational budget, project control and programme management) to make sure that the right support is granted and the required monitoring is provided.

Challenges for the next year

Main focus will be the planning activities following the agreement on a new reference schedule, expected for November 2015, the maintenance and update of the costing (both baseline at WBS L4 level and Estimate at Completion at WBS L6 level (contracts), the further improvement of the risk registers in all project areas through the link to the activities in Primavera, the increase in the number of standard reports available to the organization, the revision of existing process aiming at updating and simplifying them, the implementation of the Internal Compliance Programme for export control.

OTHER EXPENDITURES – INFORMATION AND TECHNOLOGY

General Overview

Provision of ICT support (hardware, software and services) for the specific benefit of ITER Project.

Current Status

ICT Support for the ITER Project during 2015 covered the following areas:

- EDM/PLM
- Engineering Software provisioning
- Primavera developments and maintenance
- Provision of specific hardware (workstations)

ANNUAL OBJECTIVES

PROGRAMME MANAGEMENT

Area	Scope Description
Risk management	**Improve risk management for specific in-kind procurements** Assistance of skilled risk management support staff will be provided to specific Project Teams in the same way it was already done for the buildings.
Scheduling	**Scheduling support to PTs** Planning activities in specific areas following both F4E and IO-CT guidelines.
Reporting	**Consultancy and support in the management of data through reporting system and specific applications.** Data maintenance and ad-hoc developments to improve the reporting data management. Ad-hoc reports to be provided regularly to stakeholders.
Processes	**Update of existing and development of existing process in the budget and project control environments**. Review of existing processes and/or development of new ones in line with the F4E needs and for update of the F4E Manual.
Export Control	**Implementation and follow-up of the Internal Compliance Programme**
Programmatic Documents and Reports	**Preparation of the programmatic documents as foreseen by the Financial Regulation and F4E Statutes and preparation of ad-hoc reports**
Budget	**Preparation and Monitoring of the Budget.** Follow-up and reporting according to the needs of the organization.
Cost	**Cost Monitoring and Cost Containment activities** Follow-up and reporting of cost evolution with maintenance of data including cost risks

INFORMATION AND TECHNOLOGY

The main objectives of the year is to place the following task orders:

Objective	Scope Description	CAS received/Achievement criteria	Forecast achievement date
EDM/PLM	Maintenance and development of F4E SmarTeam platform	Developments according to plans, maintenance contracts in place	Along 2016
Software licenses provisioning and maintenance	Provision of software licenses for engineering software packages	Needed number of licenses available, maintenance contracts in place	Along 2016
Project management platform support	Support for primavera platform, maintenance and further developments	Developments according to plans, platform updated according to plans	Along 2016
Workstations	Provision of specialised computer platforms	Hardware provided according to plans	Along 2016

HUMAN RESOURCES ASSIGNED TO THE ACTIVITY

F4E will be supporting this activity during the year 2016 with 21.04 FTE.

FINANCING DECISION

Procurement actions

Programme Management

Transversal support to all teams on project management topics, such as planning, costing, risk, reporting, process development,

support on export control. These activities will be mainly implemented through specific contracts under existing framework contracts (see section 6.4 for the list of main framework contracts that will be on-going in 2016).

Other Expenditures

In 2016 F4E will need specialist support from economic operators (by means of service contracts) for operational needs: this will include (where appropriate) legal and commercial services, including adjudicators of on-going contracts and provision to cover the Chairman and advisors fees in case of lost disputes in front of the adjudication Panel. Provision in this sense is included in the budget for 2016. In 2016, F4E may need specific external legal advice with regards to complex dispute resolutions (including mediation, adjudication or litigation) and other ad hoc specific legally complex matters.

F4E has issued calls for expressions of interest for individual experts to provide technical assistance in a number of specific areas related to ITER and the Broader Approach. Provision is included in the budget for a total equivalent of approximately 4000 expert man-days in 2016.

A general provision is included in 2016 for the consultancy service for participation to specific ITER/F4E committees and support/advice to F4E Management. Provisions for financial audit for the on-going contracts are included under the same budget title.

In view of the increasing demand of metrology services, analysis and surveys, it is foreseen to purchase a minimum set of tools to be used by F4E staff in the technical support services team to perform geometrical checks according component manufacturing schedule. Among the others it is worth to mention Vacuum vessel sector's and part's geometrical checks as well metrology driven assembly processes. Provisions for portable Metrology devices like laser trackers, laser tracker accessories and necessary tools to make surface scans and gap/step detection including all relevant software applications are included under the budget title 3.4.

The performance of operational technical activities requires provisions for storage/shipment/use and access to specific software, technology, hardware and items (inter alia for CAD design, planning, configuration management and reporting tools, engineering analysis codes and technical material/safety items). Provisions for supply, licenses, development, installation, maintenance and training are included under the budget title 3.4

The close follow-up of the ongoing manufacturing contracts require F4E staff to stay at supplier‘s premises or facilities for long periods. Provisions for expenditures incurred for the long-term mission are included under the budget title 3.4.

6. ANNEXES

6.1. ANNEX I - 2016 Work Programme Budget Summary

Budget line	Title	Commitment appropriation (EUR)
3 1	ITER construction including site preparation	255 632 138.01
3 2	Technology for ITER	11,500,000.00
3 3	Technology for Broader Approach & DEMO	6,708,000.00
3 4	Other expenditure	4,500,000.00
3 5	Appropriation from the ITER Host State contribution	130,000,000.00
Total Title III of the Budget 2016		**408 340 138.01**
3 5	Internal Revenue	0.00
3.6	Revenue from the ITER Organization Reserve Fund Allocation Scheme	p.m.[15]
Total amount available for the operational expenditure		**408 340 138.01+p.m.**

Budget line	Title	Commitment appropriation (EUR)		
		Grants	**Procurement**	**Cash**
3 1+3 5	Expenditure in support of ITER Project credited by IO (Multiple WBS)	33 800 000.00	149 342 138.01	
3 1+3 5	Contribution in cash in support of ITER (EU.01.CC)			166 640 000.00
3 1+3 5	Contribution in cash to Japan (EU.01.CC)			25 650 000.00
3 1+3 5	Contribution for Site Agreement (EU.01.62)			3 500 000.00
3.1+3.5	Contribution for PF6 Manufacturing Contract in China			100 000.00
3 1+3 5	Contribution in cash on NBTF Agreement (EU.01.53)			6 600 000.00
	Subtotals	***33 800 000.00***	***149 342 138.01***	***202 490 000.00***
3 1+3 5	**Total ITER Construction**	**385 632 138.01**		

Budget line	Title	Commitment appropriation (EUR)		
		Grants	**Procurement**	**Cash**
3 2	Design and R&D in support of ITER, not credited	4 200 000.00	5 500 000.00	
3 2	Contribution in cash on NBTF Agreement (EU.01.53)			1 800 000.00
	Subtotals	***4 200 000.00***	***5 500 000.00***	***1 800 000.00***
3 2	**Total Technology for ITER**	**11 500 000.00**		
3 3	Expenditure in support of Broader Approach (EU.BA)		5 000 000.00	
3.3	Cash Contribution to JT-60SA project (EU.BA.02)			1 483 000.00
3 3	Cash contribution to IFMIF/EVEDA project (EU.BA.03)			225 000.00
	Subtotals	***0.00***	***5 000 000.00***	***1 708 000.00***
3 3	**Total Technology for Broader Approach and DEMO**	**6 708 000.00**		
3 4	Other Expenditure (EU.PM.PM)		4 500 000.00	
	Subtotals	***0.00***	***4 500 000.00***	***0.00***
3 4	**Total Other Expenditure**	**4 500 000.00**		
3.6	Revenue from the ITER Organization Reserve Fund Allocation Scheme		p.m.[15]	
3 6	***Subtotals***		p.m.	
3	**Total Expenditure by type**	***38 000 000.00***	***164 342 138.01+p.m.***	***205 998 000.00***
3	**Total Other Expenditure**	***408 340 138.01 +p.m.***		

Notes

- Figures corresponding to items to be credited by IO through ITA are provisional, and are based on the present understanding of the share of work to be assigned to F4E by IO with yearly planned ITAs (not competed) or through competitive procedures (competed ITAs).
- Following the evaluation of the proposals and updates on the cash contributions, the final budget repartition may vary by up to 10% of the specified budget figures in the table above.

[15] Estimated at 50 800 000 Euro at the time of the preparation of the 2016 Work Programme

6.2. ANNEX II - Essential selection and award criteria for Grants

With regard to grant actions referred to in this work programme, the essential selection and award criteria, in accordance with Articles 165 and 166 of the Implementing Rules of the Financial Regulation, 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 given in the call for proposals.

A proposal which does not fulfil 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.

6.3. ANNEX III - Upper funding limits for Grants

The upper limits for the F4E Contribution of eligible costs for grants are laid down in Article 153 of the current Implementing Rules of the Financial Regulation of the Joint Undertaking and are summarised in the following table.

Research, technological development and demonstration activities	40%
Purchase of durable equipment or assets and of ancillary services approved by the Joint Undertaking as necessary to carry out such activities	70%
Coordination and support actions	100%
Management, audit certificates and other specific activities	100%

With the entry into force of the recast F4E Financial Regulation and Implementing Rules, the following upper funding limits will 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%

6.4. ANNEX IV - List of Framework Contracts and Framework Partnership Agreements

List of General Support Framework contracts expected to be ongoing at the end of 2015; specific contracts and grants can be implemented in different WBSs level 2 as needed by the project.

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Contract Code
EU.01.15	WP15	WP14/15/04	FwC	Quality Assurance Audits	F4E-OMF-557-01
EU.01.ES	WP12	WP11/ES/07	FwC	CAD Design Support - General Mechanical Design	F4E-OMF-357-01
EU.01.ES	WP12	WP12/45/02	FwC	Provision of Instrumentation and Control Integration Services	F4E-OFC-361
EU.01.ES	WP12	WP12/ES/05	FwC	Engineering Support in the area of Mechanical Analysis for the Vacuum Vessel	F4E-OMF-356
EU.01.ES	WP13	WP13/ES/02	FwC	Mechanical analyses of ITER components	F4E-OMF-0457
EU.01.ES	WP13	WP13/ES/03	FwC	Metrological Support Services	F4E-OMF-468
EU.01.ES	WP14	WP13/ES/01	FwC	Provisions of Engineering Support in the Area of Electromagnetic and Electro-Mechanical Analysis	F4E-OMF-0508
EU.01.ES	WP14	WP12/ES/08	FwC	Provision of Support in the Area of Nuclear Analysis	F4E-OMF-466
EU.01.ES	WP14	WP14/ES/10	FwC	Engineering Analysis in the Area of Thermo- Hydraulic and Fluid dynamic Analyses	F4E-OMF-0578
EU.01.ES	WP14	WP12/ES/01	FwC	Seismic Analyses of IO Buildings and Mechanical Components	F4E-OMF-0503-01
EU.01.ES	WP14	WP12/ES/01	FwC	Dynamic Analyses of IO Buildings and Mechanical Components.	F4E-OMF-0503-02
EU.01.ES	WP14	WP12/ES/01	FwC	Structural Analyses of IO Buildings and Mechanical Components	F4E-OMF-0503-03
EU.01.ES	WP15	WP15/IC/03	FWC	Provision of system, instrumentation and control engineering support - Conventional Instrumentation and Control (I&C)	F4E-OFC-620-01
EU.01.ES	WP15	WP15/IC/03	FWC	Provision of system, instrumentation and control engineering support - Nuclear Instrumentation and Control (I&C)	F4E-OFC-620-02
EU.01.ES	WP15	WP15/ES/06	FwC	Provision of CAD Design Support - General Mechanical Design	Not yet available
EU.01.ES	WP15	WP15/ES/05	FwC	Provision of Schematic CAD Design Support Services	F4E-OMF-0641-01
EU.01.ES	WP16	WP16/ES/01	FWC	Support in the Area of Integration, Operation, Maintenance	F4E-OPE-0707
EU.01.MF	WP11	WP11/MF/04	FwC	Engineering Support on Joining and Non-destructive tests for production of ITER Components	F4E-2010-OPE-149
EU.01.MF	WP14	WP14/MF/08	FwC	Material Characterization at Cryogenic Temperatures	F4E-OMF-0563
EU.01.MF	WP14	WP14/MF/07	FwC	Provision of Engineering Support on Joining and Non-destructive test for production of ITER Components	F4E-OMF-0586

EU.01.MF	WP15	WP15/MF/01	FwC	Provisions for Destructive and Non-Destructive Testing of Materials at Room and Elevated Temperature	F4E-OFC-0618
EU.01.NS	WP15	WP15/SF/02	FwC	Engineering Support Services in the Area of Compliance with ITER Safety Requirements	Not yet available
EU.01.PM	WP11	WP11/PO/13	FwC	Provision of Planning & Scheduling Support Services	F4E-OFC-252
EU.01.PM	WP13	WP13/PO/15	FwC	Project Management Services Lot 2 - Configuration Management & System Engineering	F4E-OMF-436-02
EU.01.PM	WP13	WP13/PO/15	FwC	Project Management Services Lot 3 - Project Management Systems	F4E-OMF-436-03
EU.01.PM	WP13	WP13/PO/15	FwC	Provision of Project Management Services Lot 4 - Cost Management Support	F4E-OMF-436-04
EU.01.PM	WP13	WP13/PO/16	FwC	Project Management Services Lot 5 - CE Marking Support	F4E-OMF-436-05
EU.01.PM	WP14	WP14/PO/17	FwC	Provision of Project Management Services Lot 1 – Risk	F4E-OMF-436-01
EU.01.PM	WP14	WP14/PO/18	FwC	Support on Planning & Scheduling	F4E-OMF-556
EU.01.PM	WP14	WP13/PO/06	FwC	Dual Use Management Support	F4E-OMF-555
EU.AD.02	WP14	N/A	FwC	Provision of Legal Services in the Field of Industrial Contracting	F4E-ADM-363

List of Framework Contracts and Framework Partnership Agreements that will be on-going at the end of 2015 by specific areas. Specific contract/Grants will be implemented during the year 2016 using these contracts:

Magnets:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.11	N/A	N/A	FwC	Strand characterization of TF Nb3Sn samples	F4E-OPE-145-01 (MS-MG)
EU.01.11	WP14	WP13/11/04	FwC	Framework Contract for Testing and Characterization of PF conductor strands	F4E-OMF-405

Vacuum Vessel:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.15	WP15	WP14/15/04	FwC	Vacuum Vessel Inspectors	F4E-OMF-557-02

Remote Handling:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.23	WP14	WP11/23/02	FWC	Procurement activities related to DIV RH	F4E-OMF-340-01
EU.01.23	WP15	WP15/23/01	FwC	FWC for Engineering Support Contracts for RH Engineering Studies	F4E-OMF-0633
EU.01.23	WP15	WP11/23/06	FwC	Design, manufacturing and Installation of Neutral Beam Remote Handling System	F4E-OMF-340-03
EU.01.23	WP16	WP11/23/04	FwC	Design, manufacturing and Installation for Cask and Plug Remote Handling System	F4E-OMF-0577
EU.01.57	WP15	WP11/23/08	FwC	Design, manufacturing and Installation of In Vessel Viewing System	F4E-OMF-383

ICH Antenna:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.51	WP13	WP11/51/02	FwC	Development of Build to print design of the ICH Antenna	F4E-OPE-0484

Electron Cyclotron Upper launcher:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.52	WP15	WP15/52/01	FwC	Contract for Support for design of cooling systems	F4E-OFC-0569
EU.01.52	WP16	WP16/52/01	FWC	Procurement of Mechanical Prototypes for the EC UL	Not yet available
EU.01.52	WP16	WP16/52/01	FWC	Nuclear safety, analysis and engineering verification	Not yet available

Electron Cyclotron Control System:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.52	WP15	WP15/52/10	FWC	EC Operation and Control	Not yet available

Electron Cyclotron Power Sources and Supplies:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.52	WP16	WP16/52/01	FWC	Set up of an Electron Cyclotron Launcher components test facility, ECT – FALCON (Electron Cyclotron Test FAcility Launcher COmpoNents), operation and execution of tests	F4E-OFC-0671

Neutral Beam:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.53	WP14	WP11/53/08	FwC	FWC Neutral Beam Test Facility Control, Interlock and Safety	F4E-OFC-280 (PMS-H-CD)
EU.01.53	WP14	WP11/53/09	FwC	FWC Procurement of Neutral Beam Test Facility Diagnostics	F4E-OFC-531 (PMS-H-CD)
EU.01.53	WP15	WP12/53/06	FwC	FWC Procurement of NBTF Assembly	F4E-OFC-582
EU.01.53	WP15	WP15/53/03	FWC	Engineering, consultancy and legal services, mainly related to work on the	F4E-OMF-660-01
EU.01.53	WP15	WP15/53/03	FWC	Services for Static Tests and Inspection "Collaudo"	Not yet available

Diagnostics:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.55	WP11	WP11/55/01	FPA	Radial Neutron Camera R&D/Design - Phase 1	F4E-FPA-327
EU.01.55	WP11	WP11/55/11	FPA	Design and R&D for Pressure Gauges	F4E-FPA-364
EU.01.55	WP12	WP11/55/01	FPA	Tokamak Services R&D/Design	F4E-FPA-328
EU.01.55	WP13	WP11/55/10	FwC	Irradiation Testing - Lot #1	F4E-OFC-358 -01
EU.01.55	WP13	WP11/55/10	FwC	Irradiation Testing - Lot #2	F4E-OFC-358-02
EU.01.55	WP13	WP13/55/01	FPA	Equatorial Visible/IR Wide-Angle Viewing System	F4E- F4E-FPA-407
EU.01.55	WP13	WP13/55/01	FPA	Design and R&D for Low Field Side Collective Thomson Scattering	F4E-FPA-393
EU.01.55	WP13	WP13/55/01	FPA	Design and R&D for Plasma Position Reflectometry	F4E-FPA-375
EU.01.55	WP13	WP13/55/01	FPA	Design and R&D for Bolometers - Phase 1	F4E-FPA-384
EU.01.55	WP14	WP14/55/05	FPA	Phase 1 of Core-Plasma Charge Exch. Recombination Spectrometer	F4E-FPA-408
EU.01.55	WP14	WP12/55/11	FwC	FWC Integration Design of Diagnostics Into ITER Ports	F4E-OFC-433 (PMS-DG)
EU.01.55	WP16	WP16/55/01	FWC	Support on the production of diagnostics build-to print Design specifications and industrial Expertise	F4E-OFC-0666

Test Blanket Modules:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.56	WP11	WP11/56/03	FPA	R&D in support to the finalization of the TBM Systems conceptual design	F4E-FPA-380-02
EU.01.56	WP11	WP11/56/03	FPA	R&D in support of ancillary systems conceptual design	F4E-FPA-380-01
EU.01.56	WP11	WP11/56/03	FPA	Project Management for Qualification of Functional Materials for Test Blanket Module	F4E-FPA-380-03
EU.01.56	WP11	WP11/56/07	FPA	Experimental Activities in support of the design of HCLL and HCP	F4E-FPA -372
EU.01.56	WP11	WP11/56/11	FwC	Conceptual & Preliminary Design of TBMs set and analyses	F4E-OMF-331-01
EU.01.56	WP11	WP11/56/11	FwC	Conceptual & Preliminary design of TBS ancillary systems	F4E-OMF-331-02
EU.01.56	WP11	WP11/56/11	FwC	Conceptual & Preliminary Design of Maintenance Equipments	F4E-OMF-331-03
EU.01.56	WP11	WP11/56/11	FwC	Test Blanket Systems safety analyses	F4E-OMF-331-04
EU.01.56	WP11	WP11/56/11	FwC	Preliminary Welding Procedure Specifications for TBM box	F4E-OMF-331-05
EU.01.56	WP14	WP13/56/02	FwC	Support from Notified Body for TBS	F4E-OMF-545
EU.01.56	WP15	WP12/MD/01	FPA	FPA TBM design methodologies and design code - Development Phase	F4E-FPA-603-01
EU.01.56	WP15	WP13/MD/06	FPA	FPA TBM structural materials characterization	F4E-FPA-603-02
EU.01.56	WP15	WP15/56/03	FwC	Continuation of Handling & Storage of EUROFER	F4E-OFC-637
EU.01.56	WP15	WP12/56/07	FPA	Development of simulation tools for the exploitation of the HCLL and HCPB TBS operation in ITER: Action 1- thermo-hydraulics/MHD/chemistry of Pb-16Li and tritium transport in solid, liquid, gases and interfaces	F4E-FPA-611-01
EU.01.56	WP15	WP12/56/07	FPA	Development of simulation tools for the exploitation of the HCLL and HCPB TBS	F4E-FPA-611-02

Radiological and Environmental Monitoring System:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.66	N/A	N/A	FwC	ESS in the area of Compliance with ITER Safety Requirements	F4E-OMF-298-01
EU.01.66	N/A	N/A	FwC	ESS in the area of Radiological and Environmental Monitoring System	F4E-OMF-29802
EU.01.66	N/A	N/A	FwC	ESS in the area of Compliance with ITER Safety Requirements	F4E-OMF-298.03

Plasma Engineering:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.PE	WP15	WP13/PE/09	FwC	Engineering Support for Plasma Engineering and Antennas	Not yet available
EU.01.PE	WP16	WP16/PE/01	FwC	FwC Signed for Engineering Support to PE and Antennas	Not yet available

Nuclear data:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.01.ES	WP12	WP12/ND/01	FPA	Nuclear Data Experiments and Measurement Techniques	F4E-FPA-393
EU.01.ES	WP12	WP12/ND/01	FPA	Nuclear Data Experiments and Measurement Techniques	F4E-FPA-395
EU.01.ES	WP15	WP15/ND/01	FPA	Development of Nuclear Data Files (2015-2019)	Not yet available
EU.01.ES	WP16	WP16/ES/01	FPA	Summary - Execution of FPA GRT-TBD Development of Nuclear Data Files (2015-2019)	Not yet available

Broader Approach:

WBS level 2	F4E-Work Programme year	F4E-WPref	Contract type	FWC/FPA scope	Procurement Code
EU.BA.01	WP12	WP12/BA/06	FwC	Transport for Broader Approach	F4E-OMF-451
EU.BA.01	WP14	WP14/BA/16	FwC	Engineering and Safety Support for onsite activities	F4E-OMF-0608

6.5. ANNEX V - Mapping of Organisational Breakdown Structure (OBS – F4E Teams/Units) and WBS level 3

F4E UNIT	WBS REF. (LEVEL 3)	WBS NAME (LEVEL 3)
Magnets (MG)	EU.01.11.01	Toroidal Field Coils
	EU.01.11.02	Pre Compression Rings
	EU.01.11.03	Poloidal Field Coils
	EU.01.11.04	Magnet Conductors
Vacuum Vessel (VV)	EU.01.15.01	Main Vessel
In Vessel (IV)	EU.01.15.02	Blanket Manifolds
	EU.01.16.01	Blanket and First Wall Panels
	EU.01.17.01	Divertor Cassette Body and Assembly
	EU.01.17.02	Divertor Vertical Target
	EU.01.17.03	Divertor Rails
Remote Handling (RH)	EU.01.23.01	Remote Handling Common Activities
	EU.01.23.02	Divertor Remote Handling System
	EU.01.23.03	Cask and Plug Remote Handling System
	EU.01.23.05	Neutral Beam Remote Handling System
	EU.01.57.01.	Remote Handling In Vessel Viewing System
Cryoplant and Fuel Cycle (CF)	EU.01.31.01	Cryopumps
	EU.01.31.02	Leak Detection and Localization System
	EU.01.32.01	Hydrogen Isotope Separation System
	EU.01.32.02	Water Detritiation System
	EU.01.34.01	Liquid Nitrogen Plant and Auxiliary Systems
	EU.01.64.01	Radiological and Environmental Monitoring System
	EU.01.66.01	Radiological and Conventional Waste Treatment and Storage
Antennas and Plasma Engineering (PE)	EU.01.51.01	Ion Cyclotron Antenna
	EU.01.52.01	Electron Cyclotron Upper Launcher
	EU.01.52.05	Electron Cyclotron Control System
	EU.01.PE.01	Plasma Engineering
	EU.01.PE.02	Plasma Control System
Neutral Beam and EC Power Supplies and Sources (NB)	EU.01.52.02	Electron Cyclotron Gyrotrons
	EU.01.52.03	Electron Cyclotron Power Supplies
	EU.01.53.01	Neutral Beam Assembly and Testing
	EU.01.53.02	Neutral Beam Source and High Voltage Bushing
	EU.01.53.03	Beamline Components
	EU.01.53.04	Pressure Vessel and Magnetic Shielding
	EU.01.53.05	Active Correction and Compensation Coils
	EU.01.53.06	Neutral Beam Power Supplies
	EU.01.53.07	Neutral Beam Test Facility
	EU.01.53.08	Neutral Beam Common Activities
Diagnostics (DG)	EU.01.55.01	Magnetics
	EU.01.55.02	Bolometers
	EU.01.55.03	Plasma Position Reflectometry
	EU.01.55.04	Pressure Gauges
	EU.01.55.06	Tokamak Services
	EU.01.55.07	Radial Neutron Camera - Gamma Spectrometer
	EU.01.55.08	High Resolution Neutron Spectrometer
	EU.01.55.09	Core-plasma Thomson Scattering
	EU.01.55.10	Low Field Side Collective Thomson Scattering
	EU.01.55.11	Core-Plasma Charge Exchange Recombination Spectrometer
	EU.01.55.13	Equatorial Visible/Infrared Wide-Angle Viewing System
	EU.01.55.14	Port Engineering Systems
	EU.01.55.15	Diagnostics Common Activities
TBM and Materials Development (TB)	EU.01.56.01	European Test Blanket System Arrangement
	EU.01.56.02	Test Blanket Systems Research & Development
Site and Buildings and Power Supplies (SB)	EU.01.41.01	Electrical Power Distribution System
	EU.01.62.02	Buildings and Civil Infrastructures
Technical Support Services (TS)	EU.01.ES.01	Engineering Support and Integration

	EU.01.ES.02	Engineering Analysis and Nuclear Data
	EU.01.ES.03	Embedded Control Data Access and Communication
	EU.01.MF.01	Materials and Fabrication Technologies
Planning and Monitoring (PM)	EU.01.CC.01	Cash Contributions to ITER Organization
	EU.01.CC.02	Cash Contributions to Japan Domestic Agency
	EU.PM.PM.02	Risk Management
	EU.PM.PM.03	Planning and Scheduling
	EU.PM.PM.04	Project Management
	EU.PM.PM.09	Other Expenditures
Technical Process Integration (TP)	EU.01.PM.05	Systems Engineering
	EU.01.PM.06	Configuration Management
	EU.01.PM.11	Assembly Coordination
	EU.01.TR	Transportation
Nuclear Safety and Quality (NS)	EU.01.PM.01	Quality Assurance
	EU.01.PM.04	Project Management – CE Marking
	EU.01.NS.01	Nuclear Safety
Broader Approach Common (BA)	EU.BA.01.01	Transportation
	EU.BA.01.02	On site activities
	EU.BA.01.03	PA Monitoring
	EU.BA.01.04	Legal Costs
Satellite Tokamak JT-60SA (JT)	EU.BA.02.01	Satellite Tokamak (JT-60SA) Common Activities
	EU.BA.02.02	Toroidal Field Magnet
	EU.BA.02.03	Assembly
	EU.BA.02.04	Power Supply
	EU.BA.02.05	Cryogenic System
	EU.BA.02.06	Materials
	EU.BA.02.07	Cryostat
IFMIF (IF)	EU.BA.03.01	IFMIF-EVEDA Project Common Activities
	EU.BA.03.02	LIPAc Activities
IFERC (BA)	EU.BA.04.01	International Fusion Energy Research Centre Common Activities
	EU.BA.04.02	Remote Experimentation Centre
	EU.BA.04.03	Computational Simulation Centre
	EU.BA.04.04	DEMO Design
Legal Service (LS)	EU.PM.PM.07	Legal Support
Information and Communication Technology (ICT)	EU.PM.PM.09.93	Other Expenditures-ICT
Corporate Services (CS)	EU.PM.PM.09.92	Other Expenditures-FMHSL

6.6. ANNEX VI - Mapping F4E WBS Level 2 vs. ITER IO WBS Level 3

F4E WBS L2 Code	F4E WBS L2 Name	F4E WBS L3 Code	F4E WBS L3 Name	IO WBS Code	IO WBS Name
EU.01.11	Magnets	EU.01.11.01	Toroidal Field Coils	00.01.01.02.02	TF Coils
		EU.01.11.02	Pre Compression Rings	00.01.01.02.02	TF Coils
		EU.01.11.03	Poloidal Field Coils	00.01.01.02.03	PF Coils
		EU.01.11.04	Magnet Conductors	00.01.01.02.08	Superconductor Systems and Auxiliaries
EU.01.15	Vacuum Vessel	EU.01.15.01	Main Vessel	00.01.01.03.02	Main Vessel & Supporting Systems
		EU.01.15.02	Blanket Manifolds	00.01.01.06.02	Blanket
EU.01.16	Blanket System	EU.01.16.01	Blanket and First Wall Panels	00.01.01.06.02	Blanket
EU.01.17	Divertor	EU.01.17.01	Divertor Cassette Body and Assembly	00.01.01.06.02	Blanket
				00.01.01.06.03	Divertor
		EU.01.17.02	Divertor Vertical Target	00.01.01.06.03	Divertor
		EU.01.17.03	Divertor Rails	00.01.01.06.03	Divertor
EU.01.23	Remote Handling	EU.01.23.01	Remote Handling Common Activities	00.01.05.09	CIE Remote Handling Equipment
				00.01.05.09.00	Project Management & Technical Integration
				00.01.05.09.01	In-Vessel Remote Handling
				00.01.05.09.02	Ex-Vessel Remote Handling
		EU.01.23.02	Divertor Remote Handling System	00.01.05.09.00	Project Management & Technical Integration
				00.01.05.09.01	In-Vessel Remote Handling
				00.01.05.09.02	Ex-Vessel Remote Handling
		EU.01.23.03	Cask & Plug Remote Handling System	00.01.05.09.02	Ex-Vessel Remote Handling
		EU.01.23.05	Neutral Beam Remote Handling System	00.01.05.09.02	Ex-Vessel Remote Handling
EU.01.31	Vacuum Pumping and Leak Detection	EU.01.31.01	Cryopumps	00.01.03.06.03	Vacuum Systems
		EU.01.31.02	Leak Detection and Localization System	00.01.03.06.03	Vacuum Systems
EU.01.32	Tritium Plant	EU.01.32.01	Hydrogen Isotope Separation System	00.01.03.06.02	Tritium Plant
		EU.01.32.02	Water Detritiation System	00.01.03.06.02	Tritium Plant
EU.01.34	Cryoplant	EU.01.34.01	Liquid Nitrogen Plant and Auxiliary Systems	00.01.03.04.03	LN2 & Auxiliaries Cryoplant
EU.01.41	Electrical Power Supply and Distribution	EU.01.41.01	Electrical Power Distribution System	00.01.03.02.02	Electrical Power Distribution (EPD) System
				00.01.04.03.01	Common Works
EU.01.51	Ion Cyclotron Heating and Current Drive	EU.01.51.01	Ion Cyclotron Antenna	00.01.02.03.02	Ion Cyclotron H&CD

F4E WBS L2 Code	F4E WBS L2 Name	F4E WBS L3 Code	F4E WBS L3 Name	IO WBS Code	IO WBS Name
EU.01.52	Electron Cyclotron Heating and Current Drive	EU.01.52.01	Electron Cyclotron Upper Launcher	00.01.02.03.03	Electron Cyclotron H&CD
		EU.01.52.02	Electron Cyclotron Gyrotrons	00.01.02.03.03	Electron Cyclotron H&CD
		EU.01.52.03	Electron Cyclotron Power Supplies	00.01.02.03.03	Electron Cyclotron H&CD
		EU.01.52.05	Electron Cyclotron Control System	00.01.02.03.03	Electron Cyclotron H&CD
EU.01.53	Neutral Beam Heating and Current Drive	EU.01.53.01	Neutral Beam Assembly and Testing	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.02	Neutral Beam Source and High Voltage Bushing	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.03	Beamline Components	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.04	Pressure Vessel and Magnetic Shielding	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.05	Active Correction and Compensation Coils	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.06	Neutral Beam Power Supplies	00.01.02.03.04	Neutral Beam H&CD
		EU.01.53.07	Neutral Beam Test Facility	00.01.02.03.06	Neutral Beam Test Facility
				00.01.03.06.03	Vacuum Systems
		EU.01.53.08	Neutral Beam Common Activities	00.01.02.03.04	Neutral Beam H&CD
				00.01.02.03.06	Neutral Beam Test Facility
EU.01.55	Diagnostics	EU.01.55.01	Magnetics	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.02	Bolometers	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.03	Plasma Position Reflectometry	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.04	Pressure Gauges	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.06	Tokamak Services	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.07	Radial Neutron Camera - Gamma Spectrometer	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.08	High Resolution Neutron Spectrometer	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.09	Core-plasma Thomson Scattering	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.10	Low Field Side Collective Thomson Scattering	00.01.02.02.03	EU DA Diagnostics

F4E WBS L2 Code	F4E WBS L2 Name	F4E WBS L3 Code	F4E WBS L3 Name	IO WBS Code	IO WBS Name
		EU.01.55.11	Core-Plasma Charge Exchange Recombination Spectrometer	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.13	Equatorial Visible/Infrared Wide-Angle Viewing System	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.14	Port Engineering Systems	00.01.02.02.03	EU DA Diagnostics
		EU.01.55.15	Diagnostics Common Activities	00.01.02.02.03	EU DA Diagnostics
EU.01.56	Test Blanket	EU.01.56.01	European Test Blanket System Arrangement	00.01.01.06.04	Test Blanket Module
		EU.01.56.02	Test Blanket Systems Research & Development		
EU.01.57	In Vessel Viewing System	EU.01.57.01	In Vessel Viewing System	00.01.05.09.01	In-Vessel Remote Handling
				00.01.05.09.02	Ex-Vessel Remote Handling
EU.01.62	Buildings and Civil Infrastructures	EU.01.62.02	Buildings and Civil Infrastructures	00.01.03.02.02	Electrical Power Distribution (EPD) System
				00.01.03.05.03	Radwaste Treatment & Storage Systems
				00.01.04.02.01	Site Preparation - Overall
				00.01.04.03	Buildings & Site
				00.01.04.03.01	Common Works
				00.01.04.03.02	Buildings
				00.01.04.03.03	Site Infrastructure
				00.01.04.03.04	Liquid & Gas Distribution
				00.01.04.03.05	IO Technical Oversight & Contract Management
				00.01.06.07.04	Technical Integration
EU.01.64	Radiological and Environmental Monitoring	EU.01.64.01	Radiological and Environmental Monitoring System	00.01.03.06.05	Radiological and Environmental Monitoring System (REMS)
EU.01.66	Waste Management	EU.01.66.01	Radiological and Conventional Waste Treatment and Storage	00.01.03.05.03	Radwaste Treatment & Storage Systems

6.7. ANNEX VIII - List of Procurement procedures GC 2015

WBS Level 2 Code	WBS Level 2 Name	WBS Level 5 Code	Contract type	Contract name
EU.01.11	Magnets	EU.01.11.03.53.09	P works	Site & Building infrastructure (S&I)
EU.01.11	Magnets	EU.01.11.03.53.11	P supply	Cold Test Engineering Study and Facility Construction (CTF)
EU.01.16	Blanket	EU.01.16.01.08.11	P serv	Provision of Manufacturing Services Using Hot Isostatic Pressing
EU.01.16	Blanket	EU.01.16.01.52.10	P serv	Storage and recycling of Beryllium coated components
EU.01.52	Electron Cyclotron Heating and Current Drive	EU.01.52.03.51.02	P supply	Procurement of Body Power Supply & Main High Voltage Power Supply (Main Contract)
EU.01.53	Neutral Beam Heating and Current Drive	EU.01.53.07.51.11	P supply	Procurement of Cryogenic Plant MITICA
EU.01.PE	Plasma Engineering	EU.01.PE.01.77.08	P serv	Development of an EFIT like real time plasma boundary reconstruction code
EU.BA.02	JT-60SA	EU.BA.02.04.03	P supply	Procurement for Electron Cyclotron Power Supplies

6.8. ANNEX X – List of Acronyms

Acronym	Description
A/E	Architect Engineer
AGPS	Accelerator Ground Power Supplies
ATP	Authorization to Proceed
BA	Broader Approach
BAUA	Broader Approach Unit of Account[16]
BtP	Build-to-Print
BPS	Body Power Supply
CAD	Computer-Aided Design
CAS	Credit Allocation Scheme
CER	Continuous External Rogowski
CVB	Cold Valve Boxes
DA	Domestic Agency
DACS	Data Acquisition and Control System
DEMO	Demonstration fusion reactor
DIV	Divertor
DNB	Diagnostic Neutral Beam
DTP	Divertor Test Platform
DWS	Detailed Work Schedule
EC	Electron Cyclotron
EC UL	Electron Cyclotron Upper Launchers
ECH	Electron Cyclotron Heating
EURATOM	The European Atomic Energy Community
FAT	Factory Acceptance Tests
F4E	Fusion for Energy
FS	Functional Specification
FW	First Wall
FWP	First Wall Panel
HAZOP	HAZard Operability
HCLL	Helium Cooled Lithium-Lead
HCPB	Helium Cooled Pebble Bed
H&CD	Heating & Current Drive
HPC	Hold Point Clearance
HHF	High Heat Flux
HNB	Heating Neutral Beam
HV	High Voltage
HVAC	Heating Ventilation &Air Conditioning
HVD	High Voltage Deck
IC	Ion Cyclotron
I&C	Instrumentation and Control
ICH	Ion Cyclotron Heating
IFERC	International Fusion Energy Research Center
IFMIF	International Fusion Materials Irradiation Facility
INB	Installation Nucleaire de Base
IO	ITER Organization
IR	Infra-Red
ISEPS	Ion Source and Extraction Power Supplies
ISS	Isotope Separation System
ITA	ITER Task Agreement
ITER	International Thermonuclear Experimental Reactor
IUA	ITER Unit of Account. 17
IVT	Inner Vertical Target
IVVS	In-Vessel Viewing System
JAEA	Japan Atomic Energy Agency
JADA	Japanese Domestic Agency
LD&L	Leak Detection and Localization
LFS-CTS	Low Field Side – Collective Thomson Scattering(Check)
MAP	Multi-Annual Programme(check JJ)
MITICA	Megavolt ITER Injector & Concept Advancement
MV	Medium Voltage
NB	Neutral Beam

[16] In July 2012 the BAUA corresponded to the value of 783.503 Euros.

NBI	Neutral Beam Injector
NBPS	Neutral Beam Power System
NBTF	Neutral Beam Test Facility
NBRHS	Neutral Beam Remote Handling System
PA	Procurement Arrangement
PBS	Product Breakdown Structure
PE	Plasma Engineering
PF	Poloidal Field
PFC	Plasma Facing Components
PFC	Poloidal Field Coils
PIE	Post Irradiation Examination
PMU	Prototypical Mock-Up
PP	Procurement Package
PPC	Pre-Production Cryopump
PRIMA	Padua Research on ITER Megavolt Accelerator
QA	Quality Assurance
RCC-MRx	Design and Construction Rules for Mechanical Components in high-temperature structures, experimental reactors and fusion reactors
R&D	Research & Development
REM	Radiological Environmental Monitoring
RF	Radio Frequency
RFCU	Radio Frequency Control Unit
RH	Remote Handling
RNC	Radial Neutron Camera
SAT	Site Acceptance Tests
SMP	Strategic Management Planning
SPIDER	Source for Production of Ion of Deuterium Extracted from RF plasma
SS	Steady State
SSEN	Steady State Electrical Network
STP	Satellite Tokamak Programme
TBM	Test Blanket Module
TCS	Transfer cask System
TF	Toroidal Field
TFC	Toroidal Field Coils
TFWP	Toroidal Field Winding Pack
UT	Ultrasonic
Vis	Visible
VV	Vacuum Vessel
WAVS	Wide Angle Viewing System
WBS	Work Breakdown Structure
WDS	Water Detritiation System
WEST	Tungsten (W) Environment in Steady-state Tokamak
XXXX WP	Year XXXX Work Programme
WRL	Warm Regeneration Lines
CPRHS	Cask and Plug Remote Handling System
DRHS	Divertor Remote Handling System
NBRHS	Neutral Beam Remote Handling System
FPA	Framework Partnership Agreement
FWC	Framework Contract
TBM	Test Blanket Modules
TBMA	Test Blanked Module Agreement
CD	Conceptual Design
PD	Preliminary Design
FD	Final Design
CDR	Conceptual Design Review