



**FUSION
FOR
ENERGY**

**Consolidated Annual Activity Report (CAAR) for 2023
of the European Joint Undertaking for ITER and
the Development of Fusion Energy
(Fusion for Energy – F4E)**

This report fulfils the requirement of Article 48 of F4E's Financial Regulation on the provision of a Consolidated Annual Activity Report.

Fusion for Energy

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

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List of Acronyms

A/E	Architect Engineer
ABAC	(Accrual-based Accounting); Accounting and budgetary tool of the European Commission and F4E
AC	Audit Committee
AHG	Ad-Hoc Group
AMC	Administration and Management Committee
ANB	Authorised Notified Body
B2B	Business-to-business
BA	Broader Approach Agreement
BAUA	Broader Approach Units of Account
BCM	Blanket Cooling Manifold
BIPS	Buildings, Infrastructures and Power Supplies project team
Body PS & MHVPS	Body Power Supply and Main High Voltage Power Supply
BPM	Business Process Management
BSM	Blanket Shield Module
CA	Contract Agent
CAAR	Consolidated Annual Activity Report
CAD	Computer Aided Design
CAS	Credit Allocation Scheme
CB	Cryostat Base
CEL	Conventional Exceptional Loads (convoys)
CER coils	Continuous External Rogowski coils
CMA	Construction Management-as-agent
CMM	Cassette Multifunctional Mover
CN-DA	Chinese ITER Domestic Agency
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CPRHS	Cash and Plug Remote Handling System
CS	Central Solenoid
CSC	Computational Simulation Centre
CVB	Cold Valve Boxes
CVBCS	Cryostat Vessel Body Cylindrical Section
CW	Continuous Wave

CW gyrotron	Continuous Wave gyrotron
CW pumping station	Cooling Water pumping station
DA	Domestic Agency
DACC	Deviations Amendments and Contract Changes tool
DC	Direct Current
DCC	Document Comment Communication
DEMO	Demonstration Fusion Reactors
DG ENER	Directorate-General for Energy
DNB	Diagnostic Neutral Beam
DP	Double Pancake for superconducting magnets
DR	Deviation Request
D-T	Deuterium-Tritium
DTP2	Divertor Remote Handling Test Platform
DWS	Detailed Work Schedules
EAC	Estimate At Completion
EBBTF	European Breeding Blanket Test Facilities
EC	Electron Cyclotron
ECA	European Court of Auditors
ECH	Electron Cyclotron Heating
EcoSys®	Enterprise Project Control System
ECPS	Electron Cyclotron Power Supplies
ECRH	Electron Cyclotron Resonance Heating
EDPS	European Data Protection Supervisor
EF	Equilibrium Field
EU	European Union
EU-DA	European Union ITER Domestic Agency (Fusion for Energy)
EUROFER	A 9% Chromium reduced activation ferritic-martensitic steel
EUROfusion	European Consortium for the Development of Fusion Energy
EVEDA	Engineering Validation and Engineering Design Activities
EVM	Earn Value Management
F4E	Fusion for Energy
FAT	Factory Acceptance Test
FC	Framework Contract
FO	Official staff

FP7 grants	Seventh Framework Programme for Research and Technological Development European Union grants
FR/IR	Financial Regulation/Implementing Rules
FSP	Full-Scale Prototype
FTE	Full Time Equivalent
FW	First Wall
FWC	Framework Contract
GB	Governing Board
GDols	General Declarations of Interest
GHe tank	Gas Helium Tank
H&CD	Heating and Current Drive
HCLL	Helium-Cooled Lithium-Lead (Test Blanket Module)
HEL	Highly Exceptional Loads (convoys)
HFTM	High Flux Test Module
HHF	High Heat Flux
HIP	Hot Isostatic Pressing
HNB	Heating Neutral Beam
HPC	Hold Point Clearance
HR	Human Resources
HRS Water treatments	Heat Rejection System Water treatments
HTS CL	High Temperature Superconducting Current Leads
HV	High Voltage
HVPS	High Voltage Power Supply
I&C	Instrumentation and Control
IAC	Internal Audit Capability
IAEA	International Atomic Energy Agency
IAS	Internal Audit Service
IC	ITER Council
ICRH	Ion Cyclotron Resonance Heating
ICT	Information and Communication Technology
IDM	ITER Document Management (software)
IFERC	International Fusion Energy Research Centre
IFMIF	International Fusion Materials Irradiation Facility
IMS	Integrated Management System

IMSS	Integrated Management System Standards
IN-DA	Indian ITER Domestic Agency
IO	ITER Organization
IP	Intellectual Property
IPR	Intellectual Property Rights
IPTs	Integrated Project Teams
IRP	Internal Review Panel
IRS	Integrated Reporting System
ISC	Improvement Steering Committee
ISEPS	Ion Source and Extraction Power Supplies
ISS	Isotope Separation System
IT	Information Technology
ITER IO	ITER International Organization (Central Team)
IUA	ITER Unit of Account
IVT	Inner Vertical Target
IVVS	In-Vessel Viewing System
JAEA	Japanese Implementing Agency (Broader Approach)
JET	Joint European Torus
JA-DA	Japanese ITER Domestic Agency
KO-DA	Korean ITER Domestic Agency
KPI	Key Performance Indicator
LC	Load Centre
'Lean Six Sigma' methodology	A set of techniques and tools for process improvement
LIFUS	Lithium for Fusion
LIPAc	Linear International Fusion Materials Irradiation Facility Prototype Accelerator
LN2	Liquid Nitrogen
MAD	Material Acceptance Document
MAP	Multi-Annual Plan
MFF	Multi-Annual Financial Framework
MITICA	Megavolt ITER Injector and Concept Advancement
MS	Management Standards
MTA	Milestone Trend Analysis
MV DC	Mega Volt Direct Current

NB	Neutral Beam
NBI	Neutral Beam Injector
NBTF	Neutral Beam Test Facility
NbTi	Niobium Titanium
NCR	Non-Conformity Report
NHF	Normal Heat Flux
NPC	Notification Point Completion
OLAF	European Anti-Fraud Office
OPS	Overall Project Schedule
PA	Procurement Arrangement
PBS	Plant Breakdown Systems
PCC	Procurement and Contracts Committee
PCR	Project Change Request
PCR	Pre-Compression Rings
PF	Poloidal Field (coils)
PGM M/IMP	Programme Management and Implementation
PoE	Port of Entry
PPEN	Pulsed Power Electrical Network
PRIMA	Padova Research on ITER Megavolt Accelerator
PS	Power Supply
PSM	Project Steering Meeting
PTC	Prototype Torus Cryopump
Q1/2/3/4	Quarter
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
QPC	Quench Protection Circuit
R&D	Research and Development
RAMI	Reliability, Availability, Maintenance and Inspectability
RAMIO	Reliability, Availability, Maintenance and Inspectability Officer
RAPID	F4E-developed tool which follows up on the implementation of audit actions
RASCI	Responsible, Accountable, Support, Consulted and Informed
RF	Radio Frequency
RFE	Ready for Equipment

RFQ	Radio Frequency Quadrupole
RH	Remote Handling
RMV	Requirements Management and Validation
RF-DA	Russian ITER Domestic Agency
RWM	Resistive Wall Mode Control
RWMPS	Resistive Wall Modes (Coils) Power Supplies
SAT	Site Acceptance Test
SCMPS	Superconducting Magnets Power Supplies
SF6 gas	Sulphur hexafluoride gas
SMEs	Small and Medium Enterprises
SNE	Seconded National Expert
SOAP	Sign-Off Authorisation Policy
SPI	Schedule Performance Index
SPIDER	Source for Production of Ions of Deuterium Extracted from Radio Frequency plasma
SR2FP	Straight Road to First Plasma
SRF Linac	Superconducting Radio Frequency Linear Accelerator
SSEN	Steady State Electrical Network
TA	Temporary Agent
TAP	Technical Advisory Panel
TB	Tender Batch (building contracts)
TBM	Test Blanket Modules
TF	Toroidal Field (coils)
TSS	Technical Support Services
US-DA	United States ITER Domestic Agency
VC	Voluntary Contributor
VV	Vacuum Vessel
WBS	Work Breakdown Structure
WDS	Water Detritiation System
WP	Work Programme
WRL	Warm Regeneration Lines
WRS	Warm Regeneration System

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Governing Board's Analysis and Assessment

Having regard to Art. 4 of the Statutes annexed to the Council decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and Art. 48 of F4E's Financial Regulation, the Governing Board:

1. Welcomes the achievements of F4E in delivering its contributions to the ITER and Broader Approach projects in 2023, especially the completion of the first plasma in JT-60SA, the delivery of the last Toroidal Field coil and Poloidal Field coil, the progress on the Vacuum Vessel sectors and the civil engineering works for the ITER buildings.
2. Commends F4E for its efforts to increase the level of integration with the ITER Organization and to improve the efficiency and performance of the project, as well as for its collaboration with Japan on the Test Blanket Module System and the IFMIFDONES facility.
3. Appreciates the involvement of European industry, SMEs and research laboratories in the design, development and manufacture of the complex and innovative systems and components for ITER, and the benefits of technology transfer, job creation and new commercial opportunities resulting from F4E's contracts and grants.
4. Recognises the challenges and uncertainties posed by the need to re-baseline the ITER project due, among other issues, to the repairs of some key components delivered by other members, and urges F4E to work closely with the ITER Organization and the other Domestic Agencies to ensure a realistic and feasible new baseline that respects the budgetary and schedule constraints.
5. Encourages F4E to continue to develop the fusion talent and knowledge base for the future development of commercially viable fusion power plants in Europe, and to pave the way for a transition from the research to the industrial sector, and the creation of a competitive European industrial fusion sector.
6. Supports the renewed and ambitious vision for F4E adopted by the Governing Board in December 2023, which puts F4E in an excellent position to contribute towards the long-term goal of developing fusion energy.
7. Acknowledges the management changes at F4E during 2023 following the dismissal of the Director from his post in June 2022, and thanks Pietro Barabaschi and Jean-Marc Filhol for their service as acting Directors. Congratulates Marc Lachaise for his appointment as Director of F4E and expresses confidence in his leadership and vision.
8. Expresses satisfaction with the quality and comprehensiveness of the Consolidated Annual Activity Report 2023 prepared by F4E and notes the Declaration of Assurance issued by the Director.
9. Adopts the present analysis and assessment of the Consolidated Annual Activity Report 2023 and requests F4E to annex it to the report.

Cadarache, 10 July 2024

Carlos Alejaldre
[Electronically signed in IDM]
Chair of the Governing Board

Executive Summary/The Year in Brief

Imagine if we could create a small Sun on Earth as a virtually inexhaustible and clean energy source – and although this may sound like science fiction, it is the ultimate mission Fusion for Energy (“F4E”) - the European organisation for the development of fusion energy.

Our main role is providing contributions to ITER – the international project to build and operate the largest fusion research machine. In parallel, we are collaborating with Japan on three other fusion projects including a fusion reactor called JT-60SA, as well as the DONES material testing project in Granada, Spain. In the longer-term we are preparing a programme for demonstration (DEMO) fusion reactors.

2023 has been a year of challenges and successes including the **achievement of the first plasma in JT-60SA, the biggest experimental fusion device**. JT-60SA is a collaboration between Europe and Japan and has the mission to carry out research for ITER. JT-60SA uses powerful superconducting coils cooled to approximately -269 °C to confine plasma that can reach temperatures of 100 million °C.

We have progressed with our contributions to the ITER project during 2023 and I am proud that we delivered our final superconducting **Toroidal Field Coil**. These coils measure 17 x 9 m and weigh 320 tons and their fabrications has been possible by working with over 40 European companies, and more than 700 people. F4E also delivered the last but one superconducting Poloidal Field Coil of 24 m in diameter, the largest such coils ever produced.

Another highlight of 2023 had been the **completion of the civil engineering works for the Tokamak Building** that houses the ITER experiment. Standing 60 m high with a foundation nearly 20 m below ground, this fortress of 100 000 m³ of concrete involved more than 900 people have been working at times in three shifts, amounting to 7 000 000 hours.

In 2023 F4E progressed with many other components for ITER together with F4E’s European industrial partners. All 2598 welds of the first **Vacuum Vessel** sector were completed to the required quality and work advanced with the other four sectors that each stand 11 metres tall and weigh over 5000 tonnes. Series manufacturing of the **First Wall Panels** and **Divertor Cassette Bodes** advanced.

Commissioning of the ITER **Cryoplat** continued with liquid nitrogen being supplied to the liquid helium plant. Progress was made with cryo-distribution system and the **Torus Cold Valve Boxes** were delivered to ITER. For the ITER **Neutral Beam Heating Systems**, F4E delivered all its contributions to the SPIDER ion source and most of the contributions to the MITICA prototype. Important progress was also made in the **Electron Cyclotron Heating Systems** and power supplies.

F4E is responsible for twelve **Diagnostic Systems** and works closely with European industry and fusion research laboratories. In 2023 F4E delivered magnetic coils and related electronic systems to ITER and made progress with design work on several other systems. Important progress in research and design work in the **Remote Handling Systems** was made. Finally, intensive activities took place for the **Test Blanket Module Systems**.

Lastly, under the Broader Approach Agreement with Japan, we continued to support the major upgrade of the **prototype accelerator LIPAc** for testing fusion materials. 2023 was marked by

work to prepare for future configurations of the LIPAc and carrying out continuous wave testing. F4E also supported preparatory activities for a new facility called IFMIF-DONES for fusion materials testing under construction in Granada, Spain.

These achievements have been possible thanks to a variety of expertise and competences in F4E. Apart from technical and fusion, successful projects need strong project management, legal support together with commercial and human resource management. We also rely on the collaboration of the European supply chain and in 2023 we signed 70 new contracts with industrial partners and laboratories for a total of almost €650m, bringing F4E's total financial contribution since the beginning of the project over €7bn. The impact of this investment spread into technology transfers, job creation, and new commercial opportunities.

At the level of the ITER International Organization, repair works continues to some key ITER components already delivered on the site by other members. This will have an impact on the schedule and budget of the whole project that has not yet been determined. Consequently, this led to a slow-down in some areas of the project, and impacted F4E's 2023 budget execution. A new baseline (scope, schedule, and cost) should be presented to the ITER Council in 2024. This will have impacts on some of the F4E in-kind delivery programs.

During 2023 F4E took steps to increase the level of integration with the ITER Organization to improve efficiency and the performance of the project. This included the closer integration of technical teams as well as systems and tools. I am also pleased that in December 2023 our Governing Board welcomed a renewed and ambitious vision for F4E. This put F4E in an excellent position to contribute towards the long-term goal of developing fusion energy.

Several changes at senior management level took place in F4E during 2023 and both Jean-Marc Filhol, Acting Director and Gebhard Leidenfrost, Head of the Commercial Department retired from F4E, and we are grateful for their service. I joined the team in May 2023 and would like to thank the managers and teams.

Fusion is getting more public momentum in the world and in Europe and I trust that F4E will play a crucial role in the European landscape.

Marc Lachaise

Director
21 May 2024

Our Vision and Mission

“Bringing the power of the sun to Earth”.

This vision communicates the active role Fusion for Energy (F4E) takes in advancing fusion towards becoming a reliable source of clean abundant base load energy. This vision is achieved through three strategic ambitions:

1. **We commit as top priority to the successful construction and operation of the ITER, Broader Approach, DONES and other fusion projects** through:
 - a. Working in **close partnership with the ITER Organization** to:
 - i. **Deliver EU contributions to the ITER project** to the required quality, within the agreed budget and schedule.
 - ii. **Improve the efficiency of the ITER project** through integration of teams with shared culture, pooled expertise, joint processes, databases, etc.
 - iii. **Jointly own and equitably govern a feasible project baseline** consistent with the capabilities of F4E and with adequate contingencies.
 - iv. **Actively engage in all phases of the ITER project** including assembly, commissioning, and operations.
 - b. Delivering EU contributions to **JT-60SA and IFMIF-EVEDA Broader Approach projects** including enhancements together with the Voluntary Contributors.
 - c. Supporting EUROfusion and European Fusion Laboratories in **exploitation of the JT-60SA and return of experience to the ITER project**.
 - d. **Contributing to the construction and future phases of the DONES materials testing facilities** leveraging experience gained from the Broader Approach.
2. **We develop the fusion talent and knowledge base for the future development of commercially viable fusion power plants in Europe** through:
 - a. **Learning lessons and retaining the knowledge gained** from F4E’s involvement in the ITER and the Broader Approach projects.
 - b. **Developing strategic fusion technologies** with EUROfusion and European Fusion Laboratories by providing the “value chain integration” towards industry.
 - c. **Attracting and growing the next generations of fusion talent** through outreach and training activities in collaboration with EUROfusion.
 - d. Driving the **engineering design and validation activities for DEMO** in close collaboration with EUROfusion, European Fusion Laboratories and industry.
3. **We pave the way for a transition from the research to the industrial sector, and the creation of a competitive European industrial fusion sector** through:
 - a. **Lowering entry barriers for industry, especially SMEs**, to work with F4E and moving from “customer-supplier” to new models of public-private partnership.
 - b. **Developing geographically broad and sustainable supply chains** capable to construct power plants in Europe and to export strategic fusion technologies.
 - c. **Supporting growth of European private sector fusion start-ups**, including possible incentivising programmes and maximisation of return of investment.
 - d. Actively supporting the European Commission and other stakeholders in the **development of fusion specific regulation, codes, and standards**.

Part I: Achievements of the year

1.1 Contributions to the ITER Project

1.1.1 Introduction

ITER is under construction in Cadarache in the south of France. Europe, as the Host Party, and France, as Host State, have special responsibilities for the success of the Project. Europe bears 45.46 % of the construction cost including all the buildings. It will provide 34.00 % of the cost of operation, deactivation and decommissioning of ITER^[1].

Europe budgeted €6.6bn until the end of 2020 and an additional €5.6 billion for the period 2021-2027. This does not include the French contribution which amounts to approximately 20%. Most of the budget is earmarked for contracts placed by F4E with European industry, SMEs and research laboratories. F4E signed new contracts with industrial partners and laboratories for a total of €634 m in 2023 bringing the total investment made by F4E through European industries and research organisations since 2007 to almost €6.7 bn helping to create jobs and support innovation.

The following subsections present a brief report on a selection of the activities undertaken in 2023 on the major systems needed to achieve 'First Plasma' in ITER (marking the start of ITER operations), namely Site and Buildings (subsection 1.1.2.1 Site and Buildings), Vacuum Vessel (1.1.2.2 Vacuum Vessel) and Magnets (1.1.2.3 Magnets).

The subsequent subsections within this chapter deal with the many other complex, first-of-a-kind technological systems for ITER, most of which are still in the design and development phase, which Europe is responsible for. The ITER schedule requires installation of some of these systems, fully or partially, before First Plasma, although delivery, in most cases, is only required for subsequent assembly phases.

It has to be noted that the ITER project has been undergoing a significant restructuring since the new Director-General took office in 2022. This includes a new baseline for the project as the previous one adopted in 2016 has become obsolete. The new baseline is being prepared in close collaboration with the different parties and the domestic agencies and will no doubt have a significant impact on the planning of the EU deliveries and the estimated cost. The new baseline will be presented in the ITER Council in June 2024 with a possible adoption by the end of the same year.

^[1] *Final Report of Negotiations on ITER Implementation, 1 April 2006. Attachment 2_C*

1.1.2 Major Achievements in EU First Plasma Systems

1.1.2.1 Site and Buildings

Not less than thirty-nine buildings and areas will house the systems necessary for the operation of ITER. The 'Tokamak Complex' will house the main ITER components and is one of the largest buildings of its type ever constructed: 60 m tall (with an additional 20 m underground), 120 m long and 80 m wide; requiring 16,000 tonnes of iron reinforcement bars, 150,000 m³ of concrete and 7,500 tonnes of steel.

Despite significant progress on worksite the Buildings Team had to face:

- Design Reviews longer than expected
- IO input data delays / changes
- Impact of raw material prices on contractor / supply chain contractual relations
- High level of coactivity (Tokamak Complex West Area) leading to reorganisation of priorities to ensure Safety

As shown in Figure 1 and Figure 2, the Tokamak Complex works have well progressed, materialised by the completion of the full scope of Civil Engineering Works on the Tritium Building (B14) available for IO equipment installation up to L3 level including the painting works and the Taking Over by IO of 40 Tokamak Complex BIO (B08/B09) Doors (protection against radiation). The Manufacturing Readiness Review for the Construction Design of the Cargo Lift was approved.

The Final Completion certificate for the TB03 contract with Vinci, Ferroviaria Razel (VFR) was signed after 11 years of successful team work to construct and deliver the Tokamak Complex and associated buildings (RFE1B Stage 2 milestone reached on time).

The construction works continued progressing for the Medium Voltage Distribution Buildings (B44, B45, B46 and B47) (Figure 3), the Control building (B71 Non PIC part) (Figure 4), the Fast Discharge Resistor building (B75) (Figure 6), the Neutral beam Power Supplies Buildings (B37) (Figure 6), the NB Power Supply Building (34) (Figure 6) and Area 30 (Figure 6) and the Busbar Bridge M2 (connecting Magnet Power Conversion Building 2 (B33) and Diagnostics Building (B74)).

The construction works for the Cryoline Bridge (Figure 5) and Radio frequency building (B15) progressed up to a state where IO contractors were able to start working (Ready for Other Contractors). Early Access was granted to IO to certain areas on the Busbar Bridge M1 (connecting Magnet Power Conversion Building 1 (B32) and Diagnostics Building (B74)) (Figure 6) and the PBS41 PPEN in Area 35 400kV 66kV was taking over to IO.

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2022 Status
EU62.05.272720	Construction of Cryoline Bridge (between B52 & B11) Completed	Q2 2023	GB57	Achieved
EU62.705323	Completion of the main civil works for B46	Q4 2023	Predecessor of GB24	Achieved
EU62.705334	Completion of the main civil works for B47	Q4 2023	Predecessor of GB26	Achieved
EU62.749685	IPL > Bus-Bar bridges B32&B74 - Early Access for IO	Q4 2023	Predecessor of GB58	Achieved

Table 1: Site and Buildings and Power Supplies – Annual Objectives presented in the F4E Work Programme 2023.



Figure 1: Aerial view of the ITER construction site. Photo: ITER Organization (September 2023)



Figure 2: TB18 (Vinci-Ferrovial-Razel, VFR) B14 Tritium Building work status in April 2022 (left) versus September 2023 (right) Photos: © ITER Organization



Figure 3: TB13 (Ansaldo - Monsud) B44, B45, B46 and B47 Power Supply and Distribution Buildings work status in November 2022 (left) versus December 2023 (right) Photos: ©F4E



Figure 4: TB12 (Demathieu Bard) B71 Control Building North work status in November 2022 versus December 2023



Figure 5: TB12 (Demathieu Bard) Cryoline bridge (connecting Cryoplant Building B52 with Tokamak Building B11) (left) in November 2022 versus December 2023.



Figure 6: TB12 (Demathieu & Bard) Areas 1 and 2 view in April 2022 (up) versus September 2023 (down)

1.1.2.2 Vacuum Vessel

The ITER plasma, where the fusion reactions will take place, will be under vacuum inside a special double-walled container, the **Vacuum Vessel**. This doughnut-shaped vessel is 19 metres across and 11 metres high. It weighs in excess of 5 000 tonnes, similar to the Eiffel Tower.

F4E is providing five of the nine Vacuum Vessel 'sectors'. Manufacturing is time-consuming and labor-intensive due to the size of the sectors (13.6 metres high, 6.5 metres wide, 7.8 metres deep and weighing 400 - 500 tonnes).

Each sector is composed of 4 Poloidal Segments (PS1-PS4). Each segment is manufactured independently from the others during the Segment Manufacturing phase. Once all 4 segments of one sector are completed, the Sector Assembly phase can start, where the 4 segments are joined together to form the complete Sector.

During 2023, AMW (the industrial consortium responsible for the manufacturing of all 5 sectors) has achieved several important milestones:

- Sector 5 fully welded, and all 2598 welds declared conform
- Sector 5 “pressure test” successfully completed (the pressure test is the first part of the Factory Acceptance Test of the sector)
- Sector 9 “D-shape” completed: all 4 segments joint together on the final assembly frame
- Welding of all 20 segments has been completed (including the segments manufactured by subcontractors ENSA and Belleli), and 13 segments have already been machined to their final dimensions.

F4E relentlessly supports and motivates the consortium to progress at the fastest rate possible, while at the same time sticking to the stringent geometrical tolerances and in strict compliance with the nuclear safety codes.



Figure 7: Sector 5 After declaration of conformity of all 2598 welds at Mangiarotti

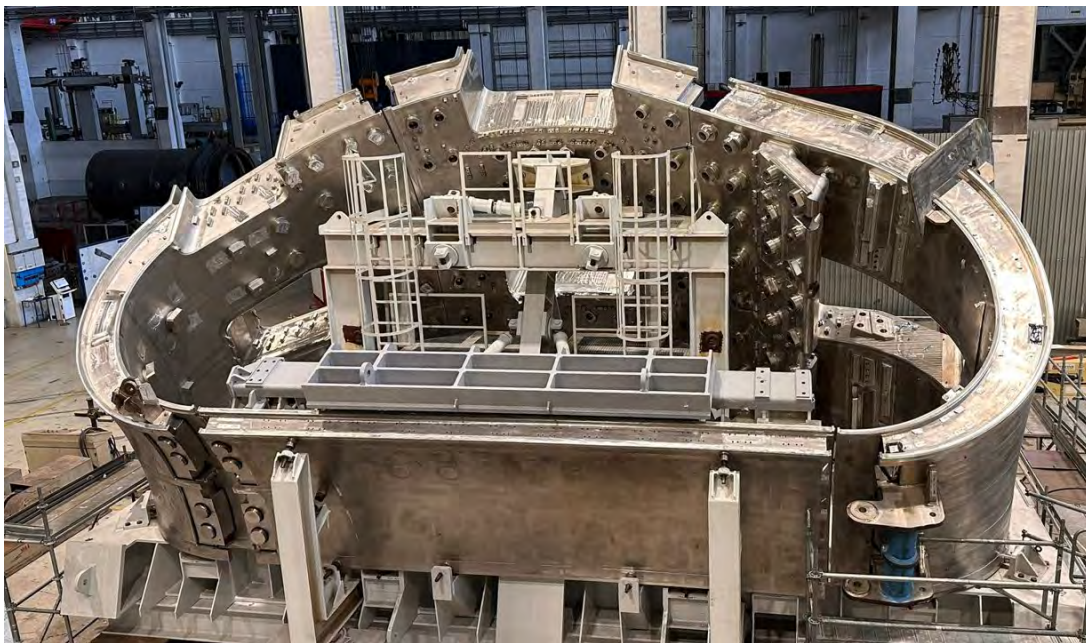


Figure 8: Sector 9 D-shape complete at Mangiarotti

Milestone ID	Scope Description	Forecast Date	Milestone Type	End of 2023 Status
EU15.1A.3093980	S9PS4 - Machining Complete	Q2 2023	Predecessor of GB25	Achieved (Q2)
EU15.1A.3104560	Sector 5 - Bolted ribs and IWS blocks installation complete	Q1 2023	Predecessor of GB16	Achieved (Q1)
EU15.1A.3104580	Sector 5 - Outer shell welding complete	Q3 2023	Predecessor of GB16	Achieved (Q2)
EU15.1A.3104860	S2 PS4_RT inspection & evtl. corresponding repairs completed	Q4 2023	Predecessor of GB25	Achieved (Q4)

Table 2: Vacuum Vessel – Annual Objectives presented in the F4E Work Programme 2023

1.1.2.3 Magnets

30 superconducting magnetic coils hold the hot plasma inside ITER and stop it touching the walls. These are among the largest and most powerful such magnets ever made.

F4E is providing 10 of 18 Toroidal Field (TF) coils installed in the tokamak, 20% of the Nb₃Sn superconductor for the TF coils, five of six Poloidal Field (PF) coils, 11% of the NbTi superconductor for the PF coils and nine fibreglass ‘pre-compression rings’, which keep the coils in place during operation.

1.1.2.3.1 Toroidal Field Magnets

Each Toroidal Field (TF) coil, weighing 310 tonnes, comprises a superconducting Winding Pack (WP), mounted in a stainless steel case. To form the WP, seven Double Pancakes (DPs) are impregnated with a special resin and then stacked together.

Each DP consists of a D-shaped stainless steel plate with spiral grooves on both sides that support two 700-metre-long length of superconductor, wound into shape, heat-treated and electrically insulated before insertion into the grooves.

By the end of 2023, all 10 TF Coils have been completed and delivered to IO and the 10th one is pending the final repair of a High Voltage wire, which will be performed directly on site early 2024.

1.1.2.3.2 Poloidal Field Magnets

F4E will deliver to ITER IO 5 ITER Poloidal Field (PF) coils.

European industries are fabricating four (PF 2, 3, 4 and 5) giant PF coils (ranging between 17 m and 25 m in diameter) under F4E responsibility and coordination at the PF coils workshop at the ITER site.

The Institute of Plasma Physics (ASIPP), Chinese Academy of Sciences-ASIPP has fabricated another one (PF6) under an international cooperation agreement with F4E.

PF Coils #6, #5, #2 and #4 have been already delivered.

In 2023 F4E successfully completed and delivered PF Coil #4 and completed the final assembly activities before cold test for PF Coil #3.

In parallel, PF Coils tooling de-commissioning for the stations that will no longer be used and handover of the building to IO is on-going.

1.1.2.3.3 Pre-Compression Rings

Before 2023, F4E had already delivered to IO all nine **Pre-compression Rings (PCRs)** that keep the 18 TF Coils in place during ITER operation, in addition to a spare PCR #10 and 8 off “1/5 scale” rings.

Each PCR is made from fiberglass and epoxy resin, weighs > 3 tonnes and has a diameter of 5.5 m. These are among the largest composite structures ever manufactured as a single piece.

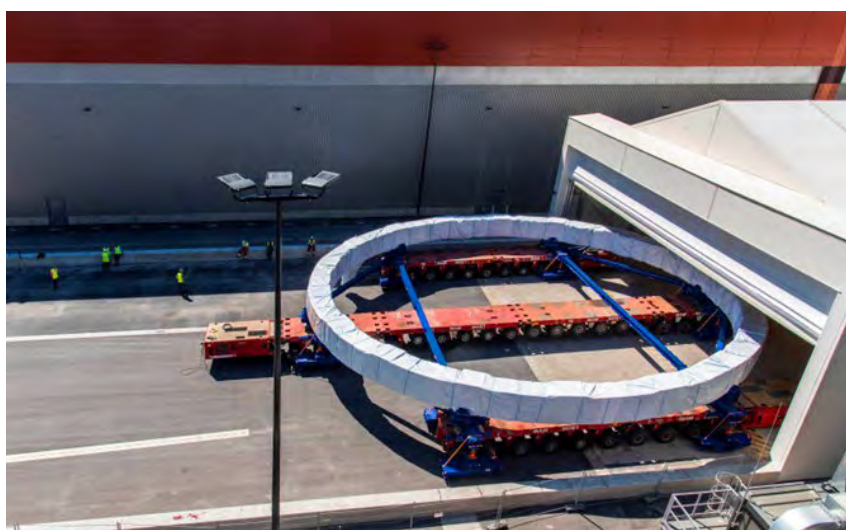


Figure 9: PF Coil #4 delivery and transfer to storage building

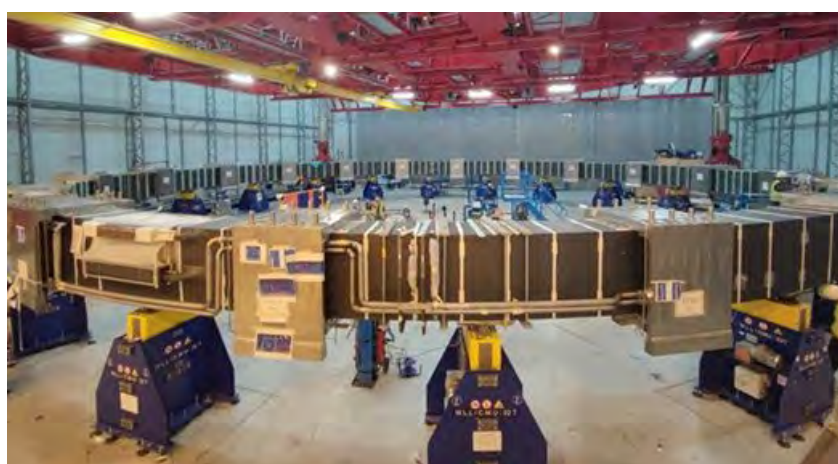


Figure 10: PF Coil #3 Assembled before Cold Test



Figure 11: 10th TF Coil arrival to ITER site.

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2022 Status
EU11.1A.24960	TF-EU10 Delivery to ITER before final repair	Q4 2023	Predecessor of GB54	Achieved
EU11.3B.01140	IPL > Delivery of PF4 Coil by EU-DA to IO	Q3 2023	WP23 objective	Achieved
EU11.3B.571190	PF3 Winding Pack VPI Completed	Q3 2023	WP23 objective	Achieved
EU11.3B.571210	PF3 Final Assembly Completed	Q4 2023	WP23 objective	Achieved

Table 3: Magnets – Annual Objectives presented in the F4E Work Programme 2023.

1.1.3 Achievements in Other EU Systems

Europe is responsible for many other complex, first-of-a-kind technological systems for ITER, most of which are largely in the design and development phase. Even if not all are required for the First Plasma milestone, the ‘Staged Approach’ of the updated ITER schedule requires installation of some parts of these systems (e.g. ‘captive’ components) before First Plasma that are impossible or very costly to install at a later date.

1.1.3.1 In-Vessel Components

Whilst the ITER magnets will confine most of the hot plasma, radiation and some particles will inevitably escape from this magnetic ‘cage’. To protect the Vacuum Vessel and the external

systems from this energy flux, the inside surface of the Vacuum Vessel will be covered by 440 special blocks, called Blanket Modules.

Each module is made from a Shield block and a First Wall panel. Europe will provide 215 First Wall panels. The cooling water of all the Blanket Modules is supplied by pipe bundles running inside recesses at the back side of the Shield Blocks: The Blanket Cooling Manifolds, which are also to be delivered by Europe. The blanket system removes heat from the inside of the Vacuum Vessel and transfers it to the Tokamak Water Cooling System.

A device at the bottom of the Vacuum Vessel, the Divertor, removes excess heat and plasma 'ash' keeping the plasma clean enough to continue operation. F4E is responsible for many key components of the Divertor, like the Inner Vertical Target and the Cassette Body, which is the supporting structure of the Divertor plasma facing components (Inner and Outer Vertical Target and Dome).

The main achievement in 2023 for the Blanket, in the frame of the two cost-plus-fee contracts for the series production of the First Wall panels, was the completion of the second Manufacturing Readiness Review (MRR) for the manufacturing of Pre-Series panels and of the first MRR for Series panels of row FW13A. The manufacturing of the pre-series panels is in progress for both contractors: ALSYMEX (France) and FUSION BUSINESS LEADERSHIP (FBL, Spain). Because of the decision by ITER IO to change the armour material of the FW panels from Beryllium to Tungsten, a PA Change Notice was signed between F4E and ITER IO to cancel the Beryllium armour from F4E scope of supply. The negotiation of an amendment with the OMF-900 suppliers has then been launched to transfer the armour cancellation decision to the supply chain. Investigation on the qualification process of the new tungsten armour started in the last quarter of 2023. An inquiry to the EU industry on the interest in developing the related technologies was launched through a market survey.

For the Blanket Cooling Manifolds, following the signature of the Procurement Arrangement between F4E and the ITER IO in 2020, three Framework Contracts containing a total of eight main tasks were signed in June 2023. Task 1, for the qualification activities and the final assessment of the different support designs alternatives, was awarded. The parallel activities on the development of an alternative and cheaper support design are still in progress, complementing Task 1. Task 8, for the procurement of the 316L material needed for series production was also awarded, in September 2023.

The Divertor Cassette Bodies Framework Contract (CB), for the manufacturing of 58 CBs, continued in 2023 for both contractors CNIM-SIMIC and WALTER TOSTO for the Stage 1, including final machining activities for the FOAK by CNIM-SIMIC, and machining of sub-assemblies, welding on pipes and structural welds of subassemblies by WALTER TOSTO. The Stage 2 of the same framework contract, with WALTER TOSTO, progressed with the continuation of manufacturing activities (mainly machining, welding and NDT related activities). In 2023, engineering and qualification related activities related to the contract for the procurement of ancillary items of pins, sleeves, and links of the CB Series, have been achieved. In addition, the Transition Pieces ancillary parts have been delivered to ITER Organization in 2023.

2023 was also an important year for the Inner Vertical Target project starting the engineering and qualification phases of the first specific contract with RESEARCH INSTRUMENTS for the IVT series. The qualification activities progressed at ALSYMEX, with the Test Assembly being successfully high-heat flux tested up to 20 MW/2 in the ITER Divertor Test Facility.

Blanket First Wall



Figure 12: Pre-Series First Wall panels under manufacturing at FBL (Spain) and Alsymex (France) workshops.

Blanket Cooling Manifolds

Task 1A : Manufacturing of Prototype

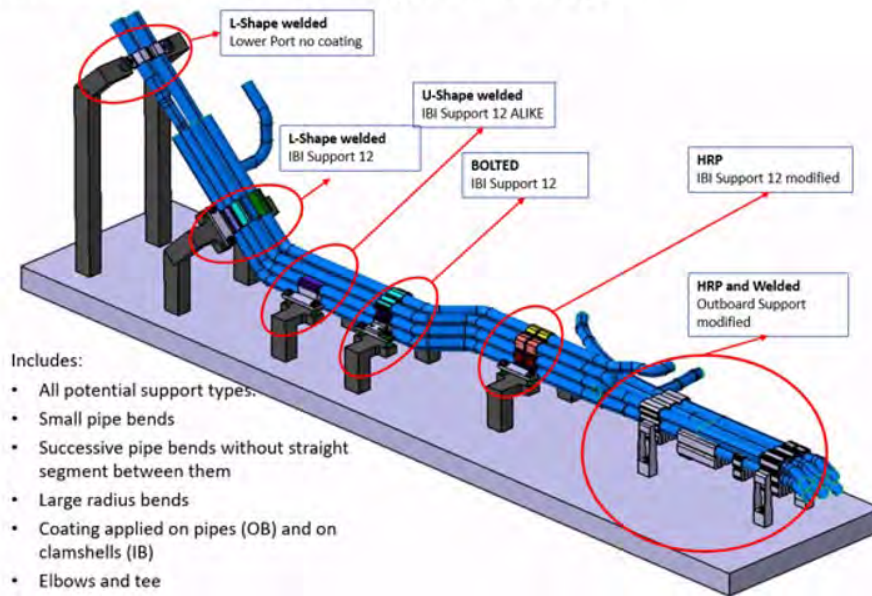


Figure 13: Task 1 prototype including all alternative support designs

Divertor Inner Vertical Target



Figure 14: IVT Test Assembly

Divertor Cassette Body

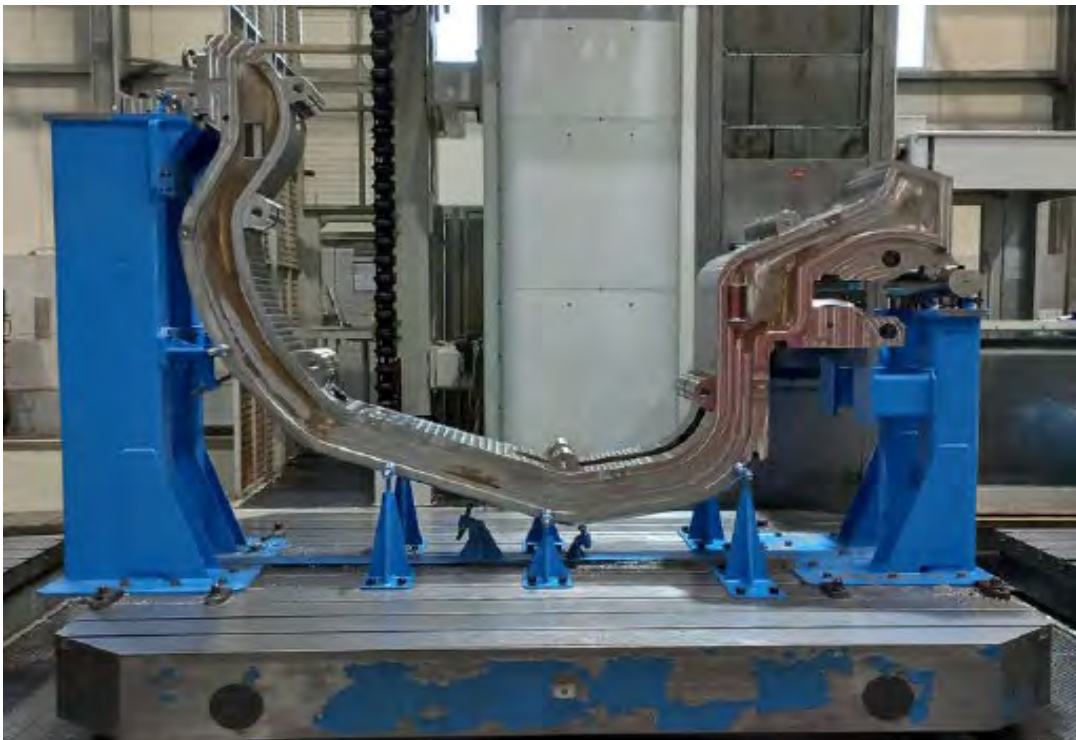


Figure 15: FOAK Divertor Cassette at CNIM (France), under final machining.

In Vessel – Blanket

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	End 2023 Status
EU15.2A.12100	Task Order Signed for Task 1 - Qualif. and Manuf. of 1st Pipe Bundles - Contractor #1	Q2 2023	WP23 objective	Achieved
EU16.01.100860	HP Process qualification - Readiness review for series manufacturing	Q4 2023	GB37	Achieved
EU16.01.83060	MS3.A.2 - PPRR2 / MRR - OMF-900 LOT 1 Approved	Q4 2023	WP23 objective	Achieved
EU16.01.83920	MS3.A.2 - PPRR2 / MRR - OMF-900 LOT 3 Approved	Q4 2023	WP23 objective	Achieved
EU16.01.209280	Evaluation of Final tender for Procurement of Standard Parts	Q3 2023	WP23 objective	Achieved

Table 4: In Vessel-Blanket – Annual Objectives presented in the F4E Work Programme 2023.

Milestone 16.01.83020: The completion of this activity depends on the outcome of some manufacturing qualifications. There were some delays due to the special processes' qualification activities (bending mainly). These are intrinsically risky activities as the number of mock-ups/iterations cannot be defined in advance and is needed to get suitable results to consider the qualification process completed.

PPRR1 was then closed in March 2023, with some minor residual chits.

In Vessel – Divertor

Milestone ID	Scope description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU17.01.1169340	HPC - Approval of Final Reports of the Transition Pieces 61-120 (M_TP (61-120)_15)	Q3 2023	WP23 objective	Achieved
EU17.01.1227460	MRR for CBLV Stage II Approved (MSII_CBLV_S13)	Q4 2023	WP23 objective	Achieved
EU17.2B.654580	Test Assembly of Additional Proto Lot 1 ready for shipment to HHFT facility (OPE-567#01)	Q3 2023	WP23 objective	Achieved
EU17.2B.566420	QA Plan approved for OMF-1139-01-01	Q2 2023	WP23 objective	Achieved

Table 5: In Vessel-Divertor – Annual Objectives presented in the F4E Work Programme 2023.

1.1.3.2 Breeding Blanket Modules

The Test Blanket Module (TBM) systems, i.e., prototypes of the tritium Breeding Blanket (BB) system for next generation of fusion reactors, are, as such, not part of the ITER basic machine, solely test sections hosted in it. F4E will test in ITER two TBM systems (TBS), one water-cooled and one helium-cooled (WCLL and HCCP TBS respectively), the latter developed jointly with ITER Korea. The testing is intended not only to provide evidence of functional capability (primarily tritium generation, then also neutron shielding and heat removal), but also, as unique opportunity in a real fusion reactor facility, to provide feedback to the next generation of BB designers in terms of i) materials development and qualification as per what related to design limits, ii) standardization and qualification of manufacturing processes, iii) consolidation of the development of the tritium breeding cycle system relevant for the future BB systems, iv) proper implementation of the regulatory and licensing process and v) global return-of-experience of a real & complete BB-relevant system integrated in a tokamak environment. The TBSs are not part of the EU in-kind contribution to ITER.

As far as the Helium-Cooled Ceramic-Pebbles (HCCP) TBS joint project between ITER Korea and F4E is concerned, the related Partnership Arrangement (PA) and the TBM Arrangement (TBM-A), among ITER Organization and the two PA parties, were signed in March 23. The PA and TBM-A kick-off meetings were held in April and May 2023. Afterward monthly meetings have been organized by the Joint Project Management team to follow-up the PA operational progress. Moreover, from end of Q2 to Q4-2024 specific workshops have been organized to report the technical progress achieved at work package level, exchange on methodology aspects, along with transverse activities such as, e.g., interface documents review and system engineering.

About the F4E contribution to the HCCP TBM Set design activities, the main progress consisted in integrating a number of analyses to support the ITER re-baseline (i.e. the 2024 ITER Project baseline) by modelling of the thermal response of the functional and structural material, by completing a fluid-dynamics analysis of the manifolds area to check the flow balance and by an optimized integration of the instrumentation and heaters, novel key design elements to compensate the expected reduction of volumetric nuclear heating in the ITER re-baseline, due to the reduced neutronic fluence.

A Water-Cooled Lithium-Lead (WCLL) TBM Set new design activity phase has been kicked-off in Q1-2023 with the signature of a multi annual (3 years) framework contract to cover preliminary (PD) and final design (FD) review gates as per the reference ITER baseline in 2023. The specific contract #1 has been signed and kicked-off in Q4-2023 to progress in the PD phase, prioritizing the preparation of documentation related to the PD readiness workshop (PDRW) scheduled in October 2024. To be noted the enhancement related to the introduction, in the design-by-analysis methodology, of a full coupled fluid-structure modelling of the TBM box (that with the shield forms the TBM Set).

In 2023 significant new elements have been introduced in the design of the WCLL TBS Ancillary Systems. They have been related to i) a simplification of the WCS (Water Cooling System) primary loop, with the change from an eight-shape to an O-shape loop. This allowed to eliminate one heat exchanger and several I&C devices, while imposing a higher operational temperature to the primary water pump, ii) consequently, a simplification of the CPS (Coolant Purification System) with the elimination of the heat exchanger necessary to cool-down the inlet water to 50 °C; this allowed to eliminate a potential source of contamination from CPS to the ITER secondary cooling system and a rearrangement of the PbLi loop in the Equatorial Port Cell #16, reducing the PbLi storage-recirculation tank size and optimizing the whole layout. In terms of analyses, the most relevant

results concerned the RAMI studies that have involved all systems and components and have allowed to determine the total inherent availability and to verify the compliance with the related ITER requirements.

At the same time also the design of the HCCP Tritium Extraction System (TES) and Tritium Accountancy System (TAS) has evolved. The major achievements have been triggered by the need to free space in the AEU (Ancillary Equipment Unit), with the consequent reallocation of the Q2O processing components in the glove box of the Tritium Process Room. Significant progress as well for what related to the RAMI analysis and the I&C design and integration.

The strong effort spent on the simplification on the WCLL and HCCP design and their integration in the AEU of the equatorial Port Cell #16 has led to a first consolidated layout that is currently under study, in terms of structural and maintainability analyses.

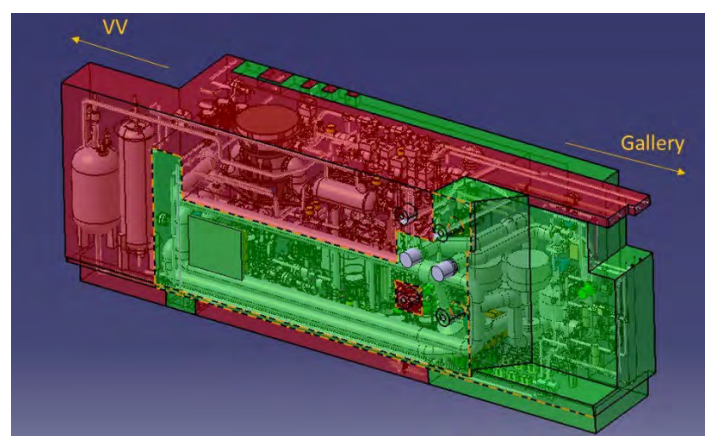


Figure 16: HCCP TBS components integrated in the AEU (equatorial port cell #16)

The TBM Safety Demonstration Project team continued in 2023 its effort in the analysis of the accidental conditions of WCLL TBS. The specific contract #2 with Jacobs (UK) has been concluded, successfully completing the studies of various Loss-Of-Coolant Accident scenarios (In-vessel LOCA, Ex-vessel LOCA in Vertical Shaft #16, ITER Front Wall (FW) + TBM First Wall LOCA), as well as a TES leak accident in the Tritium Process Room. Special mention about the combined scenario ITER FW + TBM FW LOCA, in which a collaborative work has taken place among IO, F4E and Jacobs to achieve the respective contributions and thus to build up the overall result. The subsequent specific contract #2 started with Jacobs, to continue the study of accidental scenarios: an ex-vessel LOCA in Port Interspace, two additional TES leaks with break postulated in the absorption loop, and an ex-vessel PbLi leak into the Ancillary Equipment Unit (AEU). In parallel, a new framework contract for accidental analysis has been signed with NIER (Italy), and the specific contract #1 started to include the next relevant accidental scenarios (in-TBM LOCA, ex-vessel LOCA in AEU, tritium leak in the TAS when located in the glove box, and in-vessel PbLi leak).

For the implementation of the PED and ESPN regulations, it has been carried out a reverification of the operator preliminary input data to the PED/ESPN manufacturer(s). Several areas for further consolidation have been identified, before engaging in the TBS final design. A joint workplan between the Nuclear Operator (IO) and F4E has been drafted and it will be implemented in 2024.

With reference to a fundamental aspect of TBS nuclear licensing, the huge set of Q&A, originated by the review of the fourteen WCLL and HCCP Safety Checklists, has been completed. Additionally,

an important input data package has been developed and transmitted to IO, in order to feed the ANDRA feasibility study for the acceptance of PbLi-contaminated radioactive waste.

During 2023 R&D activities have been carried out by EUROfusion for both the HCCP and the WCLL TBSs. The activities have been mainly focused on the development and qualification of functional materials, tritium transport modelling, predictive tools, sensors, mock-up experiments and integrated testing of the main relevant technologies, safety analyses (activated corrosion products assessment, FMEA, PbLi-water interaction and severe accident analysis). The work has included the preparation of technical specifications, activity monitoring and documentation review, progress meetings, technical workshops about to more than 50 technical deliverables. A schedule baseline for TBM related R&D activities has been issued by EUROfusion, allowing a detailed monitoring in preparation of the design reviews. Workshops have been organized to promote exchanges between TBM and Breeding Blanket designers.

EUROFER97 characterization and codification in RCC-MRx design and construction code: EUROfusion, as F4E partner, has as well progressed in the characterization program of EUROFER97 steel, which is expected to be achieved in 2025-26. During the year 2023, the following activities have been completed (not exhaustive list): i) tests for immediate plastic flow localization on non-irradiated material; ii) irradiation of Immediate Plastic Flow Localisation (IPFL) specimens (tests in 2024); iii) upgrade of the tension-torsion device for ratcheting tests; iv) almost complete test matrix of low cycle fatigue; v) tensile tests after irradiation between 275-550 °C at 0.7 and 1.4 dpa. From F4E side, the preparation of the call for tender for the EUROFER97 codification in RCC-MRx has been achieved. The call for tender was launched at the end of 2023. The related framework contract will encompass services for the technical management, codification and justification of the integration of EUROFER alloy steel in RCC-MRx for ITER TBMs application. It addresses EUROFER97 as base metal and welded joints, irradiated or non-irradiated. The contract is expected to be operational in the second half of 2024.

Fabrication related activities: the implementation of the specific contract #1 focused on “Consolidation of welding processes and related technologies for manufacturing of EUROFER97 structures and components”, progressed in the consortium CEA/FRAMATOME, France. During 2023 the following activities have been pursued: (i) the filler material for GTAW welding (THERMANIT MTS3) has been qualified for EUROFER97 weld joints; (ii) EUROFER97 weldability demonstration continued on lamellar tearing susceptibility, cold cracking susceptibility, gas tungsten arc welding (GTAW) without filler material, electron beam welding (EBW) and hot isostatic pressing (HIP) process in combination with laser beam welding (LBW); (iii) assessment of the multiple post-weld heat treatment (PWHT) effect on EUROFER97 mechanical properties and metallurgical state, (iv) qualification of dissimilar weld joints between EUROFER97 and stainless steel SS316L(N)-IG and (v) manufacturing of WCLL double-wall tubes (DWT) focused on hot extrusion, and cold drawing and co-drawing of inner/outer tubes. The implementation and follow-up activities have been conducted with the support of APAVE EXPLOITATION, France, in its consultant function to F4E.

The specific contract #3 with PUT Firmus, Poland, on continuation of storage and handling of EUROFER97 and P91 steel products continued in 2023. As part of this EUROFER97 material has been prepared for transportation to Korea, within the ITER Korea-F4E Partnership Agreement for execution of the HCCP TBM Set fabrication development activities.

The next procurement of EUROFER97, batch #5 (EUROFER97-5), has been prepared and a call for tender published in November 2023. The technical specifications have been prepared, also taking advantage by the lessons learnt and non-conformities observed in the previous procurement (batch #4). In total ~40 tons of EUROFER97 plates and bars are going to be procured, in this batch

#5, for F4E, EUROfusion and ITER Korea activities. The EUROFER97-5 material is expected to be delivered in 2026.



Figure 17: Qualification of dissimilar weld joints between EUROFER97 and stainless steel SS316L(N)-IG, pipe GTAW welding (CEA credit).

The hereafter 2023 TBM annual objectives have been achieved, each of them on-time as planned.

ANNUAL OBJECTIVES				
Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU56.01.1227620	Final Acceptance Data Package (ADP) F4E-OFC-0950-01-03 Approved by F4E Technical Responsible Officer (TRO)	Q3 2023	WP23 objective	NA
EU56.01.1232120	F4E-OFC-0950-03-02 - Acceptance Data Package 2 (ADP) Completed	Q3 2023	WP23 objective	NA
EU56.01.1238080	TO 01 Preliminary Design of Water Cooled Lead Lithium (WCLL) Ancillary Systems Completed	Q1 2023	WP23 objective	NA
EU56.01.1259280	F4E-OFC-0950-02-03 Acceptance Data Package (ADP) Approved by F4E Technical Responsible Officer (TRO)	Q3 2023	WP23 objective	NA
EU56.02.1240040	ADP 2 Approved of TO2 for Handling, Cutting Storage Serv for Steel Products related to the EU TBMs	Q2 2023	WP23 objective	NA

Table 6: TBM – Annual Objectives presented in the F4E Work Programme 2023.

1.1.3.3 Remote Handling

Remote Handling (RH) will play an essential role in ITER. Once the fusion reactions will have produced significant radiation and activation of the ITER components, robotic tools will be required to inspect and repair components close to, or within, the ITER machine. This is challenging since some of the items weighs up to 50 tonnes and needs precision positioning. F4E will provide many elements of ITER’s RH systems, namely: the Divertor Remote Handling System (DRHS), the Cask and Plug Remote Handling System (CPRHS) for transportation of the components from the Tokamak to the Hot Cell Building, the Neutral Beam Remote Handling System (NBRHS) and the In-Vessel Viewing System (IVVS).

For the DRHS, in 2023, meanwhile significant effort has been devoted to the final design of the Cassette Multifunctional Mover (CMM) and of the Cassette Toroidal Mover (CTM), i.e. the two major DRHS subsystems, a very important event has been the Major Project Review (with a panel of external experts) in April 2023, instigated by the F4E Director. As outcome of this review, it has been decided to focus the future efforts on the design and manufacturing of the movers for divertor 1st assembly, i.e. systems with reduced specifications (in other words, non “nuclear-grade”) to be

procured on a faster track and serving the installation needs. At the same time, the return of experience from these earlier procurements will be used for validating the design choices for the final systems. The design activities, spanning across different technologies and complemented by prototyping and testing (e.g. water-hydraulic digital valves, control system software etc. Figure 18), continued during 2023 in view of a final demo planned for January 2024. As the DRHS is a complex plant system spanning from in vessel to hot cell, F4E is producing a huge amount of technical documentation in view of the final design reviews, e.g. the one linked to the CMM which is planned for the end of 2024.

In the CPRHS area (a massive plant system travelling all across tokamak and hot cell buildings and with eight different cask variants), during 2023 F4E's main technical achievements have been the successful execution of the Final Design Review for the cask systems needed for first assembly (see also Figure 18), and the subsequent launch of the related manufacturing contract. In parallel, the preliminary design of the cask variants needed for ITER second assembly (nuclear-grade units) has moved forward in 2023 and is planned to be completed in 2024.

The NBRHS monorail crane prototyping and testing phase has been successfully completed (see Figure 19), with positive test results, together with the conceptual design of the crane deployment hoist. The contract for the final design of the monorail crane – which is needed for 1st assembly – has been awarded at the end of 2023 and is meant to start in early 2024. The preliminary design of other subsystems also needed for first assembly (Top Lid opening mechanism, beam line transporter rail) have been performed during the year and some details will be finalised during 2024. For NBRHS subsystems needed at later stages attention has to be paid to interfaces with other systems resident in the NB cell,

The IVVS main effort has been devoted to the final design of the two main subsystems, i.e. the measurement and the deployment systems, and to laboratory tests on prototypes (see Figure 19).

F4E has also progressed further in common RH technologies, in particular with the final version of the rad-hard electronics needed for cameras and multiplexers. Control system related activities have been also performed with the successful completion of the integration of innovative software (GENROBOT) in the DTP2 facility in Finland.



Figure 18: DRHS control system software development (left). CPRHS UPP final design (right).

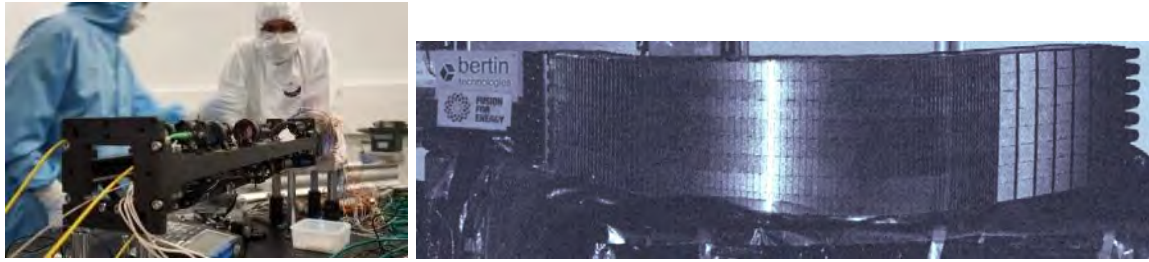


Figure 19: IVVS measurement system prototype (left) and divertor target scanning (right).

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2022 Status
EU23.03.14057020	EU CPRHS FDR Machine Assembly 1 Items meeting completed	Q2 2023	Predecessor of GB40	Achieved
EU23.03.902905	Task Order Signed for OMF-1034-01-06 for Manufacturing and Commissioning of CPRHS for MA	Q4 2023	GB32	Achieved
EU23.05.28190	Contract Signed for Final Design of MCS OPE-1252 (MM and CAS)	Q4 2023	Predecessor of GB42	Achieved (in Feb 24)
EU57.01.50560	[M3] DS Requirement Readiness Review (RRR) completed	Q4 2023	Predecessor of GB47	Achieved

Table 7: Remote Handling – Annual Objectives presented in the F4E Work Programme 2023.

1.1.3.4 Cryoplant & Fuel Cycle

The ITER Cryoplant, a complex system and one of the largest of its type in the world, will provide the cryogenic fluids necessary to cool ITER’s superconducting magnets. F4E is responsible for the Liquid Nitrogen Plant and Auxiliary Systems, about one-half of the Cryoplant, along with part of the network to distribute and regulate the cryogenic fluids; the front-end Cryodistribution lines and Cold Valve Boxes. F4E is also providing all the main Cryopumps, which maintain a high vacuum in the Vacuum Vessel and the Cryostat.

As well as being an expensive resource, tritium is radioactive. Careful management and recycling of tritium on ITER is therefore essential. This is the purpose of the Tritium Plant, a part of which (Water Detritiation System and a Hydrogen Isotope Separation System), will be provided by Europe.

The Radiological and Environmental Monitoring Systems (REMS) provide monitoring to ensure protection of the workers against occupational exposures (ionizing radiation and beryllium) and of the public and the environment against the hazards of ionizing radiation and chemical products. The whole scope of REMS is supplied by F4E.

In 2023 the commissioning of the Cryoplant continued with liquid nitrogen being supplied for commissioning activities on the liquid helium plant. The quench line header, last equipment to be supplied by Europe for the cryoplant was also delivered.

The front-end cryodistribution system that will manage the cryogenics needed for the operation of the cryopumps has seen several achievements in 2023. All the Torus Cold Valve Boxes were delivered to the ITER site together with the Torus and Cryostat cryojumpers, that link the Cold Valve Boxes to the cryopumps. A contract was placed for the procurement of the Neutral Beam cryopumps and the final design review was successfully passed for the Neutral Beam cryojumpers.

The Torus and Cryostat Cryopumping System will pump the vacuum vessel and cryostat volumes. Final assembly of two of the eight pumps was started, cold test and pressure test successfully passed. All the valves and their associated plugs were manufactured, ready for final assembly. A contract for the series production of the associated instrumentation and control system was also placed. The MITICA cryopump was also delivered to the Mitica Neutral Beam testing facility early 2023.

Sophisticated leak detection systems are required to detect potential leaks from the vacuum vessel, cryostat and neutral beam equipment. The final design was nearing completion when a decision was made to restructure the contractual strategy ahead of the manufacturing phase, leading to a temporary suspension of design activities. Significant successes were achieved in the qualification of important components for the leak detection system (for seismic and magnetic field). The final design and the manufacturing readiness reviews for the in-pipe inspection tool designed to help localize leaks in the thermal shield manifolds were completed and a full-scale prototype successfully tested.

The various REMS components will be delivered in stages. The design for First Plasma items was continued and sensitivity tests were carried out for tritium monitors in magnetic field.



Figure 20: Completed ITER Cold Valve Box.



Figure 21: MITICA cryopumps ready to be delivered.

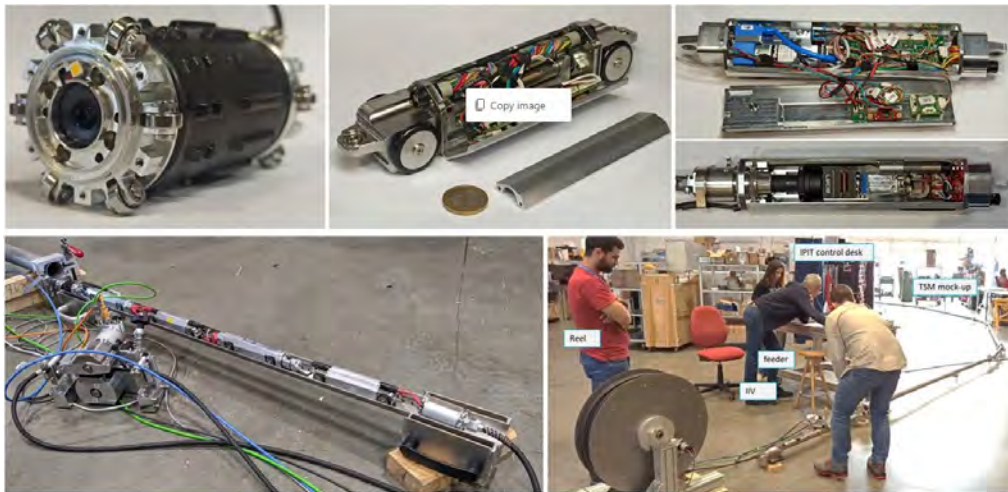


Figure 22: In-pipe inspection tool prototype.



Figure 23: Delivery of quench line header to site (last cryoplant component).



Figure 24: Ongoing Torus and Cryostat Cryopump assembly.

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU31.01.12098	IPL > Delivery of T&C FECDS and Cryojumpers 5-8 (4 no.) Batch 2 by EU-DA to IO	Q2 2023	GB28	Achieved
EU31.01.12230	EU.EU IPL > Delivery of MITICA Cryopump to RFX and SAT completed (M15)	Q1 2023	Predecessor of GB50	Achieved
EU31.01.44380	Start of final assembly with pump plug #1	Q3 2023	Predecessor of GB33	Achieved
EU31.03.25770	M.17 - Final Design Analysis report completed.	Q4 2023	Predecessor of GB18	Postponed to 2024
EU31.03.43280	Mechanical and I&C design complete for Direct Leak Detection Systems	Q2 2023	Predecessor of GB35	Achieved

Table 8: Cryoplant and Fuel Cycle – Annual Objectives presented in the F4E Work Programme 2023

1.1.3.5 Plasma Diagnostic Systems

Ensuring the safe operation of ITER and optimising its performance will require comprehensive information on the behaviour of the fusion plasma. Providing this information will be the responsibility of ITER's many 'Diagnostic' systems, which will number around fifty and measure parameters of the plasma and plasma-facing components such as the First Wall Blanket Modules and Divertor targets. Europe is responsible for twelve Diagnostics and ten ancillary systems. So far, more than 70 European research laboratories and SMEs have been involved in the design, development and/or manufacture of these systems.

During 2023, F4E delivered the Divertor Tangential Coils and associated mechanical platforms, completing the Procurement Arrangement obligations for these components. These coils form part of the ITER Magnetics Diagnostic suite and comprise 36 compact sensors mounted on electrical platforms that are bolted to the ITER Divertor Cassettes.

The Magnetics Diagnostic suite will produce 1,700 signals in all. During 2023, F4E delivered the electronics systems required to interface with these signals. The specialist electronics includes, amongst others, 1,700 state of the art 'integrators' that remain phenomenally stable for the long ITER plasma duration. These systems are now being assembled into cubicles by ITER Organisation (via an ITER Task Agreement placed with F4E) before conduct of the Site Acceptance Test, which will complete the Procurement Arrangement obligations for this system. The Magnetics Diagnostic suite (sensors and electronics) must be operational to support the first plasma operations on ITER.

F4E has progressed significantly during 2023 with systems in the design phase, closing a Final Design Review for In-Vessel components of the Radial Neutron Camera (RNC) and a Preliminary Design Review for In-Vessel components of the Core Plasma Charge Exchange Recombination Spectrometer (CXRS). The RNC provides data on neutrons produced by fusion reactions in the ITER Plasma. It uses a fan array of Boron Carbide collimators, mounted in one of the ITER Equatorial Port Plugs, coupled to two different types of neutron detector specially developed for the environment: a CVD Diamond matrix and a Uranium-238 fission chamber. The fission chambers are already in manufacture. The CXRS is installed in an ITER Upper Port and uses emissions of visible light from the ITER Plasma to derive, amongst other parameters, the density of alpha particles in the plasma, a key measure of the fusion reactions.

In addition, during 2023 F4E undertook three Preliminary Design Reviews and three Final Design Reviews: the latter being for the Diagnostic Pressure Gauges (DPG), for Instrumentation of the Equatorial Wide-Angle Viewing System (WAVS) and for Ex-Vessel sub-systems of WAVS in one ITER Port. Both the DPG and the WAVS must be operational to support the first plasma operations on ITER. The WAVS uses 15 sight lines spread across four ITER Equatorial Ports to collect visible and infra-red light from inside the ITER Vacuum Vessel, and provides a wide range of parameters, such as the power arriving to surfaces facing the plasma, which is an essential parameter for ITER operations. The DPG are compact gas pressure sensors that are distributed on the ITER Divertor Cassettes, on the Vacuum Vessel and in several ITER Ports. The core technology of the DPG is a unique, indirectly heated thermionic emitter that can reach around 1,700 degC and has taken over 4 years of R&D to develop for the ITER environment.

During 2023, F4E signed a major contract for final design of the Core Plasma Thomson Scattering Systems (CPTS) and a large grant for preliminary and final design of the WAVS in three Equatorial Ports. The CPTS is installed in an ITER Equatorial Port and delivers light from a powerful laser in the ITER Diagnostics Building into the ITER plasma, where a small fraction of the light is scattered from electrons (Thomson scattering). The scattered light is used to derive the electron temperature and density profiles across the core of the ITER plasma. CPTS must be operational to support the first plasma operations on ITER.

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	PA/ITA
EU55.01.1000120	IPL > Delivery of Electronics and Software for Magnetics by EU-DA to IO ITER Site	Q3 2023	GB39	PA 5.5.P1.EU.01 Diagnostics - Magnetics Electronics & Software
EU55.06.702380	M1b - Availability of Technical Specification for "Procurement of Raw Material and COTS"	Q3 2023	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services
EU55.09.102790	Preliminary Design Review Meeting for CPTS components (PDR Meeting)	Q3 2023	WP23 objective	PA 5.5.P1.EU.08 Diagnostics - CPTS 55.C1
EU55.11.222090	PDR Meeting for CXRS Fibres and Ex-Vessel Optical/Mechanical (PDR meeting)	Q4 2023	WP23 objective	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer

Table 9: Plasma Diagnostic Systems – Annual Objectives presented in the F4E Work Programme 2023

All the milestones in the above table were met within the forecast achievement date.

1.1.3.6 Plasma Heating Systems

The extremely high temperature required by the ITER plasma to achieve the conditions for nuclear fusion to occur calls for additional heating systems, as the heat generated by the electric current forming the plasma column is not sufficient on its own. ITER will be therefore equipped with three different systems to provide the overall heating: Neutral Beam Heating, Electron Cyclotron Resonance Heating, and Ion Cyclotron Resonance Heating. F4E provides in-kind contributions to the first two.

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	End 2023 status
EU52.01.2001322	Completion of Mechanical Redressing of UL Body - Phase 1	Q2 2023	Predecessor of GB46	Achieved
EU52.01.422055	ADP #2 TO 729-02: Series production of Diamond Disks for EC Windows	Q4 2023	WP23 objective	Achieved
EU52.02.11780	Task Order 1 Signed for European Gyrotrons Procurement (MS-01)	Q4 2023	Predecessor of GB48	Achieved
EU52.04.23065	IPL > Delivery of ECPS 52HV12 (AAG Set #8) to ITER Site by EU-DA (GB43)	Q2 2023	GB43	Achieved
EU53.06.08530	Start of Manufacture of EU-HVD1 & EU-Bushing of IHNB-1 & IHNB-2 (last items)/MRR Closure	Q2 2023	Predecessor of GB30	Achieved
EU53.TF.4443820	Assembly of ERID panels completed and tested (B4000000) - (M67)_ MITICA ERID	Q3 2023	WP23 objective	Achieved

Table 10 Neutral Beam and Electron Cyclotron Annual Objectives presented in the F4E Work Programme 2023 (UL: Upper Launcher, EC: Electron Cyclotron, ECPS: Electron Cyclotron Power Supplies, GB: Governing Board, HVD: High Voltage Deck, IHNB: ITER Heating Neutral Beam, MRR: Manufacturing Readiness Review, ERID: Residual Ion Dump)

1.1.3.6.1 Neutral Beam Heating System

The Heating Neutral Beam (HNB) system is one of the additional heating systems commonly used in the presently operating fusion devices. Its principle is based on the injection into the plasma of high-energy neutral atoms. Ions are initially produced into an ion source and then accelerated to high energies by means of an electrostatic accelerator. The ion beam emerging from the beam source (ion source + accelerator) is then neutralised via two steps: by means of a neutraliser and a residual ion dump, before being injected into the magnetically confined plasma.

Most of the HNB systems are based on the acceleration of positive ions, which is efficient up to energies of about 100keV. In ITER there is a need to reach much higher energies, in the range of 1MeV, which requires the use of negative ion beams.

Each of the two (or three) HNB of ITER is expected to provide an injected power of 16.5MW. This is achieved by accelerating a 40 Amps negative ion beam up to the energy of 1MeV. These parameters are well beyond the ranges of the presently operating negative ion HNB systems.

Therefore, to develop and test the HNB injector for ITER a dedicated test facility, the so-called Neutral Beam Test Facility (NBTF), was established in Padua, Italy. The NBTF hosts two test beds:

- SPIDER (Source for Production of Ions of Deuterium extracted from a Radio Frequency Plasma) where the ion source will be tested up to an acceleration voltage of 100KeV
- MITICA (Megavolt ITER Injector & Concept Advancement) which is the full-scale prototype of the ITER HNB Injector

F4E is currently responsible for most of the manufacturing and on-site assembly of the HNB injector components, including the necessary specific tooling. ITER will use two (or three, if required) Neutral Beam Injectors, and Europe is responsible for providing most of their components:

- The outer mechanical confinement components. This includes:
 - Two NB Vessels (including the draining tank and connecting pipes)
 - Two Drift Ducts
 - Two Absolute Valves
 - Two Fast Shutters
 - Two Exit Scrapers
 - Two Lead Walls
- Two sets of Magnetic Shielding equipment:
 - Active Compensation and Correction Coils together with a
 - Passive Magnetic Shielding structure surrounding the injector.
- Injector core components:
 - two Ion Sources,
 - one Accelerator and
 - two of each Beam Line Component (Residual Ion Dump, Neutralizer and Calorimeter).
- Power Supplies:
 - High voltage deck hosting the ion source power supplies
 - Ion Source Power Supplies
 - Acceleration Grid Power Supply – Conversion System
 - Ground Related Power Supply system (Residual Ion Dump and Active Compensation and Corrective Coils Power Supplies)
- The Control system for the HNB injectors

Starting from 2020, the management of the NBTF activities - which are moving more and more towards the integrated commissioning and operation phase - is performed directly by IO.

As of the end of 2023:

- SPIDER:
 - All contributions of F4E are completed, and all components and systems transferred to IO
- MITICA:
 - Power Supplies, Vessel and all auxiliaries managed by the F4E Heating & Current Drive (HCD) Program have been transferred to ITER Organization (IO), except for:
 - Remaining parts of MITICA control, full Interlock & Safety system
 - These are gradually under development, in parallel with the components and systems to be controlled
 - Remaining to be delivered under the responsibility of the F4E HCD Program are:
 - Beam Source - currently under assembly
 - Beam Line Components - under manufacturing and assembly
 - Some of the diagnostics and the assembly activities for these components

The following annual objectives were set in 2023 for the HNB systems (Table 10):

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	End 2022 status
EU53.06.08530	Start of Manufacture of EU-HVD1 & EU-Bushing of IHNB-1 & IHNB-2 (last items)/MRR Closure	Q2 2023	Predecessor of GB30	Achieved
EU53.TF.4443820	Assembly of ERID panels completed and tested (B4000000) - (M67)_ MITICA ERID	Q3 2023	WP23 objective	Achieved

Table 11: Neutral Beam - Annual Objectives presented in the F4E Work Programme 2023 (HVD: High Voltage Deck, IHNB: ITER Heating Neutral Beam, MRR: Manufacturing Readiness Review, ERID: Residual Ion Dump).

MITICA Beam Source

The manufacturing and testing of the components and the sub-assemblies of the MITICA Beam Source (BS) were almost complete in 2022, with only a few non-critical items still to be fabricated. The manufacturing of the remaining items was completed in 2023, with the formal closure of the corresponding milestone.

The assembly of the accelerator was finalised in 2023 by integrating together the five acceleration grids and the extractor, achieving the extremely tight tolerance for the position of the 1280 apertures of each stage, whereas for the distance between grids, some minor out of tolerance were recorded. These were in the order of microns for the apertures' alignment and a few tenths of mm for the distance between grids, but with no impact on the beam optic.

The ion source assembly - which was suspended at the end of 2022 to resolve the issue on the molybdenum coating on some of the components - was resumed in August 2023. However, it had to be suspended again in September 2023, due to a failure during a pressure test of a hydraulic

circuit. The solution to this new issue had been identified during the month of October 2023, and the restart of the ion source assembly has been planned resume in the first months of 2024.

Finally, the Top Connections, another sub-assembly of the BS, were completed in 2023, finalising its assembly in its temporary supporting structure.



Figure 25: The five stages accelerator of the MITICA BS fully assembled together with the extractor.



Figure 26: The Top Flexible Connection of the MITICA BS in the assembly structure.

MITICA Beam Line Components

The manufacturing and assembly of the MITICA Beam line components has progressed for the 3 components: Residual Ion Dump, Neutralizer and Calorimeter. The assembly steps were released for the three beamline components and is well advanced for the Neutralizer and Residual Ion Dump.

The copper panels of the Neutralizer have been assembled onto the support structure and the sandwich shape of the Neutraliser finalized. The cooling pipe work has been welded on the bottom of the Neutralizer, and part of the instrumentation installed. Successful intermediate dimensional measurements have been done with the panels assembled. The component is almost ready to undergo the Factory Acceptance Tests.

The sub-assembly of the panels of the Residual Ion Dump are completed and tested. The cooling pipework's are under manufacturing. The sensors in-between the panels of the Residual Ion Dump have been tested and mounted, the assembly of the sandwich of panels into the structure is on-going. The mounting of the external sensors is well advanced.

The assembly of the Calorimeter is progressing including its instrumentation. The manifolds are mounted into the support structure and the connection of the swirl tubes is on-going. The process to weld the swirl tubes to the manifolds is very delicate and is followed carefully for each one of the 196 swirl tubes. They are first aligned to the manifold, manual welded, non-destructive examination conducted (welds volumetrically inspected and leak tested) and repaired when needed to ensure fully compliance with regards to welding codes and vacuum compatibility.

The new prototype for the Ceramic Break was manufactured and tested during the year without successful results. A task force is devoted to providing a new solution which satisfies the demanding

specifications for the testing of the Ceramic Breaks which are driving the design solution to be adopted. A new strategy for the installation of the ceramic insulator at site is under assessment to minimize the impact during manufacturing and assembly and on the delivery of the component.

The new prototype designed for the other ceramic insulator of the Residual Ion Dump (the stand-off) was successfully manufactured and tested. With this new design, the 8 parts to be installed in the Residual Ion Dump were produced and successfully tested and installed in the component.

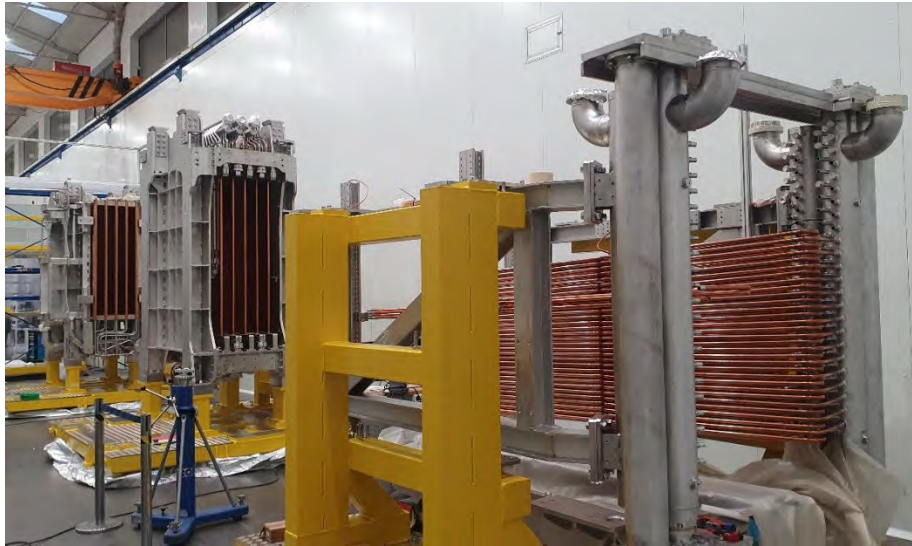


Figure 27: The MITICA 3 Beam line Components in different status of progress. On the right side of the image appears the Calorimeter with the on-going welding of swirl tubes with the manifolds. The component in the middle of the picture is the Residual Ion Dump with the panels mounted on the support structure and the stand-off insulators mounted. The component shown on the left side of the picture is the Neutralizer with the sandwich of panels assembled and pipe work completed..



Figure 28: On the right the Residual Ion Dump with the panels mounted on the support structure and the stand-off insulators mounted. On the left the Neutralizer with the sandwich of panels assembled and pipe work completed.

NBTF Auxiliary Systems

The MITICA Power Supply control system has been completed and as agreed, transferred to IO as one of the parts of the NBTF Control System.

NBTF Integrated Commissioning

During the first half of the year some modifications were implemented on the Short Circuit Device and on the Interface flange between TL2 Connecting Piece and HVD1/TL Bushing. These modifications helped the system to withstand again 1 MV for 100 minutes. The second half of the year was devoted to the preparation of the HV insulation tests in vacuumizing mock-up electrodes, which is expected to start early 2024. In parallel, the repair works of the damaged components continued with the production of new components in Japan, and additional protection systems have been designed by QST.



Figure 29: Beam Source mockup installed at MITICA for HV Holding Tests

ITER HNB Mechanical Components

Activities in relation to the ITER units of the HNB system progressed well in 2023. The first part of the Procurement Arrangement (PA) on the HNB Assembly & Tooling - for the procurement of the assembly tooling - was signed in June 2021. A staged approach for the procurement of the tooling equipment, aligned with the delivery of the different NB components, was agreed with IO. In total, more than 40 different tools will be procured to the IO under the PA. The corresponding call for

tender was launched in June 2022, first step completed in 2023 (i.e. competitive procedure with negotiation), the signature is expected in 2024. For the second part of the PA (HNB general assembly activities), F4E and IO set-up a joint technical working group to analyse in detail the assembly sequence by means of resource loaded schedule. The purpose was to consolidate the definition of the scope and revise the cost estimate of the general assembly, paving the way for a potential transfer of the assembly activities to IO. The aim is to centralise the entire scope of work in the ITER NB cell (4 injectors) to perform the installation activities using only one main contractor only, reducing the co-activities risks and delays.

The PA for NB Confinement, comprising of: the NB Vessels, the Exit Scrapers, the Lead Walls and some of the so-called Front-End Components (Drift-Ducts, Absolute Valves and Fast Shutters), has been also divided into several batches, to allow timely completion by IO of the built-to-print technical specifications for each of the complex mechanical components. The PA part related to the two NB Vessels was signed in July 2021, and the call for tender process was launched in Autumn 2021. The contract was signed-in October 2023 with delivery date foreseen in October 2029. These are nuclear safety components, due to their confinement function.

In 2023, F4E also contributed substantially to the preparation with IO of the technical documentation necessary for the signature of that PA part related to the Drift-Duct. The Drift-Duct PA part was signed in December 2023. The call for tender is foreseen to be launched in April 2024 and contract signature planned for end 2025. In addition, the strategy for the design and procurement of the Absolute Valve has progressed well with IO. It has been agreed, with IO, to launch a joint (IO/F4E) call for tender/contract. The call procedure will be managed by F4E with a joint contract signature foreseen in 2027, with IO responsible (including financially) for the build to print design with the contracted company and then F4E procuring the Absolute Valve with the same contracted company. In the meantime, to attract more companies, IO shall launch early 2024 a call for a feasibility study of the Absolute Valve, with the contract foreseen to be signed in summer 2024 and result delivered in summer 2025.

Preparation of the PA for the NB Magnetic Shielding - comprising the NB Passive Magnetic Shielding (PMS) and the Active Compensation and Correction Coils (ACCC) – is in progress, together with the finalisation of the design where F4E is contributing on aspects related to materials, magnetic analysis, and control.

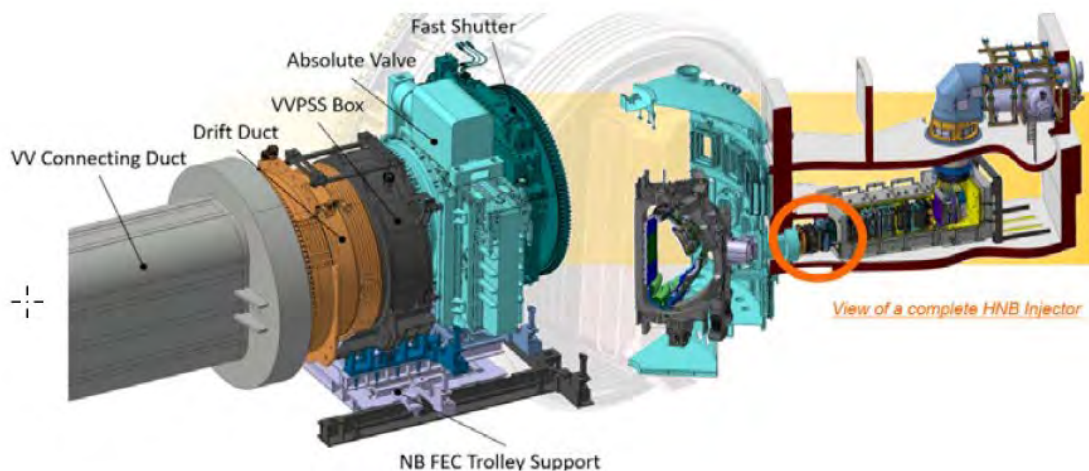


Figure 30: CAD view of the Front-End Components (FEC) of the ITER HNB injector.

ITER HNB Power Supplies

Except for the Ion Source Extraction Power Supplies (ISEPS) and the Active Compensation and Corrective Coils Power Supplies (ACCCPS) - for which the specifications for ITER are being consolidated with IO - the HNB Power Supplies (NBPS) system for the two HNB injectors moved from the final design to manufacturing, and the Factory Acceptance Tests started for some components. Further highlights include:

- The Final Design of the High Voltage Deck was completed.
- The manufacturing of the Acceleration Grid Power Supplies substantially progressed, and the Factory Acceptance Tests were successfully performed of the rectifiers and inverters of the first HNB injector.
- The manufacturing of the Residual Ion Dump Power Supply units for the two HNB injectors were completed.
- The manufacturing of the High Voltage Bushing Assembly and Deck progressed as planned for the Factory Acceptance Tests in 2024.
- Engineering activities were launched in preparation of the preliminary design of the HNB control of ITER.



Figure 31: Rectifier unit of the Acceleration Grid Power Supply system of ITER, during Factory Acceptance Testing.



Figure 32: Connecting Box Vessels of the High Voltage Bushing Assemblies under manufacturing.

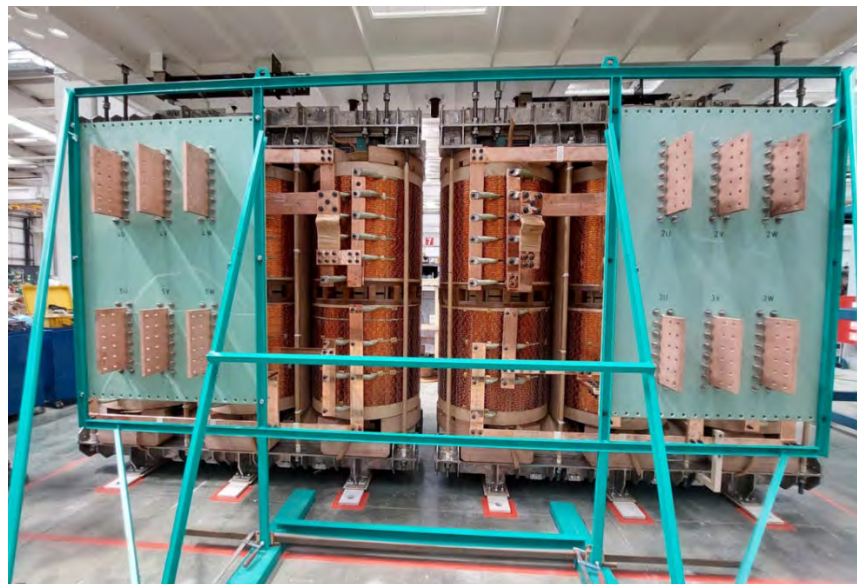


Figure 33: 66kV step-down transformer of the Conversion System of the Acceleration Grid Power Supply under final steps of manufacturing.

1.1.3.6.2 Microwave Heating system

Another way to heat up the plasma is to use radio waves to make the ions and electrons in the plasma vibrate, much like the way a microwave oven heats food. ITER is using two systems: Ion Cyclotron (IC) Heating, which heats the ions, and Electron Cyclotron (EC) Heating, which heats the electrons. Each system comprises power supplies, radio wave generators, transmission lines to transport the radio waves, and antennas inside the Vacuum Vessel to launch these waves into the plasma.

F4E is responsible for providing 4 upper port plugs (each housing one EC Upper Launcher), together with ex-vessel components of both the EC Upper and Equatorial Launchers as well as control systems for the EC plant. F4E is also responsible for providing 8 sets of power supplies for

the EC Heating system, and 6 gyrotrons, with their superconducting magnets and auxiliaries. Gyrotrons are high power microwave generators.

The following annual objectives were set in 2023 for the EC system (Table 11):

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	End 2023 status
EU52.01.2001322	Completion of Mechanical Redressing of UL Body - Phase 1	Q2 2023	Predecessor of GB46	Achieved
EU52.01.422055	ADP #2 TO 729-02: Series production of Diamond Disks for EC Windows	Q4 2023	WP23 objective	Achieved
EU52.02.11780	Task Order 1 Signed for European Gyrotrons Procurement (MS-01)	Q4 2023	Predecessor of GB48	Achieved
EU52.04.23065	IPL > Delivery of ECPS 52HV12 (AAG Set #8) to ITER Site by EU-DA (GB43)	Q2 2023	GB43	Achieved

Table 12: Electron Cyclotron – Annual Objectives presented in the F4E Work Programme 2023 (EC: Electron Cyclotron, ECPS: Electron Cyclotron Power Supplies, UL: Upper Launcher).

The EC Plant Controller is the control system that oversees the configuration and operation of the whole EC plant and implements the integrated plant protection functions. These main functions include managing EC plant parameters, plant size machine, time and events and implementing control functions.

EC Upper Launchers (UL) and Ex-Vessel Waveguides (EW)

Following the change of the procurement strategy defined in 2020, and the signature in December 2021 of the amendment to the PA for the supply of the EC Upper Launchers (UL) and Ex-Vessel Waveguides (EW), a contract for the design and manufacturing of the UL and EW systems and associated ancillary systems was signed with the industrial Consortium IDAL (IDOM and ALSYMEX), an industrial Technical Integrator, in March 2022, as planned. This contract is now under execution and the finalisation of the design of the UL and EW systems is progressing well. In parallel, the manufacturing design of the launcher, which requires complex manufacturing technologies, is progressing as well.

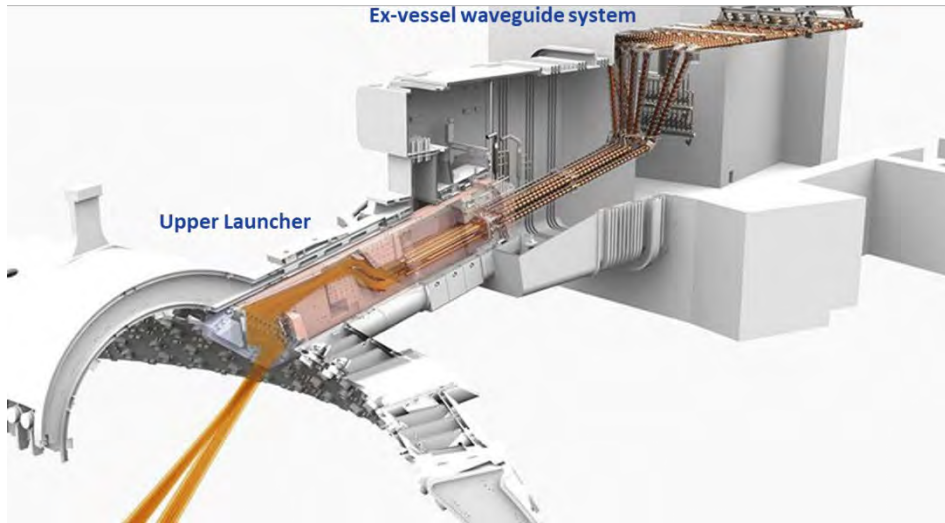


Figure 34: 3D view of the current Upper Launcher and ex-vessel waveguides systems current design.

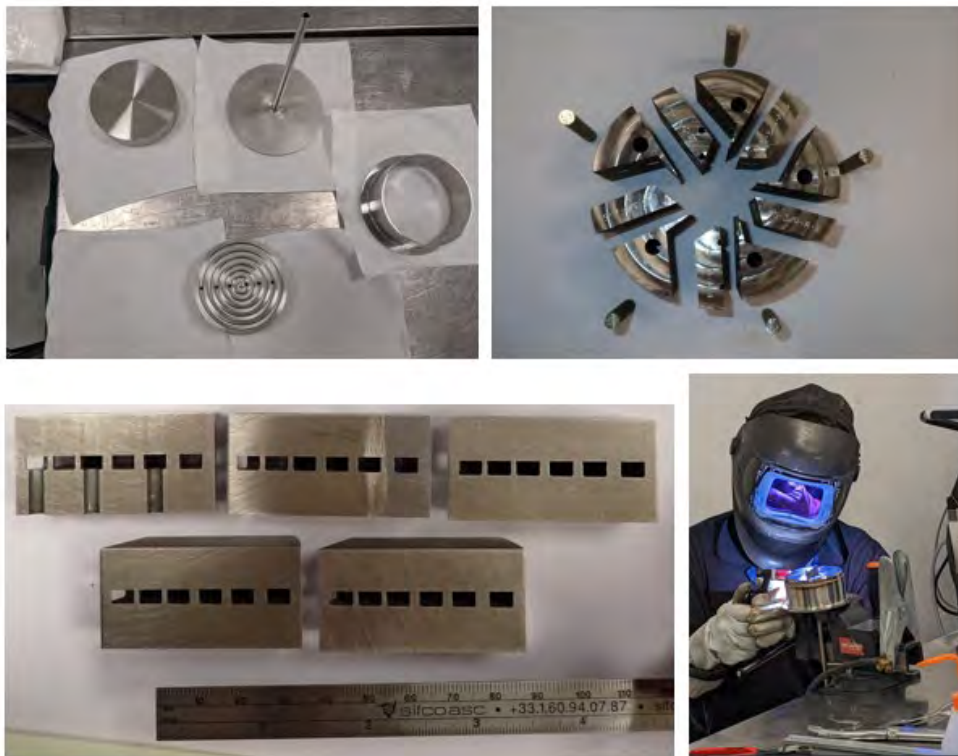


Figure 35: Examples of mock-ups for the qualification of the launcher mirrors manufacturing process.

In addition, the development of a way forward for the design finalisation and manufacturing of the EC isolation valves is on-going, and the signature of contracts for the finalization of the design and qualification is planned for second quarter of 2024. Furthermore, in 2023 100% of diamond disks required for ITER were manufactured by Diamond Materials and are now being tested. These disks

will be assembled into the diamond window unit that will be manufactured by the Technical Integrator. Finally, two diamond window proof of concepts were manufactured, which demonstrated the manufacturing feasibility - the subsequent testing is planned for the second quarter of 2024.

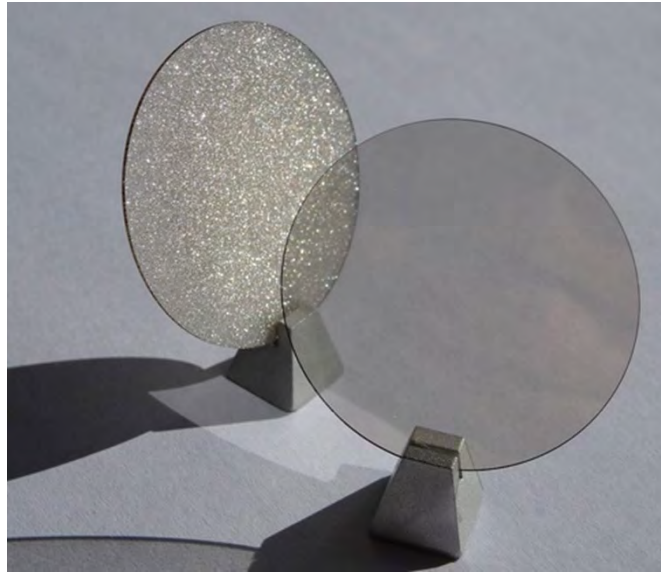


Figure 36: Unpolished and Polished Carbon Vapor Deposition (CVD) Diamond Disks.



Figure 37: Diamond window proof of concepts.

Electron Cyclotron Power Supplies

F4E oversees the design, manufacturing, delivery, installation, and commissioning of 8 Electron Cyclotron Power Supply (ECPS) units feeding 16 (out of the 24) ITER gyrotrons. In 2023, the installation of 4 ECPS units were completed at ITER and are ready for commissioning. In addition, the installation of the remaining 4 sets started in both levels 1 and 2 of the ITER building B15.



Figure 38: The eight EU High Voltage Power Supplies are installed in the ITER building #15, ready for commissioning.

Electron Cyclotron Power Sources

In the framework of the F4E and DTT joint tender procurement for the RF Power Sources (Gyrotrons) - involving 6 units procured by F4E for ITER and 16 units by DTT (Frascati, Italy)- the collaborative effort between F4E and DTT has achieved a significant progress in the development of the EU Gyrotrons for the ITER project during 2023. This includes the successful testing and acceptance of DTT pre-series gyrotron, which currently serves as the baseline for the future ITER EU gyrotrons.

Thales' design for the DTT pre-series gyrotron was accepted in March 2023. Then, following a successful bake-out and parameter control at factory in June, the gyrotron pre-series started the conditioning phase with RF short pulses in July at the F4E test facility FALCON (Lausanne, Switzerland).

From September to December 2023, an extensive long-pulse test campaign performed by Thales and SPC (Swiss Plasma Center), under supervision of DTT and F4E, confirmed the design's estimated capabilities, notably the absence of parasitic oscillations.

The DTT pre-series gyrotron achieved excellent performance during testing at FALCON. It was able to deliver continuous 1 MW pulses for up to 100 seconds, with an efficiency of approximately 40%, and without parasitic modes. This achievement led to the formal acceptance of the pre-series gyrotron tube by DTT in December 2023.

F4E procurement activities in 2023 focused on the preparation of the specific Task Order for the delivery, installation, and commissioning at site of 6 EC EU Gyrotrons for ITER. Following the

successful tests at FALCON, F4E signed the procurement specific contract with Thales in mid-December 2023, simultaneously with the signature of the DTT specific contract for the DTT series units (15 units). The alignment of both DTT and F4E contracts signature allowed to exploit synergies between both contracts, which were strategically planned to materialize financial discounts and technical collaboration between DTT and F4E.



Figure 39: DTT gyrotron prototype after successful bake-out and vacuum control at the Thales facility in Vélizy (France), with teams from Thales, DTT and F4E. EC Control system.



Figure 40: FALCON test stand with the DTT pre-series gyrotrons and project teams (Thales, SPC, DTT and F4E).

EC Control System

In 2023, the activities on commissioning and integration of EC Plant Control System (ECPC) Stage 2 with the JADA Gyrotron Sub-system Control Unit were completed. A complementary work under an ITA focused on the harmonization of control solutions among SCUs, with the aim to ease integration in ECPC and future maintenance. The ECPC was also developed to integrate the control of the temporary cooling and vacuum stations for Gyrotrons Commissioning Components (GCC). As of 2024, the ECPC is already supporting testing of power supplies on dummy load and is ready for the commissioning of the functionalities enabling the acceptance tests of the ITER EC sources.

1.1.4 Office of the Chief Engineer

The Office of the Chief Engineer plays a critical role in ensuring robust technical integration and configuration management within F4E's contribution to the ITER project. They support the Head of ITER Programme Department providing leadership and coordination to ensure integrated systems meet performance, reliability, and compliance standards while effectively managing configuration changes.

Firstly, regarding technical integration, they oversee the coordination of technical activities across different Project Teams to ensure smooth integration of F4E in-kind contribution and they support clear understanding of project scope by the Programme Managers. Secondly, in technical process integration, they ensure consistency between IO and F4E technical processes, while also overseeing configuration management processes within F4E programs. Thirdly, regarding configuration management, they interface with IO to safeguard EURATOM's investment in ITER, evaluating with the support of the Project Teams the proposed changes' impacts on technical integration, schedule, and cost as well as representing F4E to the ITER Project Configuration Control Boards.

During 2023, the Office of the Chief Engineer has performed the following activities:

Technical & Process Integration

- Participated, as panel member, to 7 system design reviews included in the F4E in-kind contribution as well as provided technical lead in the Design Review Steering Committees.
- Actively supported the IO-CT in the resolution of a number of Project Issues.
- Promoted the improvement and development of tools and procedures to ensure a continuous and proper implementation of Configuration Management in line with ITER IO.

Configuration Management

- Represented F4E in 33 Level-2 as well as in 71 Level-3 Configuration Control Board meetings and provided the corresponding F4E positions on the discussed PCRs.
- In addition to the PCRs created in the past years and not closed yet, processed the 43 new PCRs created in 2023 and impacting the F4E in-kind contributions.
- Acted as PCR RO, on behalf of ITER organization, in 4 PCRs.

- Provided technical support on different topics to the EU-DA Representative to the ITER Project Executive Project Board.
- Provided technical support to EURATOM through the review of MAC and STAC papers.

1.2 Contributions to the Broader Approach Projects

1.2.1 Satellite Tokamak Programme (JT-60SA)

The Satellite Tokamak Project (or JT-60SA) is the largest super conducting tokamak in the world and is located at QST, Naka (Japan). While re-utilising the site and some of the infrastructure of the former JT-60U (dismantled to make space to the new machine) it is a superconducting device capable of long pulse operation, with the aim of carrying out experiments which should be complementary to those studied in ITER.

The activities of 2023 focussed on the repair and reinforcement of the insulation of the superconducting magnets, investigation of different methods for protecting the magnet system and finally the first period of Integrated Commissioning (IC). The achievement of first plasma occurred in October and a ceremony took place shortly thereafter to celebrate this achievement. In parallel with this, the preparation of the machine enhancements which are due for installation over the next years continued.

As it had been decided in late 2022 that it would be impossible to make the machine completely Paschen proof, repair and reinforcement of the magnet insulation ceased in early 2023. Integral to the decision to proceed was the active magnet protection system, comprising a set of Cold Cathode Gauges (CCGs) and spark wires, which was developed mostly in 2022 by F4E. The final testing on the CCGs was successfully completed in vacuum conditions and under the influence of an external magnetic field in the first quarter of 2023. Given the complexities of testing in a cryogenic environment and the time it would have taken to implement, the decision was taken to go ahead without completing cryogenic testing on the system. The hardware was shipped to Japan for installation on the device in March 2023.

Prior to shipment of the CCGs to Japan, work had already started on closing the machine so that the integrated commissioning could proceed. The machine was completely closed with the active magnet protection system installed before the summer and cooldown started, taking approximately 1.5 months to reach operating temperature. Magnet and power supply testing started, with a number of typical commissioning setbacks during the process.

Since F4E supplied the majority of the new magnet power supplies, we were heavily involved in the integrated commissioning of these components. There were many issues, most of which were solved with the support of the EU industrial suppliers. In addition to the smaller issues, there were two significant issues, one with a transient overvoltage on the EF & CS power supplies which

appeared during a fault to ground and another with the pyrobreakers. For the transient overvoltage problem, a set of varistors was manufactured and installed solving the problem in a temporary manner. For the pyrobreakers, the issue was that they were supplied by the Efremov Institute in Russia so it is now very difficult to procure spare parts. F4E, working with industrial suppliers in Europe were able to qualify new explosives which can be used directly in the existing design, and QST continue to work on the development of repair kits that could be used if required in the future. More permanent solutions are being investigated.

At the beginning of October, we successfully tested all power supplies concurrently after which we were in a position to attempt to produce the first plasma on the device. Within a couple of operational days, we achieved this goal with the production of a 130 kA plasma for duration of less than 1 second. Work then started rapidly on pushing the essential systems of the machine, in particular the power supplies, magnets and cryogenic system, to produce larger plasmas for longer durations. Within a couple of weeks we were able to produce plasmas with a current greater than 1 MA for a duration greater than 10 seconds.

A ceremony was held on 1st December where the European Commissioner for Energy, Kadri Simson, together with Japan's Minister for Education, Culture, Sports, Science and Technology, Masahito Moriyama, and Japan's Minister of State for Science and Technology Policy, Sanae Takaichi, were all present. The event was a great success with the distinguished guests able to initiate the production of a 1 MA plasma from the JT-60SA control room.

Throughout the IC period regular meetings were held between experts from F4E, QST and ITER. On the cryogenic and magnet systems, the regular meetings facilitated troubleshooting and the support of ITER experts was greatly appreciated by the JT-60SA team. For the power supplies, F4E and QST maintained close contact, and a representative from ITER joined the F4E onsite team for a couple of weeks during the commissioning. This constant sharing of information will ensure that any learnings from the JT-60SA commissioning can be taken into account during the development of the ITER designs. In a number of areas, this collaboration will continue, ensuring that we are all working towards the same goals.

One of the results of the integrated commissioning is that it has become clear that we will need to complete a more comprehensive repair of the central solenoid. Work is ongoing both in Europe and Japan investigating possible ways to complete this repair, and a decision is expected to be made in the first half of 2024 on how we will proceed. This will likely result in a change of the planning for the subsequent operational periods of the machine, but the effect cannot be judged yet.

In parallel to the activities onsite in Japan, the preparations for the machine enhancements have continued in Europe:

- For the actively cooled divertor, contracts are now in force for all main components except for the integration of the divertor. A full-scale mock-up is in preparation for the cassette frames and material procurement is proceeding for the normal heat flux elements. There have been some issues with the bonding of the graphite to the heat sinks during mock-up testing of the high heat flux elements, however improvements have been made and we are approaching a final solution.
- For the diagnostics, we continue to follow up the activities associated with the Thomson Scattering System, Fast Ion Loss Detector (FILD) and the VUV divertor spectrometer. Most of these activities are progressing well with testing and deliveries of the hardware scheduled in 2024, 2025 and 2026.

- For the fuelling systems, we have an ongoing issue with the supply of the pellet sources for the Pellet Launching System (PLS). The contract is with a Russian supplier, who is having difficulty meeting the technical requirements, and is also having difficulty making technical improvements. In part, this is due to the sanctions restricting the availability of hardware. We are actively working on a number of potential solutions to this, including the preparation of a development contract within Europe and the possibility of using a simpler system which could be used in the first stages of the next operational period. We also delivered the Massive Gas Injection System (MGI) during the first quarter of 2023 and are proceeding with the site acceptance tests for the system.



Figure 41: Initiation of the plasma by Commissioner K. Simson, Minister M. Moriyama, and Minister S. Takaichi.

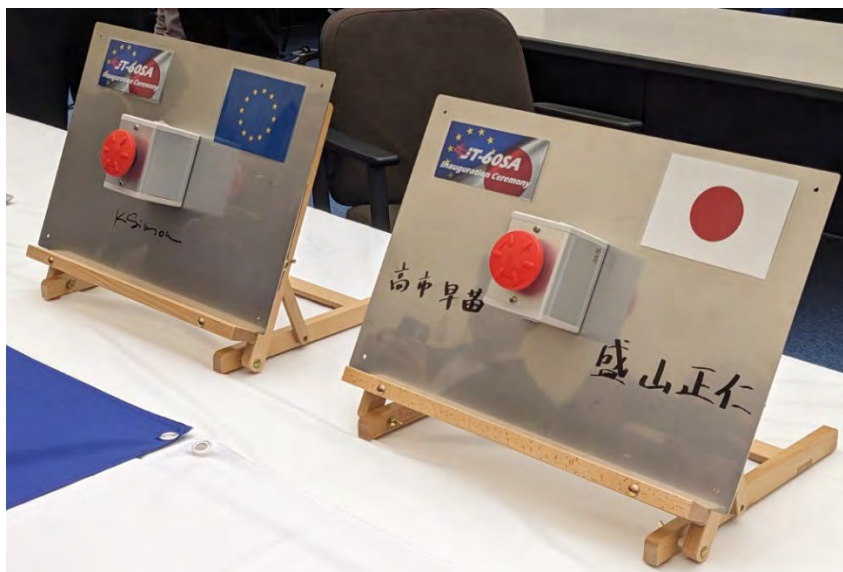


Figure 42: J Commemorative plasma start buttons.

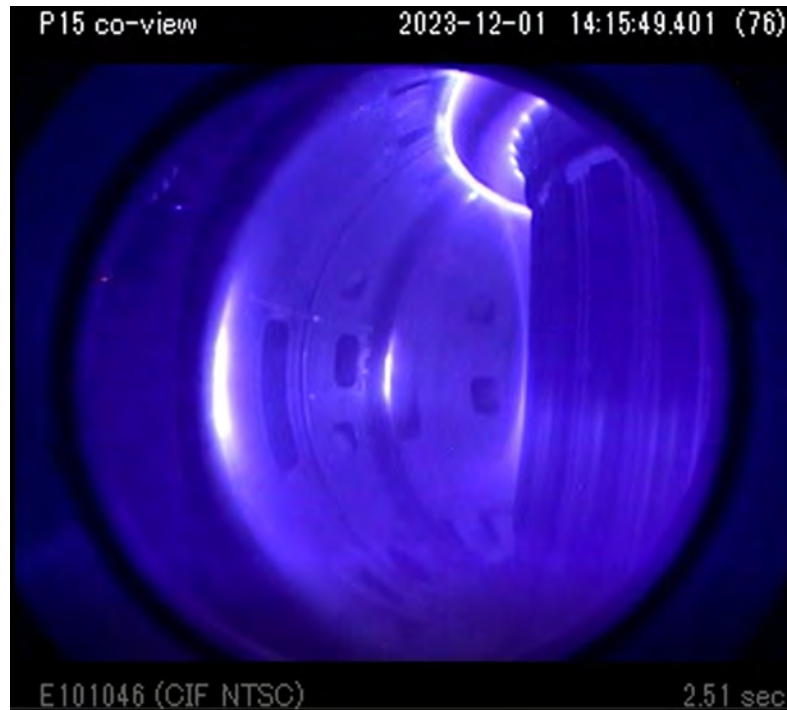


Figure 43: Image of the JT-60SA first plasma.

1.2.2 IFMIF/EVEDA

The International Fusion Materials Irradiation Facility (IFMIF) is an accelerator-based neutron source designed to produce neutrons with an energy spectrum similar to that of fusion neutrons and with fluxes compatible with the fusion roadmap to qualify materials envisioned for future power reactors. The Engineering Validation and Design Activities (EVEDA) for IFMIF are being conducted in Rokkasho, Japan, focusing on the design and validation of the three key components needed for future Fusion Neutron Source facilities: the Li target and the test facility, both of which have already been successfully validated, and the accelerator. Given that the IFMIF accelerator must achieve unprecedented performances, the engineering design is being validated through the manufacturing, installation, and commissioning of the LIPAc accelerator (Linear IFMIF Prototype Accelerator), which is a 1:1-scale prototype accelerator from the injector to the first cryomodule. This initiative brings together QST (Japan) and F4E, coordinating contributions to IFMIF from INFN (Italy), CIEMAT (Spain), CEA Saclay (France), SCK CEN (Belgium), EUROfusion, and IFMIF-DONES. The engineering validation of LIPAc remains the highest priority, with the majority of IFMIF/EVEDA resources allocated to it.

The first half of 2023 was marked by intense maintenance efforts, setting the stage for upcoming beam operations in the phase B+ configuration. Such a configuration, not planned at the beginning of the project, was devised to optimise beam operation time and commission all the LIPAc subsystems apart from the cryomodule at nominal beam current, possibly up to continuous wave (CW) at 5 MeV. It consists of three main stages: Stage 1 involves testing with proton and deuteron probe beams at low duty cycle and low intensity. It was completed in December 2021 and the results obtained met expectations. Stage 2 escalates to using a 125 mA D+ beam at low duty cycle,

specifically to validate the beam dynamics, and stage 3 that employs a 125 mA D+ beam to validate all LIPAc subsystems at high duty cycles.

2023 was mainly devoted to the preparation and implementation of the stages 2 and 3. An important achievement was the repair, installation, and testing of Circulator 1B, a crucial component for the accelerator's RF system. Furthermore, the Radio Frequency Quadrupole (RFQ) received significant enhancements with the installation of eight upgraded O-ring couplers, designed to improve its operational reliability and performance, by improving their cooling capability. By the end of the first semester, all coaxial lines, along with the repaired circulator and the power couplers with enhanced cooling, were reassembled. Additionally, concerted efforts were made to address the water quality issues in the RF water cooling system, which had been causing frequent interlocks due to low flow rates at the High Voltage Power Supplies of the RFQ. These activities were complemented by remote hardware commissioning and maintenance sessions with the involvement of experts from Europe.

In spring 2023, the CW beam campaigns for the Injector, using two plasma electrodes with aperture diameters of 11 mm and 11.5 mm, were executed sequentially. A CW beam current of 155 mA was extracted using the 11.5 mm diameter plasma electrode, with an emittance of $0.2 \pi \cdot \text{mm} \cdot \text{mrad}$ (measured at 5% duty cycle and 150 mA extracted beam current) meeting the requirements.

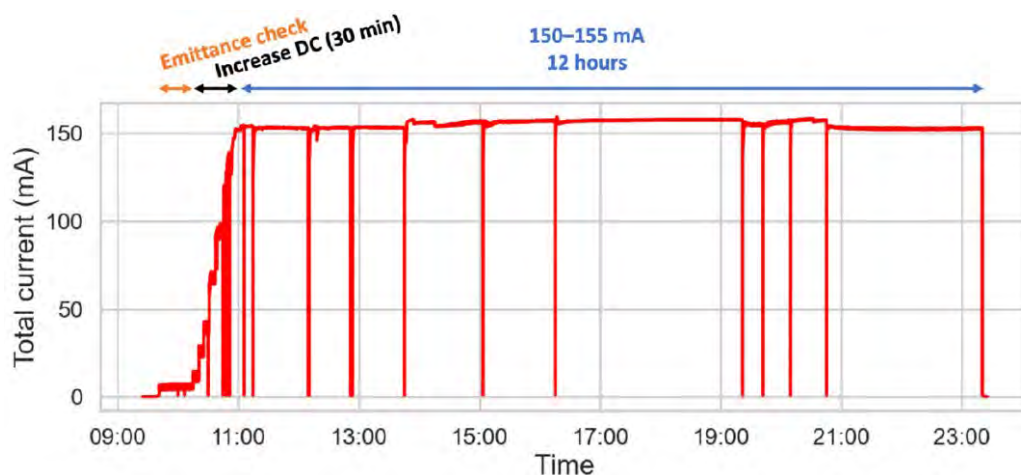


Figure 44: On April 27, 2023, 12 hours of continuous wave operation were achieved in preparation of the upcoming restart of the phase B+ with a deuteron beam of 150-155 mA IFMIF and emittance of $0.24 \pi \text{ mm mrad}$ meeting requirements.

The meticulous RFQ's RF conditioning commenced in June 2023 and reached a 27% duty cycle at the nominal cavity voltage (132 kV) by December 2023. Despite the aforementioned enhancements to the cooling power at the inner conductor of the RF window section, the temperature rise observed at the same RFQ O-ring couplers during the previous conditioning phase remained similar. A dedicated measurement campaign is planned in 2024 to further investigate this important unexpected result delivered by the phase B+.



Figure 45: IFMIF/LIPAc control rooms on Rokkasho site: Left local control room, right central control room.

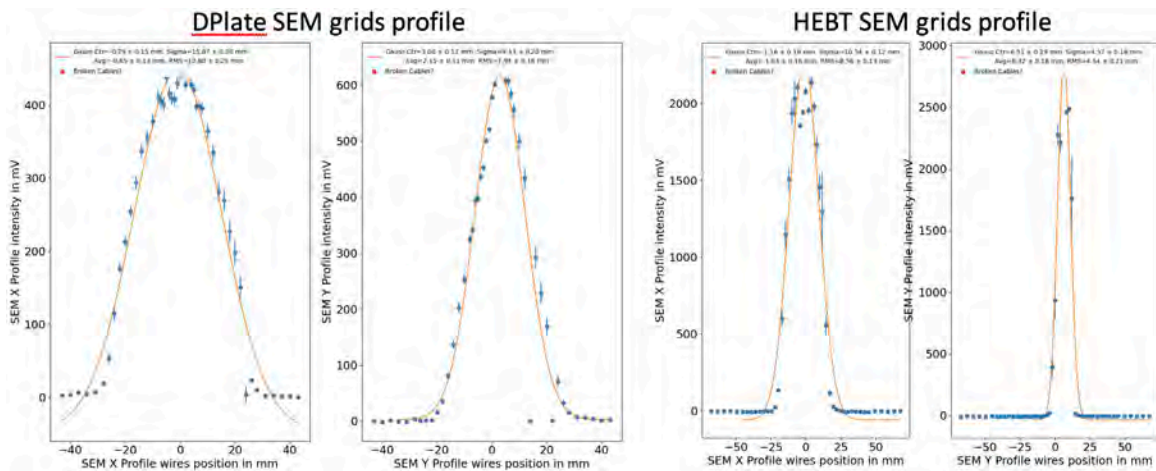


Figure 46: Examples of results of deuteron beam profiles measured at DPlate SEM grids (left) and HEBT SEM grids (right).

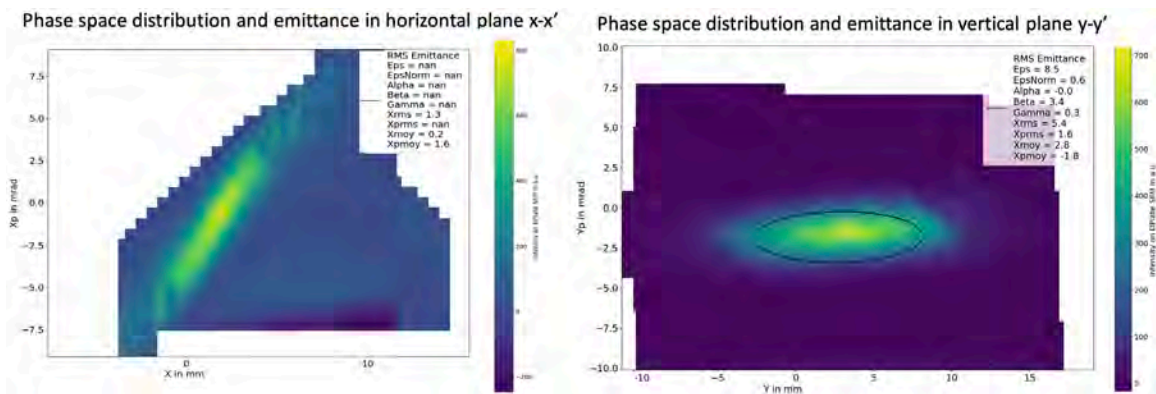


Figure 47: Examples of results of transverse emittances of deuteron beams measured with the DPlate SEM grids in horizontal plane, $x-x'$ (left), and in vertical plane, $y-y'$ (right).

In the second half of 2023, the primary focus was on LIPAc beam commissioning for Phase B+, Stage 2. Following the experimental outcomes with the 11.5 mm aperture diameter plasma electrode, it was chosen for use in this period's campaigns to achieve an output beam current of 125 mA or more at the RFQ exit. The maximum beam current attained was approximately 115 mA in low duty cycle mode, with a 90-92% transmission through the RFQ. Extensive beam

characterization campaigns were conducted, including measurements of beam profiles and emittances in the transverse plane as shown in Figure 46 and Figure 47, beam energy variations within a pulse, energy spread, and beam loss behavior in the transport line with varying RFQ vane voltage. Several attempts were made to increase the duty cycle in preparation for Phase B+ Stage 3 commissioning. However, stability control with high beam loading in the RFQ cavity still need optimization, and a maximum duty cycle of 1.5% was achieved with a 110 mA beam.

In parallel to the Phase B+, the preparation of Phases C and D is in progress with the assembly of the SRF-Linac, which consists of one cryomodule (5 cryomodules in the DONES case). In 2023, the focus was primarily on rectifying several technical issues identified during the start of the cold mass assembly in late 2022, along with addressing a newly detected leak in solenoid V06. The corrective actions undertaken were comprehensive and encompassed the following parts: Beam Position Monitor (BPM) interface on solenoid V06; bellows of solenoid V06, which was replaced, reinstating the integrity of the solenoid's vacuum environment; Cold Warm Transition sections, beam vacuum pumping manifold, and the cryogenic piping connections. Additionally, the manufacturing was initiated for a new set of 8 solenoids to replace or supplement the existing ones in case of failure. The assembly work in the Joint Research Building is expected to resume in the second quarter of 2023 and completed before its transfer into the accelerator vault in autumn 2024. After its integration into the beam line LIPAc will be then in its final configuration.

The close collaboration with the IFERC/REC project was pursued in 2023 in order to develop a safe ICT environment so that experts can have a remote access to the LIPAc data and operator interfaces. Previously, the Remote Computer Access (RCA) system, which utilized a data diode solution with a server located in Barcelona, Spain, encountered several limitations, including maintenance issues due to resource constraints and delayed responsiveness attributable to time zone differences. This system was subsequently replaced with a more effective RCA setup, featuring a server situated in Rokkasho. This new solution is accessible via the IFERC SSL VPN, to which experts can readily apply following the procedure defined in the Project CQMS. As an alternative to using the SSL VPN, experts may opt to have their fixed IP addresses registered with the IFERC firewall, thus bypassing the need for VPN access. Thanks to these tools, the EU experts were able to contribute to phase B+ beam operations by having read-only access to all Operator Interfaces (OPIs) in real-time, as though they were physically present in the LIPAc control room.

The LIPAc operational feedback has shown that the improvement of its availability, reliability, and maintainability was necessary. The enhancements include upgrading Control Systems (CS) for better integration, replacing the current RFQ's RF Power Supply (RFPS) from tetrode-based to more reliable Solid-State Power Amplifier (SSPA) technology, and improving the injector's stability, performance reproducibility and maintainability. A key feature of the CS to be enhanced is the Machine Protection System (MPS) whose final design review was passed as planned in July, giving the way to the construction phase. The upgraded injector's technical specifications, incorporating lessons from past operations and maintenance has been continued in 2023 and will be completed after the end of the phase B+. As for the procurement of the new SSPA, it has been carried out as planned over 2023 and the construction of SSPA prototype was initiated as expected in July 2023.

The Fusion Neutron Source engineering design activities and the Lithium Target Facility engineering validation activities, which restarted in 2020 in collaboration with EUROfusion in the framework of the BA phase II, have been implemented as planned in 2023 by both implementing agencies. Within the Lithium Target Facility, activities aiming to perform additional R&D in order to improve the reliability of the individual systems from the standpoints of long-term operation were continued, and the manufacturing of the Li loop facility was started both in JA (1:10 scale) and EU (1:1 scale). In parallel, the first experimental results of the erosion-corrosion of Target Assembly

and ELTL (EVEDA Lithium Test Loop) material were discussed before being used to finalize the model based on shear stress. It is completed with a modelling in the target system showing the importance of a quench tank in the design of the li loop to reduce the impurities. Furthermore, the LIPAc facility is meant to be used to validate in similar FNS environments new sensors and diagnostics, to study materials activation, to generate reliability and availability (RAMI) data, and to validate neutronics calculations. In this framework, in 2023 the first nuclear models and activation estimation calculations have been compared with the experimental results obtained thanks to LIPAc operations with ionization chambers and neutron detectors.

1.2.3 IFERC

The International Fusion Energy Research Centre (IFERC) Project is hosted in Rokkasho, Japan, and comprises three sub-projects:

- The Computational Simulation Centre (CSC) provides supercomputer resources for simulation projects in support of ITER, JT60-SA and other high priority areas. The fourth annual cycle of simulation projects was conducted in 2023 including simulations within the collaboration with ITER on uncontrolled disruptions, edge physics, materials and divertor physics.
- The Demonstration Reactor (DEMO) activities are done in collaboration with EUROfusion. In 2023, joint DEMO Design activities have been defined and progress continued in research in materials where the experimental results and simulations continued to produce data for databases.
- ITER Remote Experimentation Centre (REC) has continued the tests with ITER organisation of remote participation tools to give access to ITER data to the Parties. REC also continues an active collaboration with IFMIF/EVEDA on remote participation, where the different schemes were tested in order to evaluate how well the remote tools work.



Figure 48: Test of remote OPI application running on the CODAC Terminal in REC.

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	PA/ITA	
EU.BA.01.25100	Release of Stage 2 for Supply of the Solid State Amplifier prototype for RFQ	Q3 2023	WP23 objective	LIPAc Enhancement - RF Power System	achieved
EU.BA.01.28220	Delivery of Polychromators for JT-60SA Thomson Scattering	Q2 2023	WP23 objective	Thomson Scattering	achieved
EU.BA.01.35860	Remote participation tests REC-IFMIF	Q4 2023	WP23 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator	achieved
EU.BA.01.39680	Completion of the 1st stage of High-Heat-Flux elements for the JT-60SA Actively Cooled Divertor	Q4 2023	WP23 objective	Divertor for Operation Phase 3	not achieved due to request from stakeholders to investigate tungsten materials
EU.BA.01.39700	First set of electro cyclotron resonance heating power supply on-site acceptance test	Q4 2023	WP23 objective	ECH Power Supply	achieved
EU.BA.01.39720	Final design review of the Machine Protection System Renewal contract for the LIPAc control system	Q3 2023	WP23 objective	LIPAc Enhancement - Control System	achieved

Table 13: Broader Approach – Annual Objectives presented in the F4E Work Programme 2023.

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	PA/ITA	
EU.DO.00240	Specific contract signed for TO100 for Engineering Support for the BA/DONES Projects (2023-2025)	Q4 2023	WP23 objective	Programme Team and System Integrated Management	achieved

Table 14: Dones - Annual Objectives presented in the F4E Work Programme 2023.

1.3 Engineering Unit

1.3.1 Engineering Unit Support Activities

The F4E Engineering Unit provides specific technical expertise in engineering and fusion technologies to the F4E Project Teams delivering systems to the ITER Project and, to a more limited extent, also supports the Broader Approach Projects. Technical support is provided in the following areas:

- **CAD and technical data management group:** Providing Computer Aided Design (CAD) support to F4E’s Project Teams in setting up the CAD infrastructure for design collaboration with suppliers and ITER organization; reviewing drawings for Procurement Arrangement signature; warranting the traceability of CAD data exchanges; checking the CAD data at different design

maturity levels; performing in-house mechanical design tasks and specifying CAD task to be subcontracted. The group provides support to the Project teams in the management of technical data and documentation to ensure the technical data/documentation is produced, controlled and reviewed according the requirements specified in the IO Procurement Arrangement. During 2022 the group has extended the support on data/documentation management to the following PgTs: Cryo-Plant & FC, H&CD, In-Vessel and Diagnostics it is expected during 2023 the support will cover the remaining PgTs within ITER-D. The group provided as well strong CAD support to BIPS, Antennas, Diagnostics, Magnets and In-Vessel by performing in-house design activities, monitoring the work done by suppliers and participating in the design reviews of several components. The group has contributed to the approval of the 3D models for the PFC02, as well the group has contributed to the preparation of the 3D models and drawings for FDR and Built-to-Print of the following diagnostic systems: UP01, EP01, UP03,UP10, UP17, RNC and CTS. As well the group has participated in the preparation of the 3D models for the DPG FDR and the implementation of the post-FDR modifications of the Electrical Feed-outs. Here below some pictures illustrating the different systems.

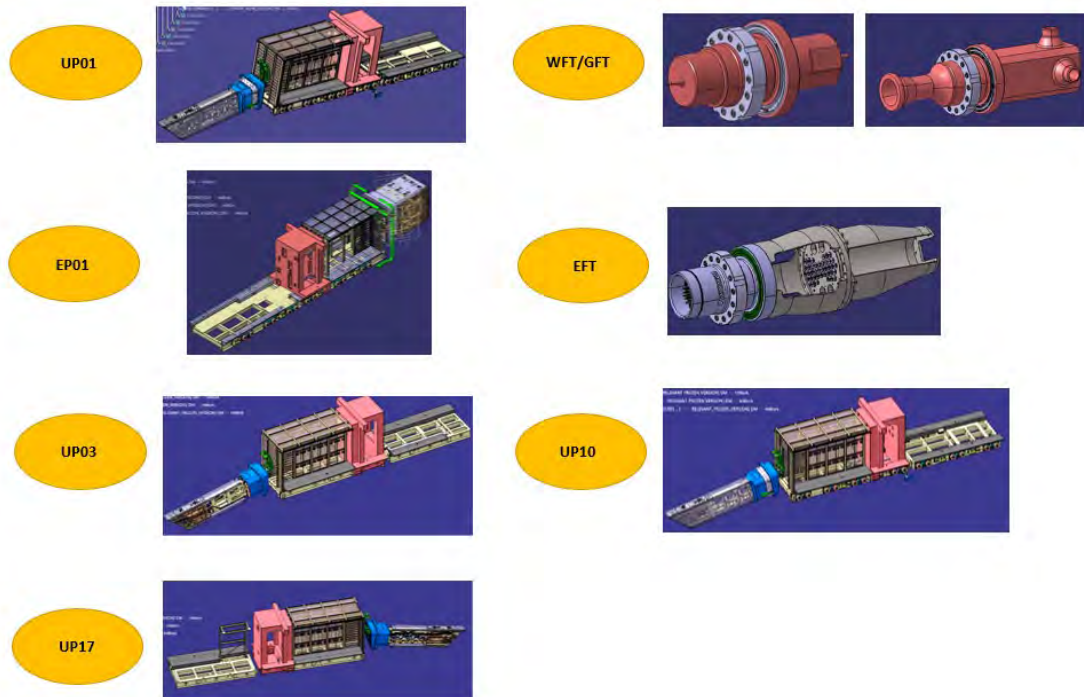


Figure 49: 3D models of the UP01, EP01,UP03, UP10, UP17, WFT/GFT and EFT.

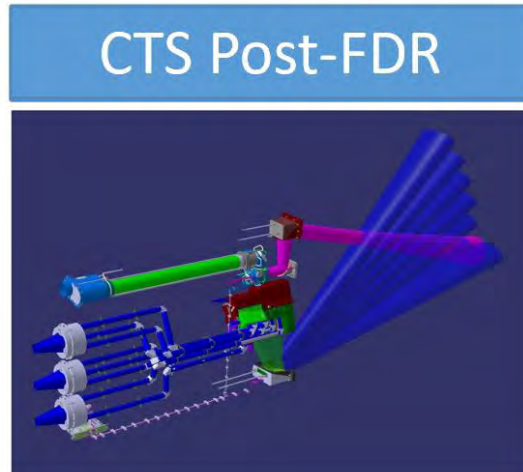


Figure 50: 3D model of the CTS diagnostic system.

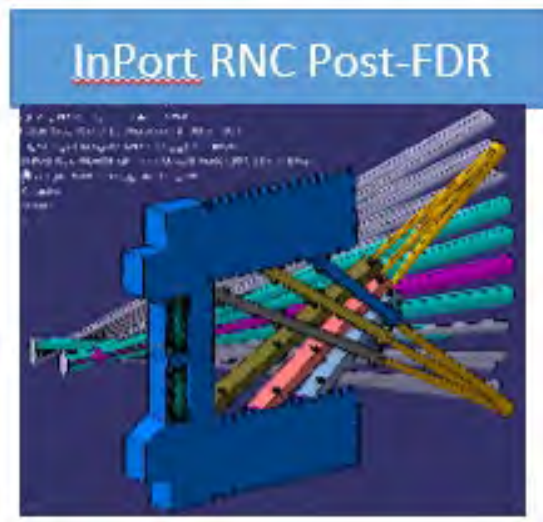


Figure 51: 3D model RCN diagnostic system.

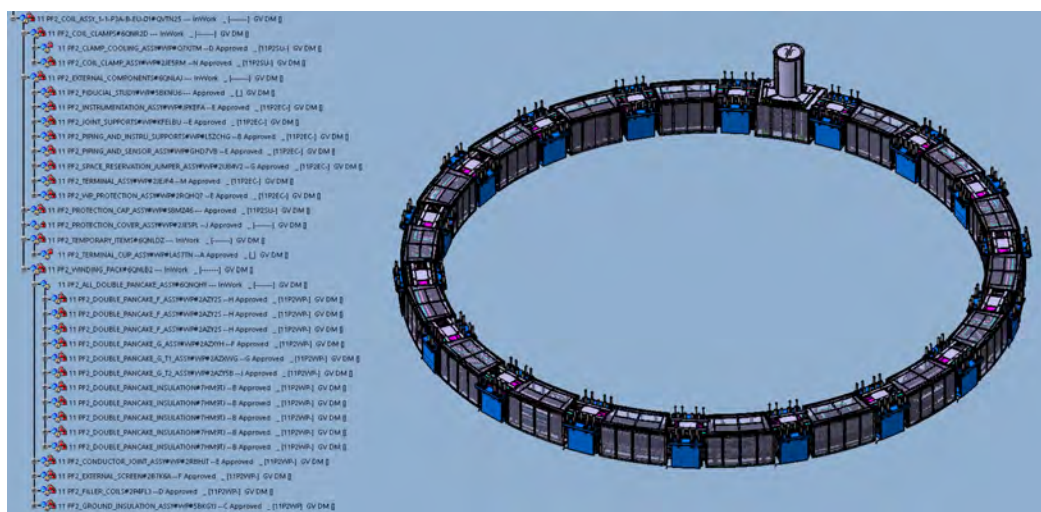


Figure 52: 3D Model approved for the PFC02.

- **Engineering Analysis**

In the area of nuclear analysis, the group contributed significantly to the decision-making process concerning the new vessel assembly strategy studied by IO. By providing crucial information on the feasibility of this technical solution, it has the potential to bring significant improvements to the vacuum vessel assembly. Additionally, we assessed the impact of W first wall implementation on nuclear responses.

In the area of electromagnetic analysis, the group gave relevant contributions in support to the design of several diagnostic systems such as the RNC, bolometers, WAVS, etc. and to the NBI magnetic shield.

Within the frame of the ITA in support of the IO magnet team, the group provided extensive analysis of the ITER superconducting magnets. We carried out feasibility studies and a wide range of analyses to support the decision made by ITER IO of testing the ITER TF and PF1 coils in a cold test facility before assembly. Moreover, in the same frame of study, different solution to Pre-Compression Rings tightening sequence were explored by carrying out a large number of mechanical simulations to define the optimal pre-loading process.

Regarding JT-60SA, thermo-hydraulic studies were performed to assess the risk associated to operating the magnet system with a defective joint in one of the TF coil feeders. Moreover, extensive electromagnetic and thermo-mechanical analysis were carried out in support of the EU procurement of the new JT60SA divertor. In preparation of its D-D operation phase, an unprecedented level of detail in nuclear responses was achieved by developing a new MCNP model of the JT-60SA tokamak.

In plasma engineering the A&C group is developing a significant activity on the 3D formulation of plasma evolutive equilibria in collaboration with European experts. The final goal of this activity is to develop an agile engineering tool capable of simulating 3D plasma equilibria during disruptions.

In the newly emerging field of Artificial Intelligence (AI) the group further developed AI models to process VV butt welds Phased Array Ultrasonic Testing data, to find welding defects and their exact location, and installation for benchmarking in the VV workshop.

- With CERN, the group has been developing a framework agreement to collaborate in areas of mutual interest. This agreement is the results of a successful voluntary study carried out by the A&C group on the electro-mechanical analysis of the target solenoids array of the International Muon Collider under study at CERN.

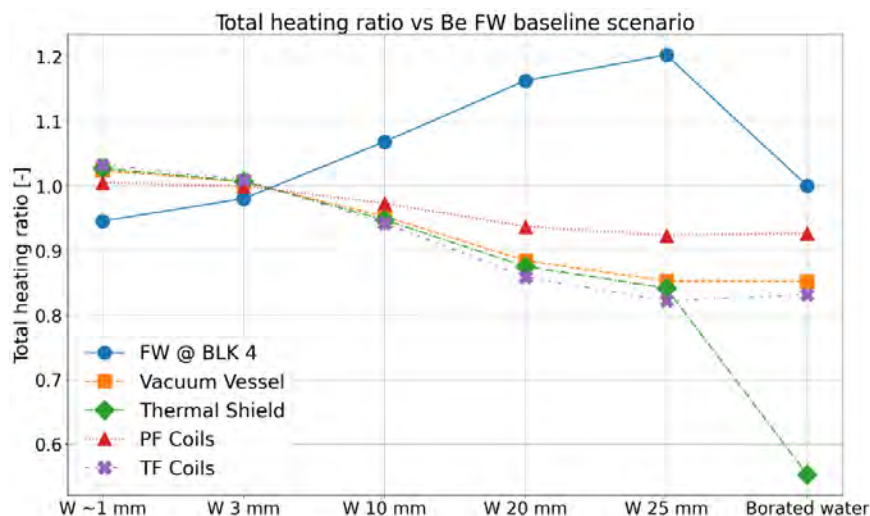


Figure 53: *Impact of W blanket implementation.*

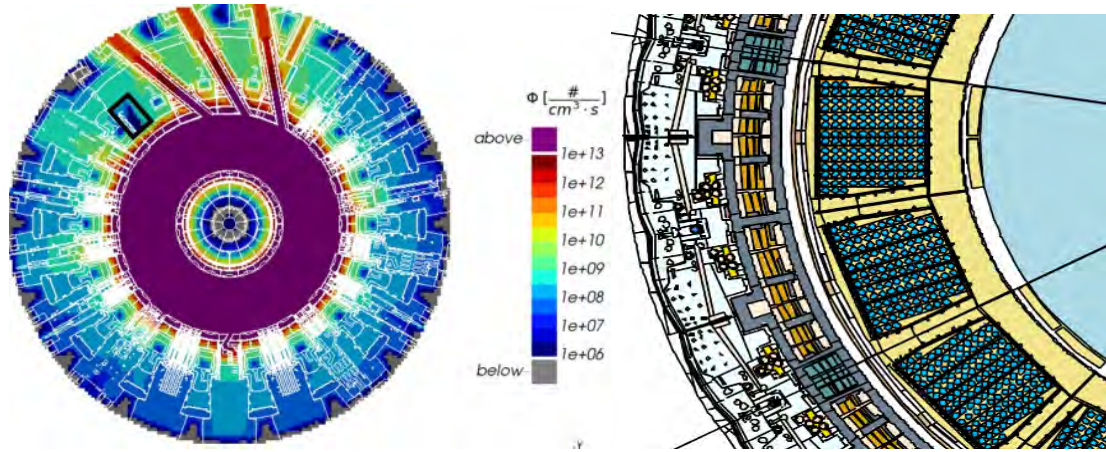


Figure 54: In-bioshield mode-0 radmaps (left) and Vacuum Vessel dry Field Joint option (right).

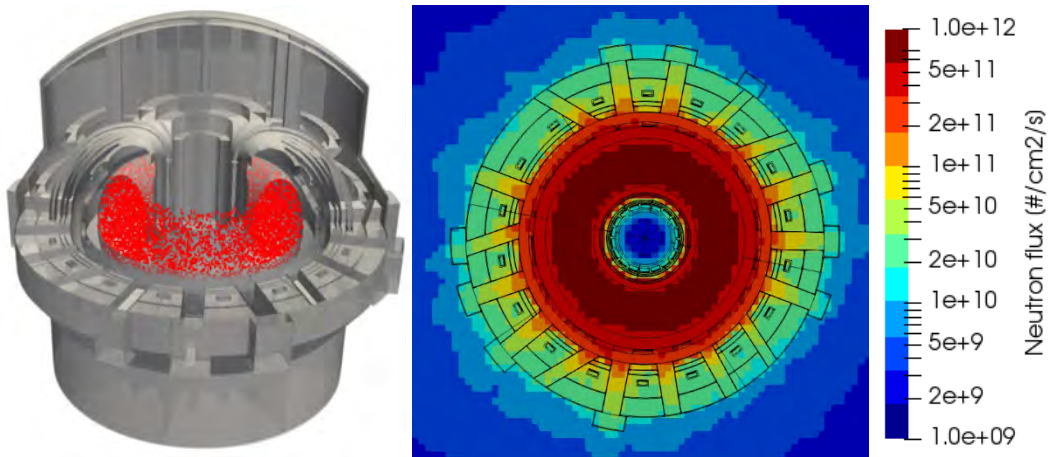


Figure 55: JT-60SA tokamak nuclear analysis: Geometry (left) and neutron flux in D-D operation (right).

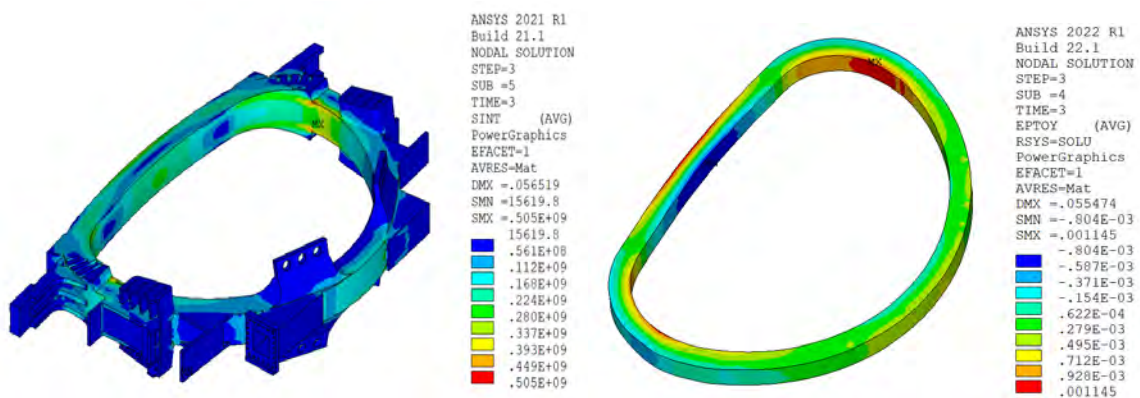


Figure 56: ITER Model Coil Test Bench: stress intensity [Pa] after energization (left) and longitudinal mechanical strain in the WP (right).

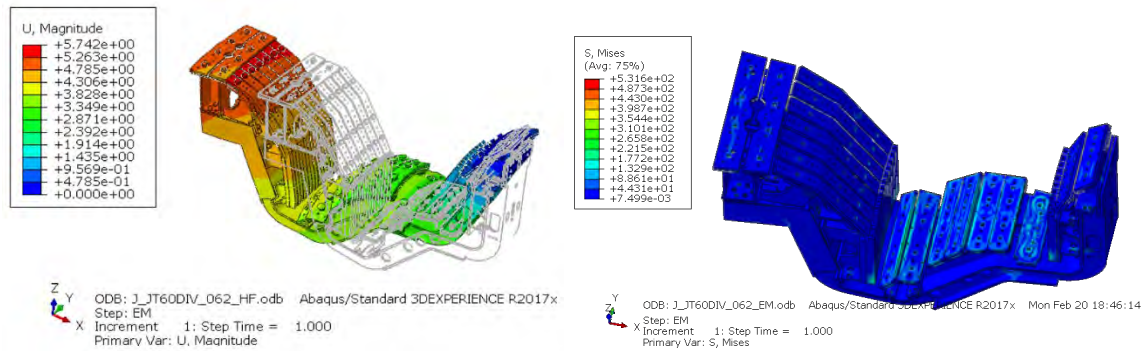


Figure 57: JT60SA EU Divertor: Displacements (left) and von Mises stresses (right).

- Design Codes and Standards:** Tracking developments in, and the application of, standard codes (e.g. ASME, RCC-MR, RCC-MRx) to the design of the key ITER mechanical components (e.g.: Vacuum Vessel, Buildings and Magnets); assuring the ACO role (Analyses & Codes) in the review of all technical specifications prepared by F4E; managing F4E code & standards repository and consultations from teams; negotiating and assuring access to AFCEN Nuclear Codes and relevant Codes & Standards via subscriptions contracts for F4E users; participating in international codes and standards organizations for the drafting and/or evolution of files.
- Reliability, Availability, Maintenance and Inspection (RAMI):** Coordinating internally with F4E Project Teams and with ITER Organization/Operations all actions concerning RAMI processes and due analyses; assuring the RAMIO role (Reliability, Availability, Maintenance and Inspection Officer) for the review of RAMI deliverables by suppliers; support F4E suppliers in the rightful application of ITER RAMI Analysis Programme (PA AD), promoting the focus on availability aspects during design to mitigate failure risks occurrence and impact, and their impact of ITER schedules operation and research plan).
- Assembly, Integration and Validation (AIV):** Coordinating internally within F4E and with the ITER Organization Construction Domain the applicable framework for assembly works at ITER Site, relevant for F4E Suppliers with assembly scope of work. Support the continuous improvement of AIV activities on site by proposing organizational, technical, management, etc. enhancements. Negotiate with IO AIV applicable documents and assess impacts of them on F4E suppliers (e.g., the General Management Specification for Executing Entities on Site); sharing and exploitation of AIV lessons learned from one system to the next and to all F4E stakeholders: support to MAC for the review of AIV files prepared by ITER IO for approval.
- Instrumentation and Control:** Leveraging the synergy of 4 framework contracts provides integrated solutions to projects; from support and consultancy to fully managed product developments. Provides necessary development and managerial/technical support resources to the development and integration of plant system instrumentation, from the conception to the final acceptance: control system modelling and design, electronics modelling and design, requirements analysis and formalization, system design and documentation, preparation of design reviews, FAT (Factory Acceptance Test) and SAT (Site Acceptance Test) manning.

Issues during the delivery of certain systems prompted for an increased synergy between F4E and IO I&C teams. The two teams jointly focus at avoiding future issues, resulted in the co-development of a PLC software framework. After a first application to the vacuum project, it has been further improved and is being used as the standard for all F4E industrial I&C projects.

Collaboration with IO continues in the software standardisation and quality area: F4E software framework for high performance/real-time software and a mechanism to coordinate the configuration of all ITER plants.

- **Metrology:**

Group Mission:

- a) Assisting programs in defining, implementing, and monitoring metrology processes for the procurement of Systems, Structures, and Components (SSC) within manufacturing contracts.
- b) Supporting ITER IO in defining and executing key Metrology and Reverse Engineering activities integrated into the assembly of the ITER machine.
- c) Ensuring programs adhere to F4E QA provisions in metrology, as outlined in the Dimensional Metrology Handbook (F4E-QA-117) F4E_D_2693FC v2.0.
- d) Assisting programs in defining and/or reviewing Geometrical Requirements specified in 2D drawings, in line with contractual and/or Procurement Arrangement requirements.
- e) Developing Metrology Standards and specialized procedures to guide manufacturing processes and facilitate Factory or Site Acceptance Tests (FAT & SAT).
- f) Supporting project teams in planning and executing Metrology Campaigns to verify product compliance with geometrical requirements.
- g) Researching and developing tailored metrology solutions, including designing and fabricating special metrology tools.
- h) Providing metrology training to F4E staff and supplier personnel to ensure competency in metrology principles and standards.
- i) Participating in supplier process and product oversight activities to uphold F4E quality assurance and control standards.
- j) Developing and implementing specialized procedures for inspection, assembly, and alignment activities guided by metrology principles.
- k) Reconstructing as-built geometries using measured data, such as scanning and reverse engineering parts to produce CAD models.
- l) Conducting clash/gap studies and assessing fit-up using virtual assembly and fitting processes based on as-built data.
- m) Inspecting parts and assemblies fabricated by domestic agencies on behalf of the ITER International Organization (IO).

Main achievements:

In 2023, significant effort went into supporting the Vacuum Vessel Project, culminating in the successful completion of dimensional inspections for the factory acceptance test for the first European VV sector in early 2024.

Concurrently, the group started to collaborate with IO to standardize metrology procedures for VV projects, forming an integrated VV metrology team and agreeing on common procedures covering different aspects like sector acceptance, sectors preparation for assembly and bevel repairs activities.

Expanding beyond the Vessel, the group established a collaboration with the IO Metrology and Reverse Engineering teams to enhance technical activities for the ITER project. This integrated approach streamlines both the management and assessment of Tokamak As-Built geometrical data for supporting the assembly of the machine, and plant As-Built geometrical data (e.g. embedded plates, metrology network, ...) for supporting the needs from the different PBS which are interfacing the buildings. This is resulting in an increase of efficiency for 2024.

The group actively supported the acceptance of the last TF coils produced in Italy.

Continuing from 2022, the group persisted in optimizing processes and procedures behind the follow-up of manufacturing contracts and implementing detailed metrology and reverse engineering strategies. Examples include efficient strategies for Cassette body projects and Mitica Beam line components, where the efficient strategy is allowing to track and have under control thousand of metrology related document per year.

Moreover, the group began supporting projects in their engineering for manufacturing phases, such as IVT, First Wall, Blanket manifolds, different diagnostic and remote handling systems. Group involvement in strategic discussions aiming at defining proper strategies for the management of geometrical requirements throughout projects was accomplished, resulting in an enhanced quality control behind the process for obtaining the manufactured product.

Efforts initiated in 2022 to support Heating & Current Drive programs continued into 2023, the agreed strategy for the managing of geometrical assembly requirements for the Neutral Beam project is now being implemented. This allowed to build a strong link between assembly needs and functional needs belonging to each component to be assembled.

In conclusion, consistent with last year's efforts, several supervision activities focused on metrology, in collaboration with quality, were undertaken. Additionally, various initiatives aimed at enhancing knowledge in metrology, geometric dimensioning and tolerancing (GD&T) were executed. These initiatives sought to share lessons learned and raise awareness within F4E about the significance of accurately defining geometrical requirements.



Figure 58: Factory Acceptance Test of VV Sector 5.



Figure 59: Factory Acceptance Test of last TF coil 18.

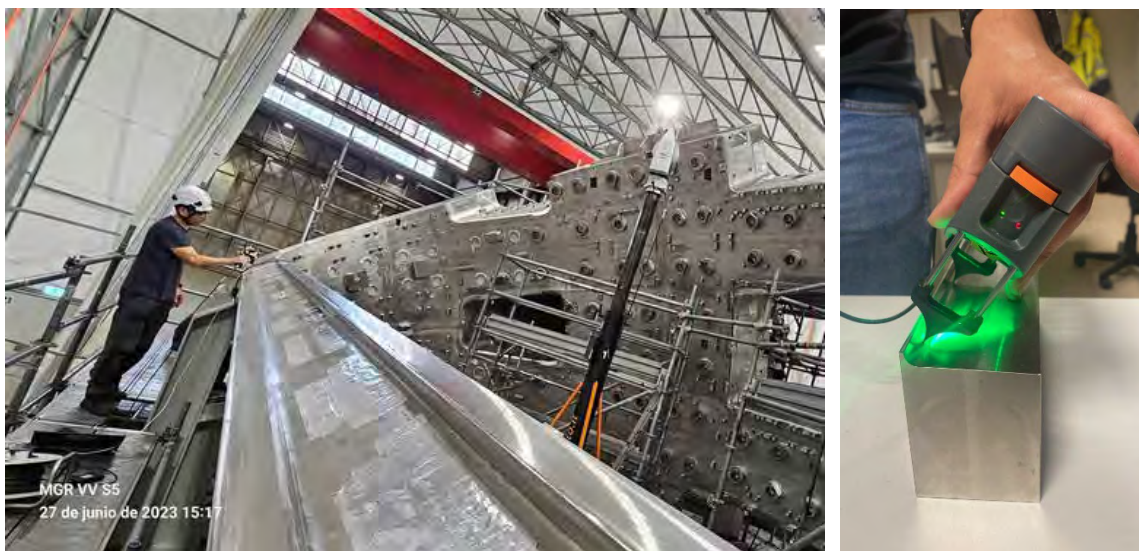


Figure 60: Geometrical Reconstruction of the VV sector bevel.

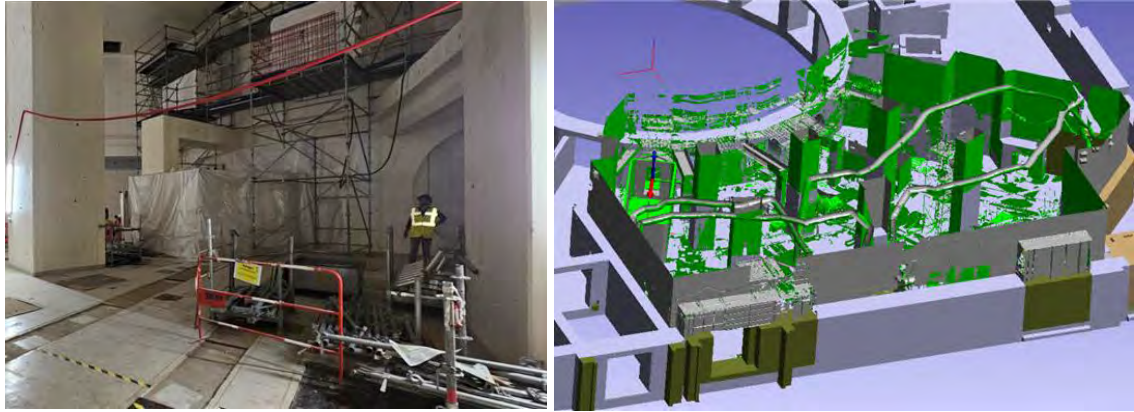


Figure 61: Scanning activity and as-built reconstruction of the NB cell.

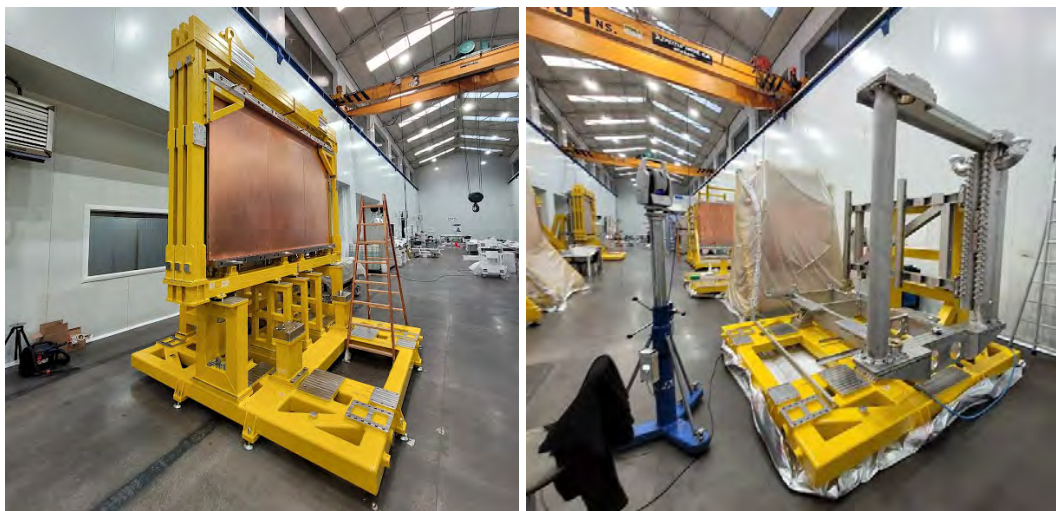


Figure 62: Dimensional Inspection activities guiding the assembly of Mitica Beam Line components.

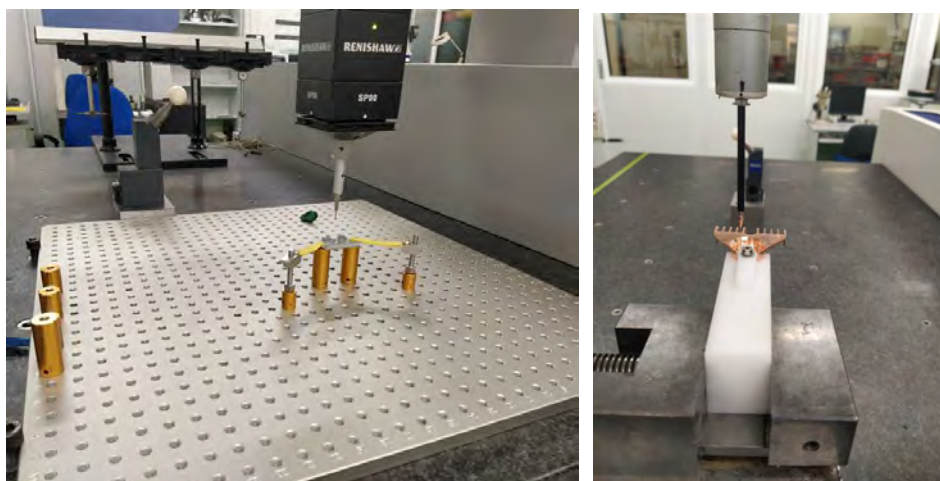


Figure 63: CMM based Dimensional Inspection of In vessel Support Components – Diagnostic Programme.

- **Materials and Manufacturing Technologies and Processes:**

The main objective of the group is to provide service contribution provided by engineers to ITER D Programmes' activities in the scope of materials and fabrication related technologies. The main service provided is allocation of staff to specific projects, but also case-based spot support. The services cover a wide scope starting from developing new ideas via R&D, elaborating technical specifications, support qualification testing and prototyping, to commissioning and manufacturing follow-up, on-site support and trainings. The key to achieve success of the group is linked to utilizing the best transversal knowhow at F4E with additional support from framework contracts. The versatile services embrace a variety of joining technologies such as welding, electron beam welding and hot isostatic pressing followed by a number of non-destructive testing activities, like UT, RT, Tomography, He leak testing and so on. Activities are also carried out to assess materials properties after exposure to ITER operational conditions (neutrons, cyclic heat flux, mechanical loads and coolant) and health & safety.

The additional support in form of Materials testing, qualification of joints, mock-ups, manufacturing processes and NDT are provided via Framework contracts, presently with F4E-OFC-1082 by ISQ, Portugal.

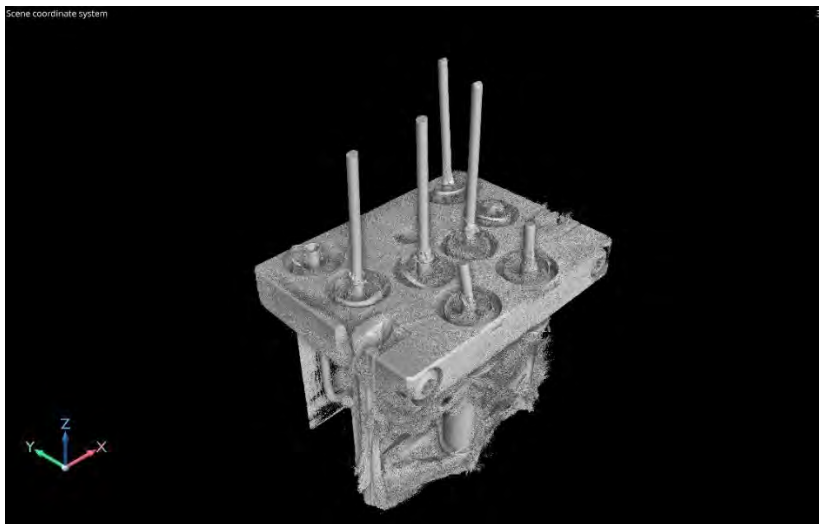


Figure 64: vibration testing inspections on the final prototypes of the Diagnostic Pressure Gauges sensor heads.

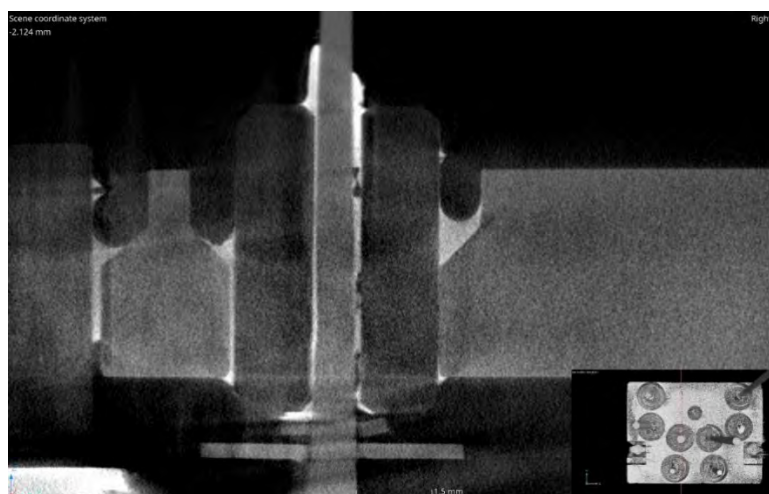


Figure 65: x-ray tomography inspections on the final prototypes of the Diagnostic Pressure Gauges.

Figure 62 and Figure 63 In 2023 a task order with ISQ Portugal was completed to perform vibration testing and x-ray tomography inspections on the final prototypes of the Diagnostic Pressure Gauges sensor heads. One of the key components of the sensor heads are Molybdenum pins that are electrically isolated and brazed to the structure. It was not possible to validate the mechanical strength purely by analysis and therefore a non-destructive x-ray tomography inspection was performed on the pins to verify the integrity of the joints. A vibration test campaign was also performed to confirm that the sensors withstand the expected vibrations and shocks.

- **System Design and Mechanical Engineering** To provide effective technical support in system design and mechanical engineering topics, all group Members are “embedded” in the Project Teams and their contribution will be part of the Programs reporting.

Two colleagues of PF Team moved within In-Vessel Program and the last two PF's members will move on TBM Program and IFMIF/DONEs during the year.

The work of the Upper Launcher System is progressing well and with good collaboration with IO colleagues. As well, good progress on other projects dealing with Power lines, NB System and Mitica, under the umbrella of the H&CD Program.

Colleagues deployed in the In Vessel Program have been busy with the challenges coming from the change of the Beryllium to Tungsten. Work has progressed also on what relates respectively: Diagnostic, Cryo Plant and TBM where collaboration with KODA is taking shape.

After the deep dive done on RH Program, colleagues have taken care to implement the new strategy. To note the good progress on the In Vessel Viewing System.

A special mention about the 3D Printing initiative. Here some numbers of the parts have been printed so far:

- 28 are ITER components mockups;
- 4 are related to the printer improvements;
- 4 are ‘office’ related, meaning stuff to improve office environment;

I welcome the interest of the staff about 3D printing. Next step will be to propose “real” parts to be manufactured utilizing such powerful process.

- **Engineering Support FWC:** Execution of the Engineering Support Contract signed in 2022 continued during 2023, with a total of 120 ESPs providing service to nearly all technical Units and Programmes in F4E.



Figure 66: Picture taken during a Progress Meeting of Framework Contract F4E-OMF-1159-01-01 with ATG Europe, organised in Cadarache (15/11/2023)

Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	End of 2023
EU.ES.02.95280	FWC Signed for Prov. of Eng. Sup. in the area of Electromagnetic and Electromechanical	Q3 2023	WP23 objective	Achieved
EU.ES.02.95640	FWC OMF-TBD for Provision of Support in the Area of Nuclear	Q4 2023	WP23 objective	Moved to 2024
EU.TR.132520	Task Order Signed for TO 18 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2023	WP23 objective	Achieved
EU.TR.132700	Task Order Signed for TO 19 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2023	WP23 objective	Achieved
EU.PE.6103150	Contract Signed for Plasma Engineering Studies Part I – Modelling for load specifications	Q4 2023	WP23 objective	Moved to 2024

Table 15: Engineering Unit Activities – Annual Objectives presented in the F4E Work Programme 2023.

Please note that this table contains the FWC for Nuclear Analysis that we moved to 2024 and also the scope of Plasma Engineering received in June and did not achieve.

This table is based on the initial WP2023 version, in the WP2023 Amendment 2 we moved the ones not achieved to 2024 and they do not appear in the list anymore.

1.3.2 Transportation

This activity reflects the management, on F4E's side, of technical aspects of the joint procurement with the ITER Organization for the transportation of ITER components to the site in Cadarache. The scope includes the transportation of large ITER components from all ITER Domestic Agencies, from the point of entry (the port of Marseille at Fos or Marseille's Marignane Airport) to the ITER site as well as F4E technical support on transportation and logistics activities.

The main cost driver is transportation of Highly Exceptional Loads that follow the dedicated ITER itinerary. During 2023, this activity mainly covered transportation of non-EU loads and EU-loads between Fos and Cadarache (EU-leg): The three Cold boxes (from the Indian Domestic Agency) arrived successfully at the ITER site in November 2023 and were transported as CHEL which resulted in cost saving impacts for F4E. The last TF coils from both Japan (3 components) and Europe (2 components) were transported to the site. From the US, 1 Central Solenoid magnet module arrived and from China 1 TCC Feeder with a width in the order of 9 meters. Despite the difficult context with Russia, the PF 1 was delivered successfully in February 2023.

To transport the Highly Exceptional Loads in a safe manner, support from the French Gendarmerie is provided. Two Task Orders ordering for these services were timely signed in Q2 and Q4 2023.

In 2023, the focus was put on the optimization of the staging area again, this has led to a cost saving.

During 2023, loads were delivered successfully and on time; risks were mitigated; and opportunities used productively, thus resulting in significant cost-savings.

Loading of PF1 into vessel KEIT



Figure 67: RF-DA PF 1 during the Loading in Russia harbour and the Unloading in Fos sur mer harbour.



Figure 68: Direct delivery from vessel to 16x4 self propelled trailer.

Part II (a): Management

2.1 Major Developments

2023 has been a transitional year for the organisation, characterised by several changes at senior management level including the appointment of a new Director in May 2023. Considering the main developments for the organisation, some highlights include:

1. Governance:

- The Governing Board (GB) reappointed Carlos Alejaldre as Chair for a second term and extended the mandates of the GB Vice-Chairs. New members were appointed to various committees, including the Administration and Management Committee, Audit Committee, and Procurement and Contracts Committee.
- Aside from supervision of F4E's core activities for the delivery of in-kind contributions to ITER, the committees paid attention to integration with the ITER Organization, F4E's industrial policy, F4E's organisation and held a strategic meeting in preparation for a renewed F4E vision which was endorsed.

2. Budget and Financial Management:

- The 2023 budget was adjusted through amendments, resulting in final appropriations of EUR 807.0 million in commitments and EUR 631.5 million in payments.
- In terms of the management of the final operational budget, the implementation has been 73% in commitments and 95% in payments. For administrative one it was 100% in commitments and 91.3% in payments.

3. Procurement:

- During 2023, 15 operational procedures were launched, 20 operational procurement procedures were awarded (including multiple lots) and 60 operational contracts were signed for a total value of around EUR 634 million. Two grants were launched and signed with a value of EUR 3 million.
- For what concerns administrative expenditure, 11 administrative procurement procedures were launched, and 10 contracts were signed (direct and framework), for a total value of EUR 12 million. In 2023 F4E initiated its sustainability programme in administrative procurement.

4. Health and Safety:

- Significant improvements were made in the Health and Safety (H&S) Management System, including the appointment of a new H&S Coordinator and revisions to the H&S Breakdown Structure. There were also updates to Occupational Risk Assessments and the introduction of mental health services, including an on-site psychologist.
- A second psychosocial survey was conducted to assess the impact of measures implemented since 2021. The results showed stability, with most psychosocial factors in acceptable condition, although two factors remained of concern.

- Various training sessions were organized to improve H&S knowledge, including mental health first aid and emergency response. These initiatives aimed to enhance overall safety and well-being within F4E.

5. Nuclear Safety:

- The Nuclear Safety Unit continued to enhance safety awareness, reaching IAEA Level 2 in nuclear safety culture. The unit performed 11 nuclear safety inspections and launched controls in response to fraudulent activities detected in the supply chain.

6. Internal Audit and Controls:

- The Internal Audit Capability (IAC) performed three main assurance engagements on the Validation of User Access Rights in ABAC and in DACC, the audit of Administrative Procurement and Contract Management, and the audit of the Magnets Unit – Lessons learned (in progress at end-2023).
- IAC's opinion on the overall internal control (IC) system is that, while acknowledging a comprehensive setup of IC standards, the existence of numerous procedures and significant number of assessments of its compliance with applicable regulations, the organisation's ICs are "analysed and managed", meaning that further opportunities remain for control optimisation and integration within the functional area.
- The European Court of Auditors (ECA) provided reasonable assurance for the implementation of F4E's budget. The ECA's 2022 report included an emphasis of matter on the cost and schedule of the ITER projects, as well as observations on senior management stability and contract management weaknesses, with several recommendations for improvement.
- An assessment of the F4E's Internal Control System was conducted in line with the EC framework. All the components are operating together in an integrated manner. As a combination of deficiencies exists, it can be concluded that the system is partially effective. However, it has not been deemed necessary to include a reservation in the Director's Declaration of Assurance.

7. People and Culture Management:

- F4E saw changes in staff composition, with 8 new recruitment and several contract changes. The total headcount by end 2023 was 231 Temporary Agents, 157 Contract Agenda and 41 Officials.
- In its commitment to having a diverse and inclusive workforce, F4E continued implementing its Strategy on Diversity, Equal Opportunities and Non-Discrimination. This was coupled with information campaigns celebrating Women's Day, Women in Science Day, Disability Day, Pride Day and Men's Day.
- In terms of gender balance, F4E has the goal that 35% of Senior Management (SM) and 45% of Middle Management (MM) positions should be filled by women by the end of 2025. Moving from 2022 to 2023, the proportion of SM increased from 25% to 33% and for MM from 19% to 23%.

Learning and development were prioritized, with a high participation rate in training activities. A new 360° feedback exercise for managers and leadership development initiatives was carried out.

The implementation of multiannual and annual objectives set in SPD 2022-2026 is shown below.

Three multiannual objectives:

1/GB-IC milestones: These objectives are obsolete due to the current re-baseline exercise performed by the ITER Organization. In the context of the integration between F4E and IO, F4E intends to comment the revised baseline that IO has to present in the course of 2024.

2/Overall Costs:

AREA	OBJECTIVE	PERFORMANCE
Overall Costs	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.	Failed Budget/Cost=0.99

Table 16: Overall Costs.

Due to the budget cuts in the early years of current Multiannual Financial Framework (MFF) the cost estimation is higher than the Budget and the KPI therefore displays a value below the target of 1.

Annual objectives:

AREA	Objective	Target	Performance
Annual M-SPI	Reach a minimum SPI value by end of the year	SPI≥0.8	0.67
Quality	Reduce percentage of long aging NCRs compared to total number of open NCRs.	KPI≤0.22	0.39
Annual budget	Implement a defined percentage of Commitment Appropriations by end of the year	95% implementation of commitment	73%
Annual payment	Implement a defined percentage of Payment Appropriations by end of the year	95% implementation of payment	95%
Human Resources	Vacancy rate to be less than a defined value by end of the year	Vacancy rate to be less than 4%	6.7%

Table 17: Annual Objectives.

Comments to table above:

- Annual M-SPI: F4E achieved 67% of the 318 milestones of the 2023 reference representing a 10 point improvement on 2022 Annual M-SPI results. 72% of the causes of delay were

due to internal F4E triggers (F4E or F4E suppliers), while the remaining triggers were mostly due to IO.

- Quality: In 2023, the NCR KPI measuring the percentage of long aging NCRs versus the number of open NCRs was 39%. This result is mainly affected by the NCRs coming from the following two programmes:
 - BIPS: at the end of 2023, BIPS has 172 open NCRs and 73 were long-aging (over one year). All these NCRs are known and followed up according to their own target date of closure, which is over 1 yearlong due to:
 - technical resolution reasons (for the majority of these NCRs),
 - or affecting other systems (PBS or CAD). These NCRs shall get the affected PBS users or CAR Unit feedback to proceed. The users are not in position to provide feedback yet due to the maturity of their system.

During 2023, BIPS team has managed to monitored the long aging NCR statuts (older than one year) as mentioned above and to close a high quantity of other NCRs (not long aging). This is why BIPS NCR KPI did not improved this year.

 - Vacuum Vessel: at the end of 2023, VV has 189 open NCRs and 108 were long aging (over one year). The quantity of long aging NCRs in VV is due to the lead time to proceed with welding defects repair actions and their necessary time to assess the repair effectiveness requesting specific qualified personnel (more specifically in Phased Array Ultrasonic Tests) and the quantity of steps to validate NCRs stages.
- Annual budget & Annual payment: The execution rate of F4E's final available budget for 2023 is 73% in commitments and 95% in payments. The main factors impacting F4E's ability to execute it, were largely outside of its control.

This under-execution in commitments largely stemmed from the 2016 ITER baseline, which is currently under revision by the IO. Compounding these challenges were the necessary repairs for ITER's in-kind components and the interim cessation of assembly activities. These factors collectively contributed to a slowdown in the overall project. The revised ITER baseline, projected to be established in 2024, is likely to bring forth substantial alterations in the project's scope and timeline. An F4E-EURATOM task force has been established to assess the situation and devise strategies for managing the unused appropriations that have consequently increased, as well as to mitigate the risks of their further increases.

The main consequences from the current situation of the ITER project on the 2023 implementation of F4E commitment budget are the following:

- EUR 48.4 million decrease in the 2024 Cash Contribution to IO proposed in May 2023,
- EUR 120.9 million decrease in In-Vessel programme mainly due to on-going discussions on changing the First Wall (FW) armor material from Beryllium to Tungsten,
- Delays in contract signatures or reduction achieved during the successful clarification and negotiation phase concerning the programmes for Heating

- and Current Drive (EUR 64.8 million), Site and Building (EUR 69.5 million) and Broader Approach (EUR 21.9 million),
 - F4E has been working on establishing a more realistic project schedule based on the available technical and commercial resources. This exercise also influenced the commitment execution in 2023,
 - EUR 50.3 million carry overs from 2022 linked to revenue cashed from IO that were transferred to the chapters for contributions from EURATOM (EUR 49.1 million) and ITER Host State - IHS (EUR 1.2 million).
- Human Resources: Following the staff reinforcement in 2023, F4E had to take a series of decisions on the correct allocation of vacant posts which delayed the overall recruitment process. On top of that, the turnover in 2023 increased significantly compared to the historical trend. Finally, 80% of the total posts vacant in 2023 were filled in by internal staff which has neutral impact on the vacancy rate.

2.2 Safety

2.2.1 Health and Safety

The F4E's **H&S Management System** is under continuous improvement according to the Plan-Do-Check-Act cycle. In this sense, the following key developments and improvements and work have been conducted during 2023.

From the H&S organisational side, a new **F4E H&S Coordinator** (Laurent Schmeider) was appointed, and a deep revision of the **F4E H&S Breakdown Structure** was conducted in order to clarify roles, responsibilities, delegations and appointments. In this regard, a new **F4E H&S Breakdown Structure** was defined during 2023 with the relevant appointments, delegations and role descriptions.

Some operational processes were reviewed in order to improve the efficiency of the F4E H&S Management System mainly on the following topics: **Radio Protection**, **Beryllium Exposure**, **Work Authorisations** and **Coordination Between F4E and Other Undertakings**. New procedures and instructions were drafted and existing ones modified.

Regarding the **Occupational Risk Assessments**, they were continuously reviewed and updated because of:

- Newcomers
- Transfers of staff within Departments, Units or Groups
- Change of activities performed by Staff
- New risks Identified
- Change of locations by Staff
- Retirement

Throughout 2023, 61 Risks Assessments were reviewed and updated, identifying new work conditions, rating the risks and proposing preventive measures, mainly focused on trainings and PPE (Personal Protective Equipment).

Following the **Psychosocial Risk Assessment** conducted in 2021, F4E conducted its second psychosocial survey in order to benchmark with the results of 2021 and assess the impact of the measures implemented after the 2021 survey. The same methodology (FPsico from *Instituto Nacional de Seguridad y Salud en el Trabajo* in Spain) was applied in both surveys. Results showed a relatively stable situation, similar to 2021, where 7 from the 9 Psychosocial factors are in acceptable situation, while two factors remain in negative situation.

Regarding the F4E Medical Service, it is to be noted that specific **Medical Protocols** were approved according to the occupational risks faced by staff members. This was pivotal step in the **Health Surveillance** process in F4E, allowing a better monitoring and care of the F4E staff. In this regard, the Medical Service can consult the risks faced by staff members in the performance of their duties and conduct the medical check-up in accordance with those risks. The medical protocols indicate whether certain risks entail additional health checks and examinations other than the standard ones. During 2023, **72,1%** of staff members conducted their annual check-up via the F4E Medical Service, a doctor of their choice or through the JSIS Health Screening Programme.

Mental Health of staff has been one of the priorities in F4E for the last two years. In addition to the measures already in place, in September 2023 F4E started the implementation of the services of an on-site psychologist, available twice per week at the Barcelona premises. The aim of this service is to provide first-hand assistance to staff members in distress, coping with personal and professional stressors, enhancing resilience and promoting a healthier work-life balance.

During this period, a total of 33 staff members used this service on one-to-one sessions.

In November, the on-site psychologist conducted a F4E talk to all staff on “*Coping with Grief and Loss*” due to the loss of two colleagues. Additionally, she conducted a specific psychosocial intervention in the Metrology Group on this same topic.

H&S Trainings were organised to increase awareness and improve the H&S knowledge of staff, reducing the risks in activities like Electrical Works, ATEX, Exposure to Ionising Radiations, Works at Height or the more general Office Works. Also, **Emergency (Fire-Pickets and First-Aid) trainings** were conducted to keep the emergency teams updated. From the Mental-Health standpoint, two **Mental Health First Aid training** sessions were provided to a total of 30 staff members.

The **H&S Committee**, internal participation body for regular and periodic consultations to F4E Staff on H&S-related matters, met a total of four times during 2023.

Finally, the Framework Contract for the provision of Medical Advice Services was due to end on 8 September 2023. However, services were extended for a period of six months (until 8 March 2024) as the preparations of the new Call for Tenders continued. This new Call for Tenders includes all the services foreseen in the previous Framework Contract with Gabinete SME (i.e. Medical Advisor, Nurse, On-site Psychologist, Occupational Health Risk Prevention Advisor) as well as additional services such as the performance of Psychosocial Risk Assessments and First Aid Trainings.

2.2.2 Nuclear Safety

F4E, as a major contributor and the principal external "intervener" to the ITER Project, has the responsibility to design and build safe systems, buildings and equipment and, overall, to give to nuclear safety the attention it deserves by maintaining a high level of nuclear safety culture across the whole organization and its supply chain.

In this perspective, since 2021, the Nuclear Safety Unit has launched a series of actions to enhance the nuclear safety awareness across F4E. After NS weeks organized in 2021 and 2022, and reaching IAEA Level 2 in NS culture in 2022, this year was dedicated to an internal contest (NSQA Trivia Championship) to reinforce NS and QA culture awareness in F4E staff. With new issues in 2023, the nuclear safety bulletin launched in 2021 continues to bring to F4E staff the latest news and developments about nuclear safety. According to F4E Policy, training of F4E staff (PIA performers and other staff) and external collaborators also continued in 2023. At the end of year 2023, 100% of F4E staff working on ITER project had been trained (non-PIA performers) and qualified (PIA performers). In total more than 400 staff have been trained since this program was launched.

F4E's Nuclear Safety Unit main mission consists of supervising, implementing and ensuring the propagation of nuclear safety requirements into the supply chain and checking the final compliance of built and manufactured systems, structures and components to these requirements. It provides the relevant expertise and assistance to F4E's programs, and executes various controls during design and manufacturing phases. In 2023, the team performed 11 nuclear safety inspections. Inspection results show that efforts have to be maintained on supplier's compliance with nuclear safety requirements.

Following a case of fraudulent activities detected by IO in March 2023 (fake welder certificates), F4E NS and QA units launched a series of controls in the supply chain and delivered many trainings on the subject of Counterfeit, Fraudulent and Suspect Items (CFSI).

The French Nuclear Safety Authority (ASN) also controls F4E activities: it conducted five inspections on the ITER site. None of them showed any major issue related to the F4E work. IO also requested support from Domestic Agencies to reply to an ASN letter sent to all french nuclear operators regarding the control of the supply chain. Exchanges with the ASN also took place on the subject of the new and more graded approach safety and licensing approach in relation to the new baseline and ITER research program. ASN welcomed such an approach and invited IO to submit a technical file. F4E was involved in the task force which prepared this new approach.

2.3 Governing Board

The governance framework of F4E provides strategic orientation to the Joint Undertaking and ensures the supervision of its activities through the Governing Board (GB) – representing the Member States and Euratom – and a system of specialised Committees providing advice and preparing the decisions of the Board.



The summaries of the meetings of the GB are made public and accessible via F4E's website: <https://fusionforenergy.europa.eu/governance-committees/governing-board/>

In its supervisory role, the GB closely monitored the financial, operational and technical challenges facing ITER and other fusion projects under F4E's responsibility. During a period of organisational change marked by the appointment of the new Director in February 2023, F4E's governance was instrumental in ensuring continuity and provided guidance to the management on strategic matters, including fostering closer integration with the ITER Organisation (IO), the optimisation of the organisational framework, and shaping F4E's vision to align with the dynamic global advancements in fusion energy.

The main discussions and decisions taken by the Board in 2023 are outlined as follows:

Governance

Following a decision taken in December 2022, the GB held its first annual strategic meeting in July 2023 to discuss F4E's role for a European strategy towards fusion electricity.

In December 2023, the GB reappointed Carlos Alejalde as its Chair for a second term of two years. Moreover, the GB exceptionally extended the mandates of the GB Vice-Chairs, and consequently their mandates as Administration and Management Committee (AMC) Chair and Technical Advisory Panel (TAP) Chair until April 2024.

In relation to the AMC, the Board appointed Anne Montagnon (Euratom) and Salah Dib (France) as new members of the AMC.

Concerning the Audit Committee (AC), the GB appointed Tea Enting Beijering as Chair of the AC and Friedrich Bräuer, Ciaran Spillane, Andras Siegler and Mark Crisp as members of the AC.

Regarding the Procurement and Contracts Committee (PCC), the GB appointed Ulrich Breuer as the PCC Chair, reappointed Yannick Paris and Arnout Tromp as PCC members and appointed Laura Litzenburger, Claire Regus and Lisa Bellini-Devictor as PCC members.

F4E's vision, industrial policy and improved organisation

At its meeting of December 2023, the GB endorsed F4E's Vision, the Corporate Culture Policy and acknowledged the first proposal for F4E's reorganisation, requesting a full organisational chart, including the detailed allocating of units, to be presented for approval by the GB in April 2024.

The GB also endorsed the report from the Industrial Policy Working Group, a stepping stone towards the development of F4E's vision. This report proposed recommendations aimed at fostering the long-term participation and competitiveness of European industry in key fusion technologies, as well as lowering barriers to Small and Medium Enterprises (SMEs) and deepening the collaboration with European Fusion Laboratories (EFLs). The GB requested F4E to implement the Working Group recommendations, with a particular focus on the development of a Technology Development Programme to address key technological challenges towards the commercialisation of fusion energy.

F4E-IO Integration

One of the first priorities set by the Board for the mandate of the new Director was to ensure a stronger integration between F4E and IO, for which a comprehensive F4E-IO Integration Plan has been developed by F4E and approved by the Board in December 2023. A tripartite group, representing F4E, the European Commission and IO, provides the required coordination among the parties towards the achievement of this objective.

Project Planning and Budget

In 2023 the GB carefully monitored the project's key performance metrics and endorsed a strategy for the improvement of schedule performance.

The GB and its subsidiary bodies paid close attention to actions taken by F4E to address the high level of unused appropriations as a result of the ongoing re-baseline of the ITER project. A joint Euratom- F4E task force was established to assess Euratom's and France's contributions to F4E's budget and informed the budgetary decisions taken by the GB in 2023.

In December 2023, the GB adopted F4E's 2024 Budget, the Single Programming Document (SPD) 2024-2028 and delegated the approval of the draft SPD 2025-2029 to the Bureau in early 2024. The Governing Board also adopted three amendments to the 2023 Budget and two amendments to the 2023 Work Programme.

Annual Accounts and Audit matters

The GB approved the 2022 Annual Accounts of F4E and approved in December the 2023 Internal Audit Capability (IAC) Annual Plan.

DONES

In July 2023, the Board approved the early implementation measures for DONES as foreseen by the First Amendment to 2023 Work Programme. Additionally, the GB asked F4E to develop, in coordination with DG ENER, a legal framework to define F4E's contribution to IFMIF-DONES and the allocation of responsibilities for the DONES project, to be presented at the July 2024 GB meeting.

2.4 Budgetary and Financial Management

This section gives information on the establishment of 2023 Budget, its evolution, and final implementation. More details are available in the 2023 Annual Accounts and in the 2023 Budgetary and Financial Management Report.

2.4.1 Establishment of the 2023 Budget

F4E 2023 Budget was originally adopted by F4E's Governing Board (GB) in December 2022, amounting to EUR 1 018.6 million in commitment appropriations and EUR 820.6 million in payment appropriations. The budget was modified by F4E GB via three amendments in May¹, July and December 2023. The final available appropriations for 2023, including the carry-over from the previous year are EUR 807.0 million in commitment appropriations and EUR 631.5 million in payment appropriations.

Detailed information can be checked in Section II. 7.1. of the Annex IX – Annual Accounts

2.4.2 Budget 2023 in Revenue (Payments): Contributions

The distribution of the 2023 revenue ensures a fair balance between contributors to F4E budget, in line with their proportional participation during the overall period of ITER construction².

The final available appropriations, including the carry-over from the previous year amount to EUR 631.5 million in payment appropriations.

¹ Amendment 1 was approved via written procedure on 16 May 2023

² Detailed figures are presented in Annex III (b) Evolution of the Statement of Expenditure in Payments



Figure 69: Revenue breakdown in Payment appropriations.

2.4.3 Budget 2023: Implementation

Commitments	73% execution of the final available budget	Final Budget: 806.98	Execution: 586.18	EUR million
	58% compared to the original budget	Original Budget: 1 018.65	Execution: 586.18	EUR million
	76% without additional revenue from ITER IO	Standard Budget: 757.09	Execution: 571.73	EUR million
	99% in individual commitments	Execution: 586.18	Ind. Commit.: 578.68	EUR million
Payments	95% execution of the final available budget	Final Budget: 631.54	Execution: 597.71	EUR million
	73% compared to the original budget	Original Budget: 820.58	Execution: 597.71	EUR million
	98% without additional revenue from ITER IO	Standard Budget: 587.45	Execution: 578.42	EUR million

Figure 70: Budget Implementation in Commitments and Payments

2.4.3.1 Implementation of the 2023 Administrative Expenditure

The final implementation of administrative expenditure in payments was lower than the total committed amount in the original budget due to the nature of administrative contracts, with commitments proceeded in 2023 and subsequent payments executed in the next years. In accordance with Article 26 of F4E Financial Regulation, the Director approved in 2023 a series of transfers³ resulting in a decrease of EUR 254 165 in the administrative expenditure.

³ Detailed figures are presented in Annex III (c) Transfers adopted by F4E Director

The execution of the final administrative budget was respectively 100.0 % of commitment and 91.3 % in payment appropriations.

Also, see Annex II. Statistics on Financial Management where the administrative budget is disclosed. The final appropriations for Title 1 and 2 were MEUR 10.5M in commitments.

2.4.3.2 Implementation of the 2023 Operational Commitments

The Statement of Expenditure⁴ for operational commitments was modified by F4E's Governing Board during 2023 via three amendments with the purpose to align the operational budget in commitment appropriations with the evolution of the Statement of Revenue and with the successive amendments to the 2023 Work Programme. The final execution of the budget was 73%, of which 99% in individual commitments. One on-going procurement procedure has been globally committed, amounting to EUR 7.5 million in total.

2.4.3.3 Implementation of the 2023 Operational Payments

Title 3 – Operational expenditure⁵ in payments was also amended in 2023 by F4E Governing Board, to align the operational payments with the changes in the Statement of Revenue. In accordance with Article 26 of F4E Financial Regulation, the F4E Director adopted a series of transfers within the Title 3 to cover the operational needs and to ensure the highest implementation rate.

Title 4 – Earmarked expenditure, the payments linked to the ITER Host State contribution (France), have been allocated entirely to the domain of ITER construction. The appropriations received from ITER Organization covered tasks implemented by F4E on ITER Organization's request.

The final implementation rate for operational payments, under Title 3 and Title 4, was 95% by the end of 2023. The non-execution is mainly due to assigned revenue extraordinary collected from ITER IO that will be spent in the subsequent years. The amounts not spent on Title 3 were cancelled and those on Title 4 were automatically carried over to the budget 2024.

2.4.4 Impact of the 2023 Budget in Commitment

2.4.4.1 Main Commitments

The main operational commitments for the 2023 budget representing EUR 321.4 million or 63% of the executed operational budget (EUR 513.0 million) were:

⁴ Detailed figures are presented in Annex III (a) Evolution of Expenditure in commitments

⁵ Detailed figures are presented in Annex III (b) Evolution of Expenditure in payments

- EUR 153.8 million for the in-cash contribution to ITER Organization
- EUR 44.8 million for the Architect Engineer Service contract (Buildings)
- EUR 35.6 million for the Vessels for the Heating Neutral Beam Vessel 1 & 2
- EUR 23.9 million for the Blanket Cooling Manifold System
- EUR 20.0 million for the Electron Cyclotron Radio Frequency Gyrotrons
- EUR 12.9 million for an amendment of the vacuum vessel contract
- EUR 10.9 million for the in-cash contribution to the JT-60 SA
- EUR 10.5 million for the TB12 [Design and build of buildings 34, 37, 71, 75 and plant bridges](#)
- EUR 8.9 million for the TB18 Civil Works for B14 Tritium Building

The balance to the executed budget for Title 3 and 4 consisted of 653 commitments for smaller contracts, amounting in total to EUR 191.6 million.

2.4.4.2 Actions Carried Forward to 2024

The F4E obligations amounted to EUR 1 194.9 million at the closure of the 2023 budget, that corresponds to the total outstanding amount on open budgetary commitments, as detailed below:

2023 budget Heading	(EUR)				
	from previous years (1)	from 2023 budget (2)	Open Commitments Total (3)=(1)+(2)	To be de-committed (4)	Net Total (5)=(3)-(4)
TITLE 1 - STAFF EXPENDITURE	0.00	1 992 053.98	1 992 053.98	0.00	1 992 053.98
TITLE 2 - INFRASTRUCTURE AND OPERATING EXPENDITURE	30 076.31	3 687 082.03	3 717 158.34	15 545.43	3 701 612.91
Total TITLE 1 & 2	30 076.31	5 679 136.01	5 709 212.32	15 545.43	5 693 666.89
B31 -ITER CONSTRUCTION INCLUDING SITE PREPARATION	569 673 615.15	267 502 173.77	837 175 788.92	0.00	837 175 788.92
B32 - TECHNOLOGY FOR ITER AND DEMO	3 422 703.45	3 460 176.27	6 882 879.72	0.00	6 882 879.72
B33 - TECHNOLOGY FOR BROADER APPROACH	15 667 239.19	16 154 526.70	31 821 765.89	0.00	31 821 765.89
B35 - EXTERNAL SUPPORT ACTIVITIES	15 984 656.19	14 974 757.93	30 959 414.12	0.00	30 959 414.12
B36 - OTHER OPERATIONAL EXPENDITURE	0.00	3 159 842.04	3 159 842.04	0.00	3 159 842.04
Total TITLE 3	604 748 213.98	305 251 476.71	909 999 690.69	0.00	909 999 690.69
B41 - ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	183 706 872.59	76 771 263.44	260 478 136.03	0.00	260 478 136.03
B42 - ACTIVITIES LINKED TO ITER ORGANIZATION	11 179 764.81	7 146 738.46	18 326 503.27	0.00	18 326 503.27
B43 - OTHER EARMARKED EXPENDITURE	388 991.47	0.00	388 991.47	0.00	388 991.47
Total TITLE 4	195 275 628.87	83 918 001.90	279 193 630.77	0.00	279 193 630.77
Total TITLE 3 & 4	800 023 842.85	389 169 478.61	1 189 193 321.46	0.00	1 189 193 321.46
Total	800 053 919.16	394 848 614.62	1 194 902 533.78	15 545.43	1 194 886 988.35

Table 18: Open budgetary commitments at the closure of F4E's 2023 Budget

The open commitments have decreased by EUR 79 million in 2023 compared to the end of 2022.

Notes:

- **Title 1 and 2:** Administrative expenditure, carried forward from 2022 and not paid, were cancelled. The commitments that are carried over should be consumed at the latest by 31 December of the following year;
- **Title 3 and 4:** The open operational commitments are carried over to the following year with no limitation in time, to be paid according to the advancement of the contracts.
- EUR 8.0 million out of the EUR 8.1 million committed globally in 2022 were implemented in 2023 as the on-going procurement procedures have been concluded.
- F4E made use of global commitment in 2023 for a total amount of EUR 7.5 million, for implementation in individual commitments in 2024. They are included in the total of the F4E obligations/open commitments at the end of 2023.

2.4.4.3 Action Extending for More than One Financial Year

The entire operational budget of F4E consists of differentiated appropriations. About 1448 open commitments positions from the 2023 budget, amounting to EUR 1.182 million, cover actions extending for more than one financial year.

2.4.5 Interest Charged by Suppliers through Late Payments

During 2023, F4E has processed 3661 payment transactions (excluding salaries). F4E paid EUR 28 555.55 EUR of late interests in 2023.

2.4.6 Procurement Procedures in 2023

In line with the focus that F4E has on the achievement of ITER First Plasma, procurement procedures continued in 2023 to further progress, with focus on the production of the systems and components part of the EU in-kind obligation.

During 2023, 15 operational procedures were launched, 20 operational procurement procedures were awarded (including multiple lots) and 60 operational contracts were signed (direct and framework), for a total value of around 634 million euro, covering strategic areas such as Buildings and Site Management (TB 21) and In Vessel (Divertor and Blanket Manifolds).

Of the 20 operational procedures awarded, 7 were awarded following a Competitive Procedure with Negotiation amounting to 85 million euro, 7 following an Open Procedure representing 67 million euro, 6 following a Negotiated Procedure for a total awarded value of 16 million euro. No Restricted Procedures nor Competitive Dialogue procedures have been concluded by F4E during 2023.

For what concerns administrative expenditure, 11 administrative procurement procedures were launched, and 10 contracts were signed (direct and framework), for a total value of 12 million euro.

In 2023 two grants were launched and signed with a value of 3 million eur in total.

In the same period F4E initiated its sustainability programme in administrative procurement, consolidated its Key Account Management approach and organised joint workshops with ITER IO (International Organization) colleagues. Additionally, during 2023 F4E started to analyse the integration of some projects with the ITER Organization.

2.4.6.1 Type of Operational Procurement Procedures

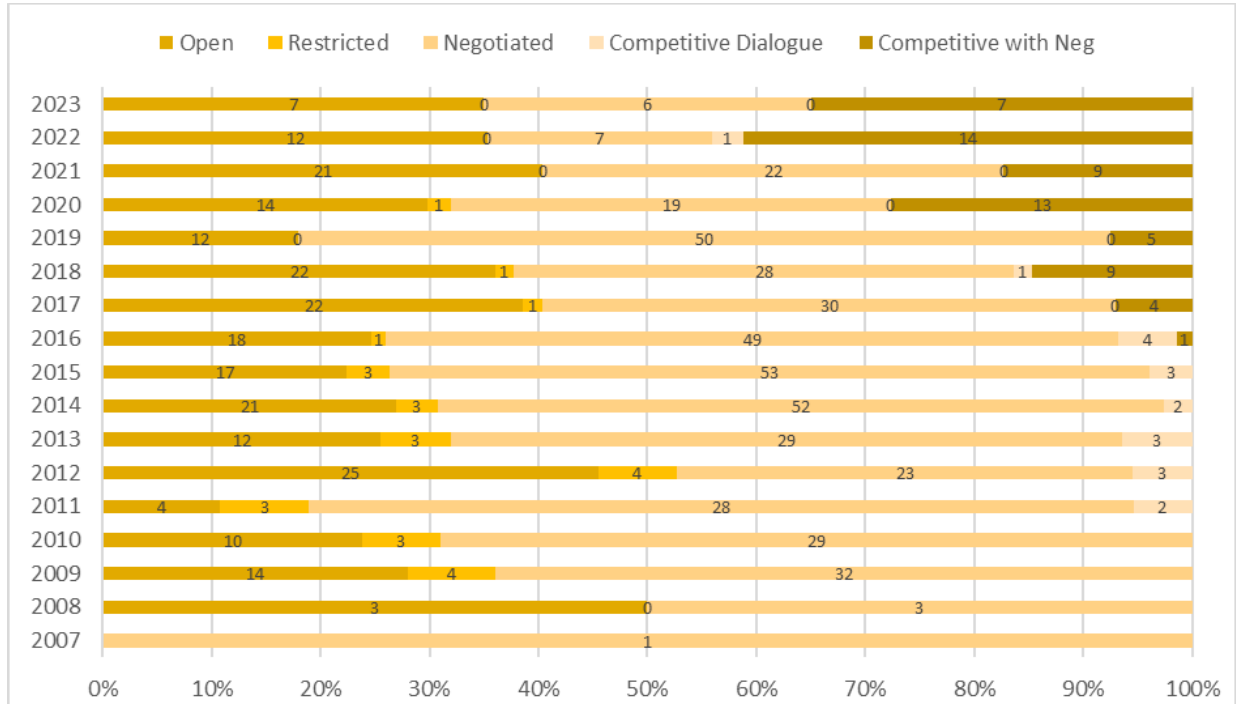


Figure 71: Number of operational procedures (LOT level) awarded by type of procurement procedure.

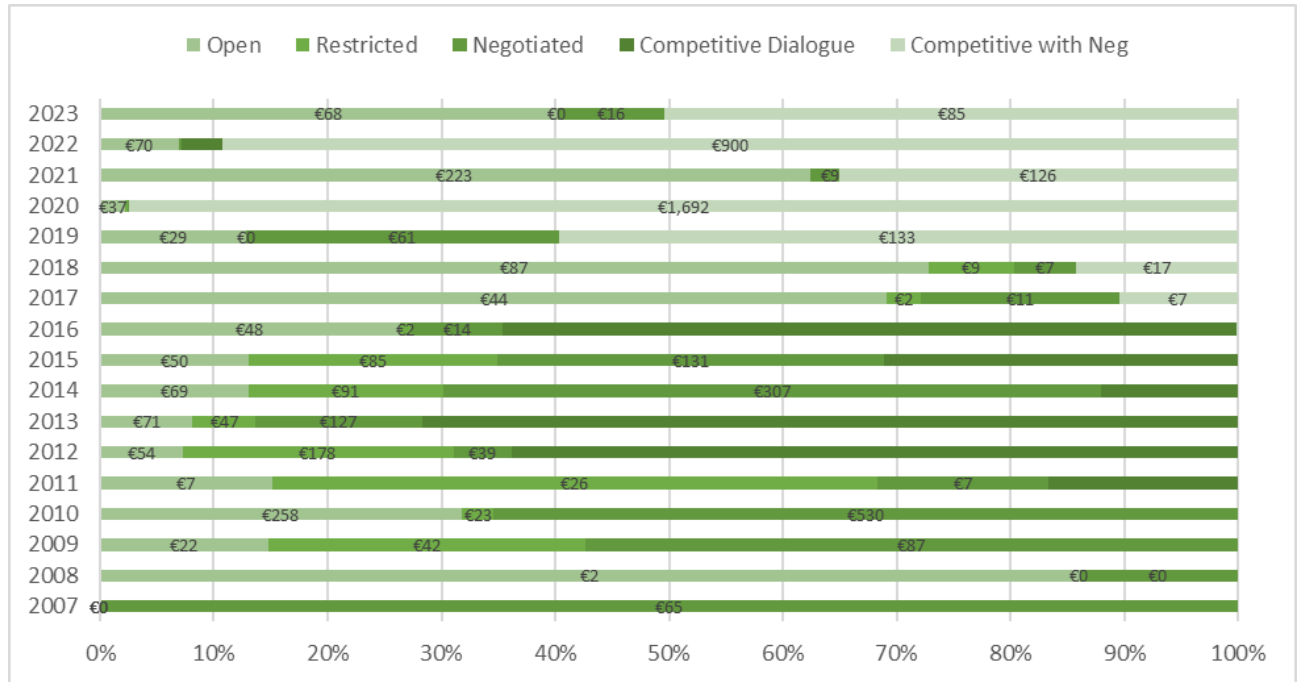


Figure 72: Value of operational procedures (LOT level) awarded by procurement procedure (€ million).

2.4.7 Budget Evolution for 2008-2023

The graphs below show the evolution of available F4E budgets in commitment and payment appropriations and their final execution since F4E financial autonomy in 2008.

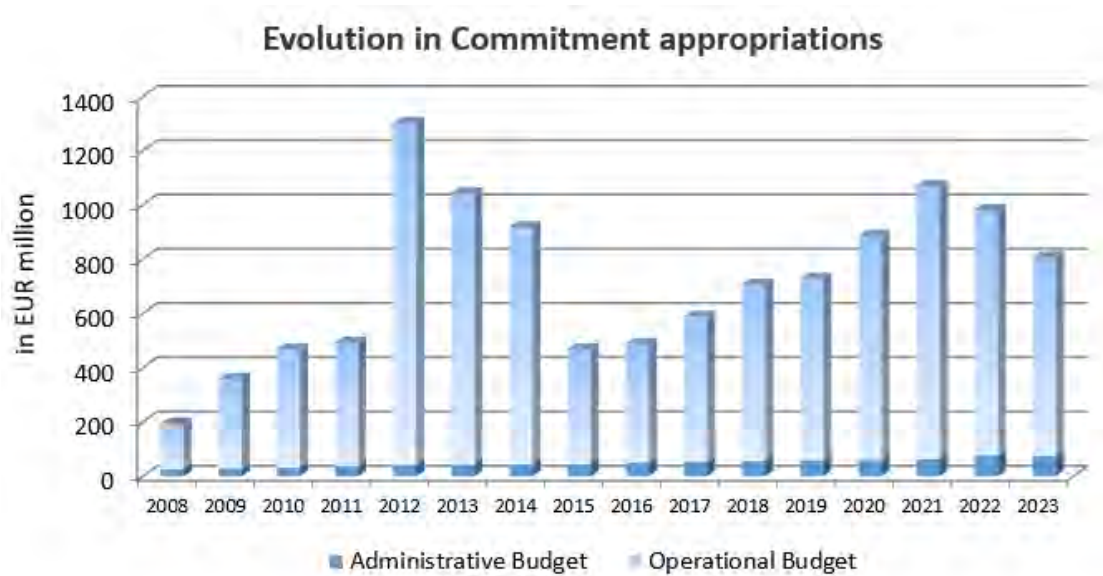


Figure 73: Evolution in commitment appropriations for years 2008 – 2023.

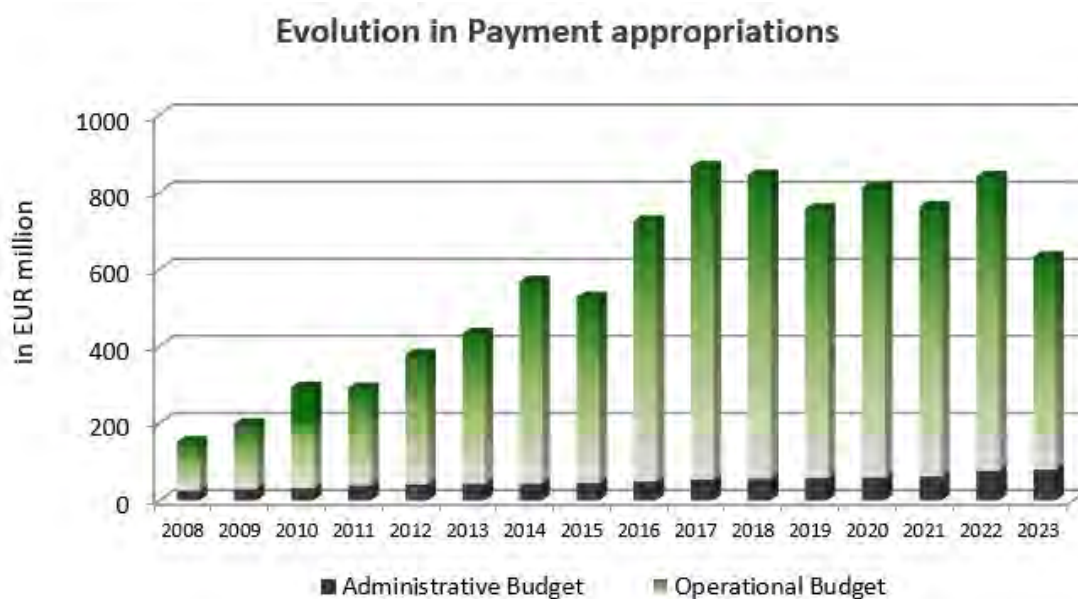


Figure 74: Evolution in payment appropriations for years 2008 – 2023.

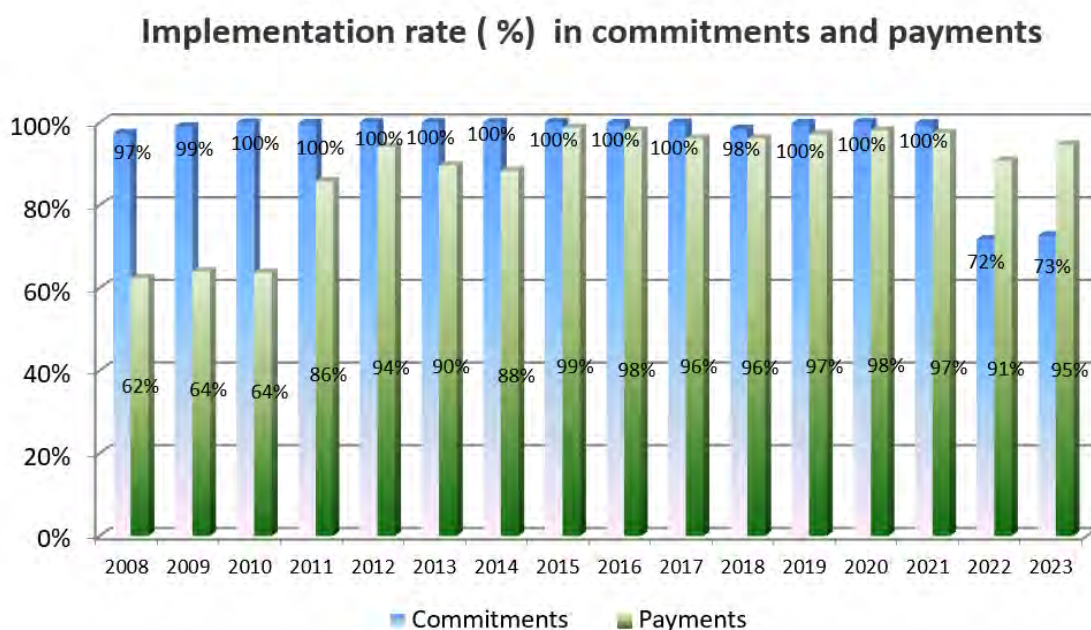


Figure 75: Evolution of budget implementation rate for years 2008 – 2023.

This is further explained in the Annual Accounts - Section II. 7.1. F4E follows a more conservative global commitment policy compared to previous years.

2.4.8 Budget Implementation Tasks Entrusted to Other Services and Entities

There are no F4E activities delegated to other European Institutions or Bodies.

2.4.9 Cost of Controls

F4E has continued to apply the methodology endorsed by the Improvement Steering Committee in 2018, due to the continuity of the same organisational structure. In 2022 a consultation exercise with the Heads of Department confirmed the implementation of this approach and the estimated time spent in control activities by each unit was updated to reflect some minor changes.

All F4E activities remain grouped into four main categories: (1) Operational Control, (2) Internal Control, (3) Governance and (4) Support. Based on the guidelines of the Commission a detailed list of activities has been included for each of the four main categories. Of these four categories, the two first ones, (1) Operational Control and (2) Internal Control, are considered as being control activities.

The result of this calculation is that out of the 429 staff members at F4E, 83% (354 FTEs) spend their time in control activities (Operational Control and Internal Control). The cost of these FTEs dedicated to control activities was calculated by using a pro rata of the number of staff by category (Administrator, Assistant, Contractual Agent FG-IV and the rest of contractual agents) and using the yearly costs per category as indicated by the Commission. The result of this calculation is that the 354 FTEs dedicated to control activities at F4E have an estimated cost of 43,998,677 EUR.

In the last previous years, 2021 and 2022, the costs of controls have represented 9% of the yearly commitments. In 2023, the total cost of control has increased 7% from 2022 (from 66 022 340 EUR to 70 685 482). Most of this increase is explained by the increase in the cost of control FTEs (F4E staff members carrying out control activities) due to the increase in the associated salary costs (as F4E staff numbers have remained stable).

These costs are considered as proportionate to the activities F4E carries out, as F4E is mostly managing procurement procedures (and in particular contract execution with suppliers) in order to procure the different components that Europe is delivering as in-kind contribution to the ITER project. The methodology used by F4E to calculate its costs of controls is aligned with the EC guidance. Amongst others, the following activities are classified as control ones:

- Programme and project management: Operational Management and monitoring of project cycle (excluding financial circuits); managing project deliverables and all the legal, technical and administrative work involved in managing contract, etc.;
- Financial Management related to the operational part: procurement (from technical specifications to contract), contract management, financial planning, and management of financial transaction (financial circuits, OIA, OVA, RAO), etc.;
- Quality Audit, Quality Control, Inspection, etc.;
- Reporting and Monitoring of Project activities.

In addition to this, F4E made an estimation of the cost of External Service Providers (ESPs) supporting F4E in internal and operational control activities. ESPs are personnel (individuals) of the contractor providing the service contracted by F4E with a service provider (ESP Contractor) to support F4E in carrying out its core technical tasks:

- in F4E premises; and/or
- remotely having access to F4E Internal Information System.

This notably means that ESPs have similar access to working tools/environment unique for F4E staff (premises and/or Internal Information System). The amount of these services for 2023 is 22,579,514 EUR.

Finally, F4E also calculated the payments made on contracts for audit services, inspection and adjudicators, which resulted in a total of 4,107,291 EUR.

As a conclusion and based on the principles provided by the Commission for the calculation of the Cost of Control activities, the value for F4E in 2023 is 70,685,482 EUR representing 9% of the 2023 executed budget in commitment appropriations (807M EUR) and 11% of the 2023 executed budget in payment appropriations (632M EUR).

2.5 Delegation and sub-delegation

Delegations and sub-delegations in 2023 followed the organisational structure, with a clear segregation between administrative and operational project management, empowering staff members within their areas of responsibility. During 2023, there were 108 Authorising officers in F4E (12 Authorising Officers by Delegation, 32 Authorising Officers by Sub-Delegation and 64 Authorising Officers by Sub-Delegation level 2). Each staff member who received a (sub)-delegation for the implementation of the 2023 budget provided his/her individual 'Declaration of Assurance' for the budgetary area for which they were responsible. None of these contained a reservation nor raised any issue of significance that may have an impact on the F4E Director's Declaration of Assurance.

Notwithstanding this, the F4E Director's Declaration of Assurance draws the attention of the reader to the most significant operational risks that F4E is addressing at corporate level, that may lead to cost increases and schedule delays. These are inherent to the magnitude and complexity of the ITER in-kind delivery project, in particular in the areas of the buildings and vacuum vessel.

2.6 People & Culture (HR) Management

2.6.1 Major HR Developments

Staff evolution, selections, and recruitment

As of 31 December 2023, the total occupied staff posts at F4E amounted to 429, included 41 Officials, 231 Temporary Agents⁶ and 157 Contract Agents. In addition, F4E relied on the support of 9 interim staff (in FTE) and 5 Seconded National Experts. The staff evolution at the end of the year can be seen in the following table:

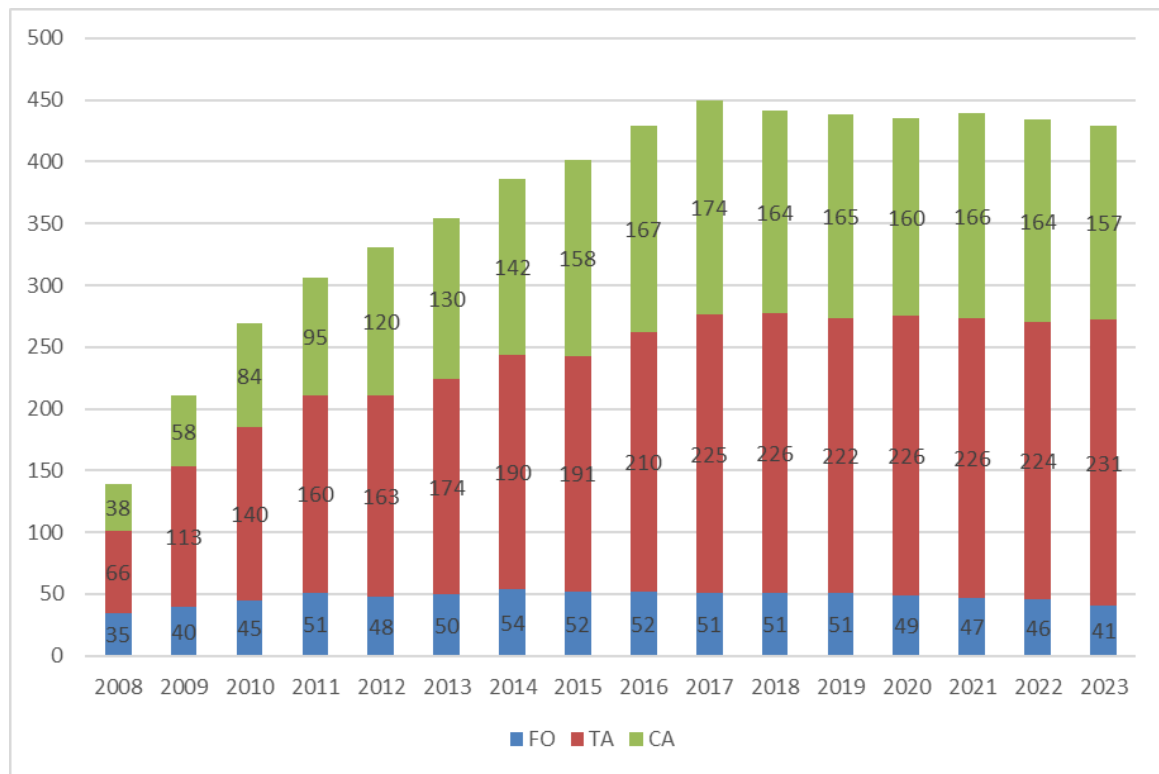


Figure 76: Staff evolution from 2008 to 2023 where FO stands for Officials, TA for Temporary Agents and CA for Contract Agents.

⁶ Out of which, 8 correspond to job offers for newcomers (5 AD and 3 AST)

In addition to the aforementioned statutory staff complement, F4E relied on 361 External Service Providers (ESP)⁷. These resources are covered mostly by operational. Given that the service contracts through which these ESPs are availed are administered in a decentralised manner by different F4E services and given the number ESP, various measures are under development to complement those already put in place to mitigate the risks inherent to F4Es reliance on this external workforce. The main purpose of this on-going effort is to better ensure administrative and contractual alignment, cost containment, accuracy and timely reporting, knowledge retention, conflict of interests as well as preclude the risk of assimilation.

Since then, we have developed a policy, we have addressed several risks (lost of technical knowledge, assimilation) and we have discussed the model of framework contract that would be needed for the future.

During 2023, 15 vacancy notices were published externally for 11 Temporary Agents and 4 Contract Agents. Overall, 10 selection procedures were completed in 2023, of which 2 were published in 2022 and the remaining 8 published in 2023.

A total of 8 newcomers (4 Temporary Agents, 2 Contract Agents and 2 Seconded National Expert) took up duties in 2023. In addition, 18 staff members (7 Temporary Agents and 11 Contract Agents) underwent a contract change. The following table shows those figures distributed by type of contract, category and department:

Department	FO	TA	CA	SNE
Administration	-	1 AST	-	-
Broader Approach Programme & Delivery	-	-	-	2 SNE
Commercial	-	-	1 FGIII	-
Director	-	1 AD	-	-
ITER Programme	-	-	-	-
ITER Delivery	-	2 AD	1 FGIV	-
Project Management	-	-	-	-

Table 19: Recruitments distributed by type of contract, category and department.

Changes to the Establishment Plan during 2023

The vacancy rate at the end of 2023 totalled 6.7% (31/460 i.e. , vacant TA + CA posts / total TA + CA posts. Given that the CA category of staff is covered by a budget envelope rather than slots on the establishment plan, the VR for just the TA's and FO's amounted to 10.8% i.e. (33 out of 305 establishment plan posts). The 33 vacant establishment plan posts at the end of 2023 should be understood in light of the 19 departures during the year out of which 11 were retirements. In addition, 2023 saw a reinforcement of the establishment plan with 10 new TA posts and 15 CA to TA conversions. Whilst the new TA posts were all filled during the year only 2 of the conversions

⁷ In addition to the 361 ESP, there are also 110 resources from Architect Engineer and Support to the Owner contracts, based in Cadarache, who have access to ITER IO tools and to F4E offices but provide operational services (deliverable-based)

were finalised. This exasperated the vacancy rate as the remaining 13 TA posts were left vacant. The reason for not having implemented more conversions relates to the time it took to agree on the allocation in a manner agreeable to the social dialogue.

The 2023 Establishment Plan benefitted from two types of reinforcements: first with the addition of 10 new TA AD posts and second through the conversion of 15 CA posts into 15 TA posts (9 AD and 6 AST). In keeping with its staff policy, three FO AD posts were converted into three TA AD posts following the departure of one official in 2021 and two officials in 2022.

For the purpose of implementing the certification procedure, 2 AD slots in the Establishment Plan were reserved for the conversion of 2 FO AST into AD posts. In 2023, it was confirmed that only one of the posts was needed. Therefore, 1 FO AD post was converted back into 1 FO AST post,

Finally, 5 FGII posts were converted into FGIII, in line with the Legislative Financial Statement proposal for the 2021-2027 period.

Learning & Development

In the ambit of L&D, F4E continued to leverage online and digital resources to provide staff flexibility of access. A total of 91% of F4E staff members enrolled to at least one learning activity during the period. The rate of satisfaction remained high with 89% of F4E staff rating courses as either excellent or good.

Several corporate actions to support F4E's transformation, including the revamp of the leadership development offer were launched during 2023. Another important L&D action included the design of a new 360° feedback exercise for managers. In the same vein, staff were given access to curated learning paths in the area of leadership development and individual coaching opportunities. Furthermore and thanks to targeted learning initiatives, F4E supported the creation of a pool of internal facilitators to help uphold, in particular, a culture of inclusion and respect.

Appraisal and Promotions

The 2023 Performance Dialogue exercise was launched on 16/01/2023 and the 2023 Promotion exercise was launched on 13/05/2023 resulting in a timely completion of the Performance Dialogue Exercise.

The 2023 Promotion exercise benefitted from a clear strategy that allowed for alignment and consistency at all levels. Information sessions were organized to ensure transparency and extensive involvement of the Staff Committee all contributed to the timely implementation of the exercise. The number of appeals fell from 24 to 9 which was the lowest on record. This fall confirms that the approach and strategy are paying off and to be maintained.

Traineeship Programme

The 2022/23 Traineeship Programme started in October/November 2022 and welcomed 31 trainees. These were distributed among the departments as follows:

- Administration Department: 8 trainees
- Commercial Department: 6 trainees
- ITER Delivery Department: 6 trainees
- PM Department: 7 trainees
- Internal Audit Capability: 1 trainee
- Broader Approach Department: 2 trainees
- Office of the Director: 1 trainee

27 trainees were located in Barcelona, 1 in Cadarache, and 2 in Garching.

During 2023, 7 trainees resigned from their traineeship for job opportunities.

The remaining 23 trainees were offered extensions for one additional year until September/October 2024.

In terms of gender distribution and in contrast with the same distribution among staff, 60% of the trainee intake was female against 40% male.

In contrast to earlier intakes, the 2022/23 cohort of trainees were given the opportunity of mobility and assignments to different parts of the organisation.

Another, equally popular initiative amongst the trainees was the organisation of a visit to the ITER site where the F4E trainees met the ITER IO trainee cohort. To the extent possible, F4E will make this visit a standing part of its trainee program.

In anticipation of the launch of the call for the 2024/25 cohort F4E contacted approximately 400 universities for the dissemination of its call. The focus was on institutions specializing in disciplines closely aligned with F4E's core business (STEM, Law, Data Protection, Economics) and situated within under-represented countries from North, Central and East Europe.

Over 50 universities expressed a positive response to promoting the F4E Traineeship programme. With commitments ranging from offering to register the F4E call on their career portals to publishing our Traineeship call and sharing promotional materials across their social media platforms, newsletters, and other channels.

As part of its efforts to attract more women to STEM professions, F4E will be expanding its traineeship eco-system and be part of IAEA Marie Skłodowska-Curie Fellowship Programme. The agreement with the IAEA is due for signature in the spring of 2024 and this new program will host female students at F4E.

The communication outreach efforts undertaken in 2023 with key organisations such as CERN, IAEA, the Sub-working Group on EUAN Traineeships, EUROfusion, and FuseNet have paved the way for future collaborations, fostering a stronger bond within the nuclear community. These interactions have laid a foundation for building partnerships that will benefit F4E and that will see the increase in the number of trainees F4E expects to host in the coming years.

F4Es engagement with CERN and IAEA allowed F4E to participate in two large student fairs and offer employee branding opportunities as well as invest in the multi-generational footprint F4E wants to leave in the fusion sector.

People Matters

The collaboration to produce the internal newsletter, People Matters, involved all Administration Units while the People & Culture unit retained ownership of the final product. Through the Internal Communication Board (ICB), the upcoming newsletter topics were presented, and F4E's Communication Team coordinated the input from the representatives of the other services. The Spring and Autumn editions included editorials from F4E's GB Advisor and AMC Chair, and Director, respectively.

Diversity

In its commitment to having a diverse and inclusive workforce, F4E continued implementing its Strategy on Diversity, Equal Opportunities and Non-Discrimination. This was coupled with information campaigns celebrating Women's Day, Women in Science Day, Disability Day, Pride Day and Men's Day. F4E will continue celebrating these dates and establish them as important moments on the annual calendar thereby confirming its attachment to diversity and inclusivity.

F4E also participated in the Inter-Agency Group on Diversity & Inclusion, and organized various other talks in that framework.

Gender balance: To tackle its gender imbalance (62% male, 38% female), F4E has adopted the corporate goal that 35% of Senior Management and 45% of Middle Management positions should be filled by women by the end of 2025.

Gender / Category	CA		FO		TA		Grand Total	
	Staff	%	Staff	%	Staff	%	Staff	%
Women	86	54.8%	16	39.0%	58	26.0%	160	38.0%
AD	N/A		9	22.0%	50	22.4%	59	14.0%
AST	N/A		7	17.1%	8	3.6%	15	3.6%
GFII	10	6.4%	N/A				10	2.4%
GFIII	45	28.7%	N/A				45	10.7%
GFIV	31	19.7%	N/A				31	7.4%
Men	71	45.2%	25	61.0%	165	74.0%	261	62.0%
AD	N/A		20	48.8%	146	65.5%	166	39.4%
AST	N/A		5	12.2%	19	8.5%	24	5.7%
GFII	2	1.3%	N/A				2	0.5%
GFIII	6	3.8%	N/A				6	1.4%
GFIV	63	40.1%	N/A				63	15.0%
Grand Total	157		41		223		421	

Table 20: Gender balance on 31 December 2023.

	2019		2020		2021		2022		2023	
	Number	%	Number	%	Number	%	Number	%	Number	%
Female Senior Managers	0	0	1	14%	1	14%	1	25%	1	33%
Male Senior Managers	7	100%	6	86%	6	86%	3	75%	2	67%
Total	7		7		7		4		3	
Female Middle Managers	4	16%	4	16%	5	20%	5	19%	5	23%
Male Middle Managers	21	84%	21	84%	20	80%	22	81%	17	77%
Total	25		25		25		27		22	

Table 21: Gender balance on Senior and Middle Management on 31 Decembre 2023.

Geographical balance: Notwithstanding its efforts towards a balanced geographical balance, attainment of this goal is highly dependent on the nationality of applicants. In this respect, the relative over representation of Spanish nationals (35.9%) reflects the location of the F4E Headquarters in Spain. Italian nationals (17.6%) and French nationals (19.2%) are the next two most represented nationalities.

Nationality	AD + CA FGIV		AST + CA FGII/FGIII		TOTAL	
	Number of staff	% of total staff in AD and FGIV categories	Number of staff	% of total staff in AST and FGII&FGIII categories	Number of staff	% of total staff
Belgium	8	2.5%	9	8.8%	17	4.0%
Bulgaria	3	0.9%	1	1.0%	4	1.0%
Croatia	1	0.3%	0	0.0%	1	0.2%
Czechia	2	0.6%	2	2.0%	4	1.0%
Estonia	1	0.3%	0	0.0%	1	0.2%
Finland	3	0.9%	1	1.0%	4	1.0%
France	64	20.1%	17	16.7%	81	19.2%
Germany	7	2.2%	6	5.9%	13	3.1%
Greece	6	1.9%	3	2.9%	9	2.1%
Hungary	6	1.9%	0	0.0%	6	1.4%
Ireland	6	1.9%	2	2.0%	8	1.9%
Italy	56	17.6%	18	17.6%	74	17.6%
Lithuania	0	0.0%	3	2.9%	3	0.7%
Malta	1	0.3%	0	0.0%	1	0.2%
Netherlands	4	1.3%	0	0.0%	4	1.0%
Poland	5	1.6%	0	0.0%	5	1.2%
Portugal	10	3.1%	1	1.0%	11	2.6%
Romania	8	2.5%	1	1.0%	9	2.1%
Slovakia	1	0.3%	0	0.0%	1	0.2%
Spain	116	36.4%	35	34.3%	151	35.9%
Sweden	4	1.3%	0	0.0%	4	1.0%
United Kingdom	7	2.2%	3	2.9%	10	2.4%
Grand Total	319	100.0%	102	100.0%	421	100.0%

Table 22: Geographical balance on 31 December 2023

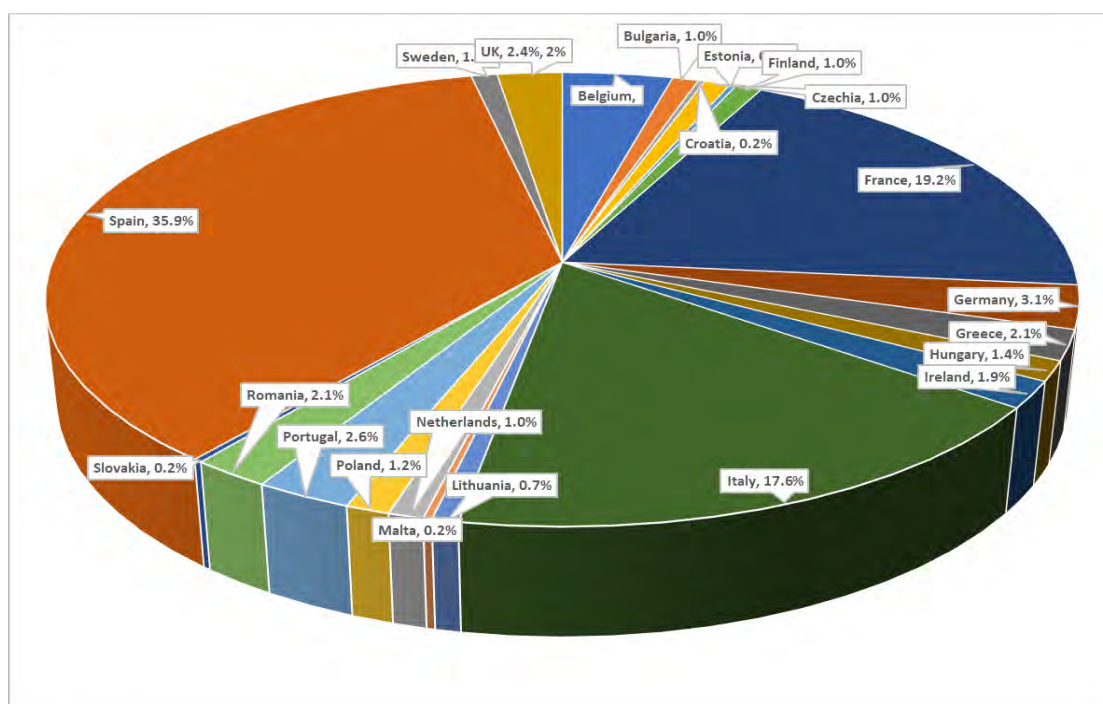


Table 23: Geographical distribution - All F4E staff

2.6.2 The Results of the Screening/Benchmarking Exercise

The benchmark is provided in Annex V and is based on a methodology and approach consistent with the Communication C(2014) 9641 from the European Commission on the reporting on Resources Management. According to this methodology, F4E staff is classified in different categories depending on the area of work. The rates per category represent the number of staff assigned to each activity out of the total number of staff (the results of the Screening/Benchmarking exercise can be found in Annex V.b Benchmarking Exercise). Some the key conclusions are:

- 15% of the posts in F4E are assigned to Administration Support and Coordination functions, 75% belong to Operational functions and 10% are so called Neutral functions. There are no major changes in those headings compared to 2022.
- The majority of the Operational posts are found in the Programme Management and Implementation category. This represents approximately 65% of the total posts.

2.7 Strategy for efficiency gains

Upon the direction of its senior management team, F4E manages its corporate improvement projects through an **Improvement Steering Committee (ISC)** that provides a dedicated forum to set priorities on corporate improvement actions and align management views. This committee monitors results and proposes corrective actions if needed.

F4E uses the DMAIC (Define, Measure, Analyse, Improve, and Control) approach that forms part of the Lean Six Sigma methodology (a set of techniques and tools for process improvement). This ensures that processes are more efficient and effective to achieve efficiency gains. F4E measures results over a certain period with key performance indicators to confirm the positive trends, and corrective actions taken if needed to streamline F4E's core activities. F4E achieved the following efficiency gains from a series of improvement projects:

Project Name	Achievements	Conclusion (objective vs achievement)
Time to recruit	Reduction of the average lead time to recruit, 26 % of efficiency gain: <ul style="list-style-type: none"> Before (2017) = 152 days 2023 = 117 days 	Improvement project successfully completed in 2021 on the time to finalise a selection procedure from the vacancy notice preparation to the establishment of the reserve list of candidates. An Improvement project had been successfully completed in 2021. Longer term confirmation of the efficiency gains and systematic reporting thereon will follow from the electronic recruitment tool for which development is on-going.
Time to procure	Reduction of the average lead time to procure for open procedure, 36 % of efficiency gain: <ul style="list-style-type: none"> Before (2017) = 287 days 2023 = 185 days 	Improvement achieved on the time from approved Contract Procurement Strategy to contract signature. F4E has digitalised the procurement process, facilitating tender submission and management up to contract signature.
Time to sign and pay	Reduction of the average time to sign a contract (from award to legal commitment), 34% of efficiency gain: <ul style="list-style-type: none"> Before = 41 days 2023 = 27 days 	Financial Transactions – improvement achieved and good performance of the improved process for the time to sign and to pay.
	Reduction of average time to prepare the Technical Assessment Report, of the supplier deliverables related to a payment, 56 % of efficiency gain: <ul style="list-style-type: none"> Before (2017) =16 days 2023 = 7 days 	Further financial modules were piloted to the existing contract management electronic tool (DACC) to perform budgetary commitments, contract signature (legal commitments), supplier deliverable acceptance and payments.
	Reduction of the average time to pay for the 30 days payment type by 30%. <ul style="list-style-type: none"> Before (2017) = 23 days 2023 = 16 days 	This means that F4E has digitised all the core processes of the contractual cycle as the process reached a high maturity and efficiency level. F4E envisages further developments and improvements to the documentation exchange with suppliers.

DACC (Deviation, Amendment and Contract Changes) tool	Reduction of the average time to perform a contractual change or deviation, 49 % of efficiency gain: <ul style="list-style-type: none"> • Before: 90 days • End of 2023: 46 days 	to	F4E added an additional scope of contract signature in April 2020 to provide F4E with business continuity during the Covid-19 pandemic. All Deviations and Contract changes being performed through DACC as well as all operational contracts signed in DACC.
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Table 24: Overview of Improvement Projects.

2.8 Assessment of audit and ex-post evaluation results during the reporting year

2.8.1 Internal Audit Service (IAS)

The Internal Audit Service (IAS) of the European Commission concluded two audit follow-ups: one on Project Management of ITER deliverables (3rd follow-up) and another follow-up on the report on Delegations and efficiency of decision making in F4E and cooperation mechanisms with DG ENER.

Follow-up of Project Management of ITER deliverables audit

The IAS performed a 3rd follow-up on the “Project management of ITER deliverables”, which was finalised in March 2024. The audit aimed to assess if the management and control systems put in place by F4E are adequately designed, effective and efficient to ensure that project management activities related to deliverables to ITER support the timely delivery of the planned project deliverables, at the required level of quality and within the planned budget.

The 3rd follow-up confirmed that the remaining recommendations were adequately and effectively implemented, and therefore the audit is now considered closed.

Follow-up of Delegations and efficiency of decision making in F4E and cooperation mechanisms with DG ENER audit

The objective of this audit was to assess the adequacy of the design and the effective implementation of F4E’s internal control processes for financial circuits, financial delegations and deputising arrangements for its key operational processes. Furthermore, the audit assessed DG ENER’s and F4E’s cooperation and supervision mechanisms.

The IAS performed a 1st Follow-up (report issued on 6th March 2024) that covered two out of the three recommendations included in the original report. As a result of the review, the recommendation related to the Conflict of Interests was considered as adequately implemented.

For the recommendation on roles and responsibilities, one out of the 4 actions was considered as fully implemented and the others as partially implemented. The remaining recommendation on automated controls was not checked as one out of the 8 actions had not been completed by the cut-off date.

Annual Report of the IAS

Article 78(7) of the F4E Financial Regulation⁸ provides that, beyond reporting on its findings and recommendations in audit reports, "the internal auditor shall also report to the Governing Board, or where the Constituent instrument allows it, a body delegated by the Governing Board and to the Director in any of the following cases:

- *Critical risks and recommendations have not been addressed;*
- *There are significant delays in the implementation of the recommendations made in previous years."*

The IAS reported on two recommendations from the audit on Delegations and efficiency of decision making in F4E and cooperation mechanisms with DG ENER, related to a) **Roles and responsibilities** (as 3 actions in response to this recommendation have been re-opened after this follow-up) and b) **Automated controls** (as one of the actions out of 8 the actions in response of the recommendations has been delayed 15 months from the original target date).

The status of implementation of the IAS audit actions is set out in section 2.9 *Follow up of recommendations and action plans for audits and evaluations* of this report.

2.8.2 Internal Audit Capability (IAC)

In 2023, F4E's Internal Audit Capability (IAC) performed three main assurance engagements:

- the Validation of User Access Rights in ABAC and in DACC,
- the audit of Administrative Procurement and Contract Management (in progress as of year-end)
- the audit of the Magnets Unit – Lessons learned (in progress as of year-end)

The Validation of User Access Rights in ABAC and in DACC resulted in 30 observations (ABAC/DACC), from which 17 were accepted.

Additionally, IAC performed follow-up activities in 2023 for four engagements (Broader Approach Agreement, Ecosys, Nuclear Safety and Vacuum Vessel Contract) and facilitated a management self-assessment of safety and security preparedness. The outcome of the follow-up activities was published in 2024 and as such will only appear in the 2024 CAAR.

⁸ <https://industryportal.f4e.europa.eu/mainmenu/how-to-do-business/procurement-documents>

Audit management tasks were also performed in 2023 such as preparation of IAC's 2022 Annual Report, the 2024 Annual Plan, and management of the framework contract for "Provision of Internal Audit Support Services for Internal Audit Capabilities".

The Head of IAC has performed a self-assessment of the IAC's attribute and performance criteria and has determined that IAC is generally conforming with IIA Standards and complies with the IAC Charter.

IAC's opinion on the overall system of internal control is provided on the basis of the nature and scope of the work of the IAC performed during the year 2023. As an outcome, IAC's overall opinion is that, while acknowledging a comprehensive setup of internal control standards, the existence of numerous procedures and a significant number of assessments of its compliance with applicable regulations, the organisation's internal controls are "analysed and managed", meaning that further opportunities remain for control optimisation and integration within the functional area.

2.8.3 European Court of Auditors (ECA)

In November 2023, the European Court of Auditors (ECA) adopted the final Annual report on the EU Joint Undertakings for the financial year 2022, where Chapter 3.10 is devoted to F4E accounts. The ECA 2022 report is structured in three Chapters, where Chapter 1 describes the Joint Undertakings, and the nature of the audit performed by the Court, Chapter 2 presents the overall result of the audit and an analysis of the areas that need improvement by each Joint Undertaking (in the case of F4E those areas are two: Senior Management situation remaining unstable, and weaknesses on contract management). Finally, Chapter 3 contains, for each of the nine JUs, a statement of assurance with the opinions and observations on, firstly, the reliability of their accounts and, secondly, the legality and regularity of the underlying transactions.

The ECA provides a reasonable assurance for the implementation of the budget of F4E, concluding that:

- the accounts of the JU for the year ended 31 December 2022 present fairly, in all material respects, the financial position of the JU at 31 December 2022, the results of its operations, its cash flows, and the changes in net assets for the year then ended, in accordance with its Financial Regulation and with accounting rules adopted by the Commission's accounting officer. These are based on internationally accepted accounting standards for the public sector.
- revenue and payments underlying the accounts for the year ended 31 December 2022 are legal and regular in all material respects.

"Emphasis of matter"

Since 2013 the Annual Report from the ECA includes, in the Statement of Assurance section, a subsection 'Emphasis of Matter' raising awareness on the problems faced by F4E in relation to the cost and schedule of the overall project. The ECA refers to the estimation of the total cost for completing F4E's delivery obligations for the ITER project assessed at €19.1 billion (in 2022 values), pointing out that the 2022 Estimate at Completion is still based on 2016 milestone and cost assumptions and will be subject to significant revision, once the new ITER project baseline and requirements would be finalised, approved by the ITER Council, and formally communicated to F4E.

The [2022 ECA report](#) (section 3.10) also draws attention to point d) of the “Introduction” of the annual accounts: “Impact of international situation”, which describes the impact of COVID-19 and the war of aggression against Ukraine on F4E’s operations.

Observations of current and previous years

The 2022 ECA report contains 11 observations which do not affect the overall statement of assurance. F4E will enhance its overall control environment in the areas reported by the ECA as 3 out of those 11 observations require some actions.

The ECA 2022 report also maintains as on-going one observation from 2019, and 2 observations from 2021, and confirms that F4E has fully and effectively implemented 1 observation from 2019 and one from 2021.

The following table provides an overview of the status of these observations at the end of 2023:

ECA – Annual Report on F4E’s 2022 Accounts Status of Observations

Area		In Progress	Implemented	No Action	Total
Cost estimate at completion for ITER				3	3
Budgetary Management				4	4
Senior management situation				1	1
Risks Management System		1			1
Contract Management (Buildings area)		1		1	2
TOTAL from 2022		2	-	9	11
Follow-up of previous years’ comments					
2019	Senior management and corporate culture level		1		1
	Insourced resources	1			1
2021	Employer’s contribution to the EU pension scheme		1		1
	Intensive audits and assessments causing administrative burden	1			1
	Working environment	1			1
Total from Follow up		3	2	-	5
GRAND TOTAL		5	2	9	16

Table 25: Observations and actions taken by F4E.

The status of the actions in progress is the following:

- **Risk management system:** The new framework to facilitate quick consolidation to the risk summary level and increase the visibility of the portfolio risk management activities is now consolidated.
 - The effects of the changes at senior management level are expected to be present during 2024 and will be mitigated by the implementation of the new F4E reorganisation.
 - Delays in procurements: the related risks are captured at the project/programme level risk registers rather than at the level of the procurement management function.
 - The ITER-IO re-baselining exercise will be on-going during most of 2024 and will affect in-kind delivery (F4E projects) or Euratom cash contribution to the ITER-IO.
- **Contract Management (Buildings area):** F4E organised two trainings in 2023 on *Common contractual problems and their solutions* and on *Delays, Extensions of Time, and Damages*. For 2024, F4E organised four trainings on *delay assessment* based on the practical examples of previous claims. The training program will continue as there is an action from the 11th Annual Assessment in setting up a FIDIC training program. In addition, the F4E Legal Unit prepared a lessons learnt document on the TB04 contract administration/adjudication in 2023 that was shared with the ITER Organization, which has triggered discussions on how to better organize the FIDIC Engineer function at F4E and the ITER Organization. The discussions are still ongoing to improve construction contract administration.
- **Insourced resources** (observation from 2019): The need to deliver on a critical project such as ITER and the associated workload requires substantial use of external resources. F4E is striving to find an optimal balance between the mitigation of the legal risks (amongst other the retention of key competences, unclear accountability, possible judicial disputes, and lower staff efficiency due to decentralised management) and the delivery of the European contribution for the completion of the ITER project.
- **Intensive audits and assessments causing administrative burden** (observation from 2021): F4E has continued implementing the recommendations of the 9th and 10th Annual Assessments, having implemented 66% and 50% respectively.
- **Working environment** (observation from 2021): During 2023 F4E has continued implementing specific actions in the domain of well-being and reporting regularly to its Governing Board. The different actions undertaken in the fields of mental health and wellbeing showed to be appreciated by the members of staff. 64.9% are satisfied or very satisfied with the actions undertaken. F4E endeavours to continue improving the staff wellbeing, and in particular, it will continue monitoring the situation in view of the upcoming events that might have an impact (reorganisation, further integration and rebaseline exercise).

2.9 a Follow-up of recommendations and action plans for audits and evaluations

The status of the implementation of the internal audit action plans as of 31 December 2023 is as follows:

Audit Name	Audit Source	Actions	In Progress	Implemented	Cancelled	Obsolete/ Suspended	Implemented %
Action plans issued before 2023							
Nuclear Safety Management	IAC	24	0	24	0	0	100.00%
Project Management of ITER deliverables	IAS	26	0	26	0	0	100.00%
ECOSYS - Systems and Controls ensuring reliability of financial planning data	IAC	28	0	27	0	1	100.00%
Vacuum Vessel contract	IAC	17	0	17	0	0	100.00%
Corporate Governance Audit	IAC	14	3	10	0	1	76.92%
Delegations and efficiency of decision making	IAS	19	1	18	0	0	94.74%
total before 2023		128	4	122	0	2	96.83%
Action plans issued from 2023							
Audit of Digitalisation and Cybersecurity	IAC	12	3	9	0	0	75.00%
Total from 2023		12	3	9	0	0	75.00%
TOTAL PORTFOLIO		140	7	131	0	2	94.93%
			5%	94%	0%	1%	

- Implemented % is equal to the number of actions implemented per total number of actions that can be executed (Cancelled and Obsolete actions are not taken into account)*

Table 26: Overview of implementation of action plans per Audit.

F4E's portfolio includes six action plans issued before 2023, for which the implementation rate has reached 96,83% (with 122 actions already implemented), and one action plan from 2023, related to the IAC audit on Digitalisation and Cybersecurity, already implemented at 75%.

Of the 7 action plans in F4E's portfolio, 3 have been fully implemented from management point of view, and have been subject to a follow-up by the IAC, although the results will only be reported in the 2024 CAAR. Another action plan from IAS (audit on Project management of ITER deliverables) has been followed up, concluding that all the actions were effectively implemented.

Evolution of F4E's portfolio of actions in progress

Looking at the evolution of the portfolio it can be concluded that F4E has timely implemented most of the action plans. As regards audit reports issued before 2023, the rate of implementation has reached 97%, with only 4 actions in progress, and 75% of actions are implemented for the action plan that was issued in 2023.

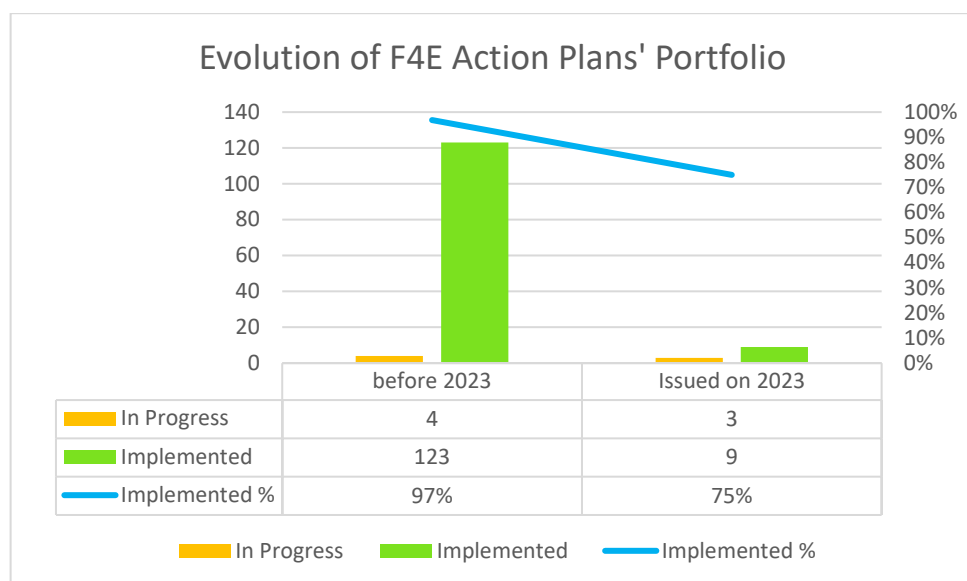


Table 27: Evolution of F4E's portfolio and status of implementation by year of audit.

Overview per Criticality of Actions

	In Progress	Implemented	Cancelled	Obsolete	Totals*	Implemented %*
Critical	0	3	0	0	3	00,00%
Very Important	4	72	0	1	76	42,06%
Important	3	46	0	1	49	31,75%
Desirable	0	10	0	0	10	7,94%
Totals	7	131	0	2	138	81,75%

*Implemented % is equal to the number of actions implemented per total number of actions that can be executed (Cancelled and Obsolete actions are not taken into account)

Table 28: Overview per Criticality of Actions.

2.9 b Follow-up of recommendations issued following investigations by OLAF

The Anti-Fraud and Ethics Officer is the contact point for OLAF. F4E proposed actions to strengthen its cooperation with OLAF and the Commission. Also, in the context of the Inter Agencies' Legal Network (IALN) Working Group on Ethics & Transparency F4E is contributing to the drafting of Working Arrangements with OLAF and the European Public Prosecutors Office (EPPO).

2.10 Follow-up of observations from the discharge authority

For the financial year 2021, the European Parliament (EP) granted, in its plenary session of May 2023, the Discharge in respect of the implementation of the budget to F4E and the closure of its accounts. They issued 42 observations with regards to some aspects of the project, in relation to the “Emphasis of Matter” of the European Court of Auditors raising concerns on the cost and schedule risk of F4E and the ITER project, impact of the COVID 19, working environment at F4E and wellbeing of the staff, insourcing of workers, and in relation to procedural aspects of F4E internal control.

In September 2023, F4E submitted a report to the EP on the measures taken in the light of the observations accompanying the EP’s discharge decision for 2021, in accordance with Article 107 of the F4E Financial Regulation. Out of 42 observations of the European Parliament, 32 were reported as “No Action” required from F4E, 2 were reported as “Implemented” and the remaining 8 as “Ongoing”. Additional information can be found at [2022 ECA report](#) (section 3.10). At the end of 2023, these observations were still “Ongoing”, within the initially proposed deadlines, in the following areas:

- Working environment and wellbeing of staff - Change Agenda (2 observations)
- External staff (ESP) risks associated.
- Management culture
- Gender balance
- New baseline for ITER Project
- First Operational test
- Nuclear safety requirements (NSA)

2.11 Environment Management

As Chair of the Greening Network, F4E multiplied efforts to raise the awareness on sustainability issues at all levels. As a result, the Greening Network has been recognised by its peers and sustainability has been integrated in the reflection and work programme of several EU Agencies subnetworks. Fruitful discussions among GN members have nurtured a global strategy "The EU Agencies and JUs towards a sustainable future" to implement the ambitions set in the EUAN 2021-2027 Strategy (“Greening and Sustainability in the EU Agencies Network”) in the context of the European Green Deal and the Commission’s ambitions.

At local level, fruitful exchanges took place with the Building Management of Barcelona premises on energy efficiency (air condition and ventilation) and mobility (installation of plugs for electric cars). Some steps have also been taken to further investigate the implementation of environmental certification (e.g. EMAS, ISO) within the building, our procurement practice and, in general, F4E as a whole.

2.12 Assessment by Management

2023 was a challenging year for F4E and the ITER project at large in several respects.

At the level of the ITER International Organization, repair works continues to some key ITER components already delivered on the site by other members. This will have an impact on the schedule and budget of the whole project that has not yet been determined. Consequently, this led to a slow-down in some areas of the project, and impacted F4E's 2023 budget execution. A new baseline (scope, schedule, and cost) should be presented to the ITER Council in 2024. This will have impacts on some of the F4E in-kind delivery programs.

During 2023 F4E took steps to increase the level of integration with the ITER Organization to improve efficiency and the performance of the project. This included the closer integration of technical teams as well as systems and tools. In December 2023 our Governing Board welcomed a renewed and ambitious vision for F4E. This put F4E in an excellent position to contribute towards the long-term goal of developing fusion energy.

Several changes at senior management level took place in F4E during 2023. A new Director, Marc Lachaise, took up his duties in May 2023 after which Jean-Marc Filhol, Acting Director and Gebhard Leidenfrost, Head of the Commercial Department retired from F4E. By the end of 2023, four out of the six departments were managed on an acting basis, pending a reorganisation that the new Director was asked by the Governing Board to propose.

Despite the challenging conditions described above, F4E continued to do its utmost to deliver its contributions to the ITER, Broader Approach and other projects. Noteworthy achievements in 2023 included:

- One of the main successes of 2023 was the achievement of the first plasma in JT-60SA, the biggest experimental fusion device. JT-60SA is a collaboration between Europe and Japan and has the mission to carry out research for ITER. JT-60SA uses powerful superconducting coils cooled to approximately -269 °C to confine plasma that can reach temperatures of 100 million °C.
- F4E progressed with our contributions to the ITER project during 2023 and delivered the final superconducting Toroidal Field Coil. These coils measure 17 x 9 m and weigh 320 tons and their fabrications has been possible by working with over 40 European companies, and more than 700 people. F4E also delivered the last but one superconducting Poloidal Field Coil of 24 m in diameter, the largest such coils ever produced.
- Another highlight of 2023 had been the completion of the civil engineering works for the Tokamak Building that houses the ITER experiment. Standing 60 m high with a foundation nearly 20 m below ground, this fortress of 100 000 m³ of concrete involved more than 900 people have been working at times in three shifts, amounting to 7 000 000 hours.
- In 2023 F4E progressed with many other components for ITER together with F4E's European industrial partners. All 2598 welds of the first Vacuum Vessel sector were completed to the required quality and work advanced with the other four sectors that each stand 11 metres tall and weigh over 5000 tonnes. Series manufacturing of the First Wall Panels and Divertor Cassette Bodes advanced.

- Commissioning of the ITER Cryoplant continued with liquid nitrogen being supplied to the liquid helium plant. Progress was made with cryo-distribution system and the Torus Cold Valve Boxes were delivered to ITER. For the ITER Neutral Beam Heating Systems, F4E delivered all its contributions to the SPIDER ion source and most of the contributions to the MITICA prototype. Important progress was also made in the Electron Cyclotron Heating Systems and power supplies.
- F4E is responsible for twelve Diagnostic Systems and works closely with European industry and fusion research laboratories. In 2023 F4E delivered magnetic coils and related electronic systems to ITER and made progress with design work on several other systems. Important progress in research and design work in the Remote Handling Systems was made. Finally, intensive activities took place for the Test Blanket Module Systems.
- Lastly, under the Broader Approach Agreement with Japan, F4E continued to support the major upgrade of the prototype accelerator LIPAc for testing fusion materials. 2023 was marked by work to prepare for future configurations of the LIPAc and carrying out continuous wave testing. F4E also supported preparatory activities for a new facility called IFMIF-DONES for fusion materials testing under construction in Granada, Spain.

F4E is informing its Governing Board and subsidiary committees on a regular basis about the risks associated with the above projects.

Part II. (b) External Evaluations

The April 2018 Council Conclusions on the reformed ITER project state that “the independent annual assessments of the progress of ITER have to be continued and intensified with a focus on the performance and project management, including cost containment, schedule project control as well as risk management”.

To meet the Council’s request for 2022, F4E’s Governing Board appointed a panel of three independent experts of recognized standing to conduct an assessment of F4E’s contribution to the ITER project with a focus on the human resources management and risk management

The outcome of the assessment was presented to F4E’s Governing Board in July 2022 and entrusted F4E’s Bureau to approve any urgent actions to be taken in response to the recommendations.

The assessment panel put forward nine recommendations of which five focused on human resource aspects and four on risk management. An action plan in response to these recommendations was approved by F4E’s Governing Board in December 2022.

Throughout 2022 F4E continued to implement actions in response to previous annual assessments and ad-hoc groups. By the end of the year, F4E had implemented 96% of 279 actions with pending actions mostly in the area of buildings and neutral beams. The April 2018 Council Conclusions on the reformed ITER project state that “the independent annual assessments of the progress of ITER have to be continued and intensified with a focus on the performance and project management, including cost containment, schedule project control as well as risk management”.

To meet the Council’s request for 2023, F4E’s Governing Board appointed a panel of three independent experts of recognized standing to conduct an independent assessment of the Buildings Programme.

The preliminary findings of the assessment were presented to F4E’s Governing Board in July 2023 and the final report was transmitted to the GB and the Council in September. The Board asked F4E to address the recommendations and report to the GB. The assessment panel put forward thirty-six recommendations principally focused on the ITER Buildings Programme. An action plan in response to these recommendations was approved by F4E’s Governing Board in December 2023.

Throughout 2023 F4E continued to implement actions in response to previous annual assessments and ad-hoc groups. By the end of the year, F4E had implemented 96% of the actions with only four pending actions.

In December 2023, the GB decided that the independent interim evaluation on the achievement of the implementation of the Council Decision (Euratom) 2021/281 of 22 February 2021 amending Decision 2007/198/Euratom would constitute 2024 (12th) Annual Assessment of F4E.

Part III Assessment of the effectiveness of the internal control systems

3.1 Effectiveness of internal control systems

At the end of 2018, the Governing Board adopted a revised framework 'F4E Management and Internal Control Standards' (MICS) adapting it to the 2017 EC Internal Control Framework covering the five components: control environment, risk assessment (including risks of fraud), control activities, information and communication and monitoring activities.

Monitoring criteria, comprising baselines, indicators and targets for measuring the effectiveness of the implementation of the MICS were also introduced with the aim of facilitating the identification of any deficiencies in the internal control system as part of the overall procedure for conducting the Internal Control System Annual Assessment (from now on, the assessment).

In 2021, F4E further aligned its MICS, indicators and procedures with the EC Internal Control Framework.

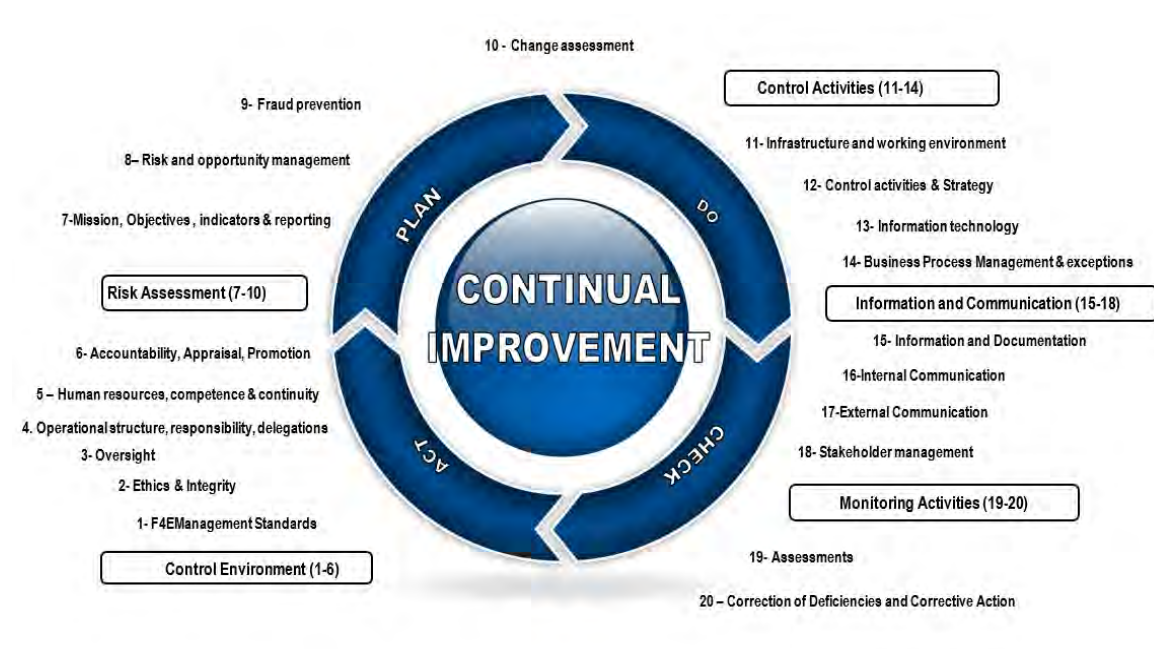


Figure 77: F4E Management and Internal Control Standards (MICS).

F4E has followed a step-by-step approach on the identification of strengths and weaknesses of the Internal Control system based on any deficiencies identified in the functioning of the MICS and formulated corresponding corrective actions, leading to the conclusions for the establishment of the Director's Declaration of Assurance and reporting in the CAAR.

3.1.1 Actions undertaken during the year to respond to the priority areas identified in the 2021 CAAR

In last year's Consolidated Annual Activity Report, F4E concluded that all the components were operating together in an integrated manner. Nevertheless, due to a combination of major

deficiencies (in MICS # 5 Human Resources, Competence and Continuity and MICS #11 Infrastructure and Work Environment), it was concluded that the system is **partially effective**.

The corrective actions proposed in response to the 2022 assessment were the following:

- 1) Continue implementing ongoing actions in response to audits, non-compliances.
- 2) Address all actions identified in the various staff assessments and surveys in a centralized and streamlined manner, with clarity, transparency and accountability.

During 2023 F4E has continued implementing the actions in response to the multiple audits (internal and external), non-compliances and external assessments. Several actions have been put in place to address the concerns identified by the various staff assessments and surveys. Further attention to this will be given in 2024, please refer to the results of the internal control assessment for 2023.

3.1.2 Methodology for the Internal Control System annual assessment for 2023

F4E implements its specific procedure for conducting its annual assessment. This includes:

- I. Assessment of the Internal Control Monitoring Criteria and Staff MICS questionnaire results;
- II. Analysis of sources available in RAPID (F4E's database to follow-up actions): ECA Annual Report, Annual Assessments of External Assessors and ad hoc group reports, Reports from IAC, IAS audits, Actions proposed for each exception and non-compliance and Anti-Fraud Strategy action plan;
- III. Other sources: Corporate Risk and Opportunity register, Declarations of Assurance of the Responsible Authorising Officers (RAOs), Annual report of Internal Auditors, weaknesses reported by Staff;
- IV. Determination of the Severity of Deficiencies per MICS and proposal of corrective actions;
- V. Workshops with the Internal Control Coordinator and the assurance providers and the staff responsible for the areas covered by the 20 MICS;
- VI. Preliminary assessment made by the Internal Control Coordinator;
- VII. Conclusion of assessment per Standard and Overall System;
- VIII. Workshop for Senior Management and Director endorsement; and,
- IX. Preparation of the Director's Declaration of Assurance and CAAR.

The results of the preliminary assessment and a final corrective action plan for 2023 were endorsed as follows:

- 11 MICS have been identified as effective and functioning well.
- 8 MICS have been identified as effective with moderate deficiencies.
- 1 MICS has been identified as effective with major deficiencies.

The corrective actions proposed as a result of the assessment will be regularly monitored by the Assurance Network, in charge of the ongoing monitoring of the F4E internal control system.

3.1.3 Classification of the MICS resulting from the assessment and corrective actions

The following classification has been applied to determine the severity level of the deficiency.

Category	Definition
Effective, functioning well – Minor corrective actions	The MICS is present and functioning well, in some cases minor corrective actions are needed.
Effective with moderate deficiencies – Moderate corrective actions	The MICS is present and functioning but some moderate corrective actions are needed.
Partially Effective – Major corrective actions	The MICS is partially present and functioning, major corrective actions are needed.
Not Fully Effective – Critical corrective actions	The MICS is not fully present and functioning.

On the level of the MICS

Below is a summary of the assessment by MICS, detailing the deficiencies identified and the corrective actions.

MICS	CATEGORY	DEFICIENCY	CORRECTIVE ACTION
MICS 4: Operational Structure, Responsibility, Delegations and Reporting lines	Effective MODERATE deficiency	<ul style="list-style-type: none"> Recommendations of the 11th Annual Assessment of F4E on the reinforcement of the roles of the Engineer and of the Employer in the buildings area. Unstable situation in the Senior Management team. 	<ul style="list-style-type: none"> Implementation of the actions in response to the 11th Annual Assessment of F4E. The reorganisation of F4E that will be effective as of 1st July 2024 aims at tackling amongst others: the culture of the organisation, its long-term strategy, its working methods, and its management, including transparency in the F4E management's decision-making process and in its relationship with F4E's governance.
MICS 5: Human Resources, Competence & Continuity	Partially Effective MAJOR deficiency	<ul style="list-style-type: none"> Risks in relation to the use of external resources (concerning the retention of key competences, unclear accountability, possible judicial disputes, and lower staff efficiency due to decentralised management). Workload is an issue of concern for staff. 	<ul style="list-style-type: none"> The need to deliver on a critical project such as ITER and the associated workload requires substantial use of external resources. F4E is striving to find an optimal balance between the mitigation of the legal risks and the delivery of the European contribution for the completion of the ITER project.
MICS 8: Risk and Opportunity Management	Effective MODERATE deficiency	<ul style="list-style-type: none"> Recommendations of the 11th Annual Assessment of F4E to reinforce the risk management system. 	<ul style="list-style-type: none"> Implementation of the actions in response to the 11th Annual Assessment of F4E.
MICS 9: Fraud Prevention	Effective MODERATE deficiency	<ul style="list-style-type: none"> Lack of awareness amongst staff on where to find information on Fraud prevention. 	<ul style="list-style-type: none"> Dissemination actions will be undertaken during 2024.
MICS 11: Infrastructure and work environment	Effective MODERATE deficiency	<ul style="list-style-type: none"> Staff wellbeing and mental health continue to be a matter of attention. 	<ul style="list-style-type: none"> F4E has put in place processes to prevent (awareness campaign, medical check-up), react (reintegration process) and monitor (absenteeism). Close monitoring of the situation throughout 2024 in particular after the reorganisation that will be effective as of 1st July 2024 and which is expected to have an impact on this area.
MICS 12: Control Activities and Strategy	Effective MODERATE deficiency	<ul style="list-style-type: none"> Several recommendations to reinforce the control activities by the external auditors and assessors. 	<ul style="list-style-type: none"> Implementation of the actions.

MICS 13: Information Technology	Effective MODERATE deficiency	<ul style="list-style-type: none"> Recommendations of the IAC audit on Digitalisation and Cybersecurity. 	<ul style="list-style-type: none"> Implementation of the actions.
MICS 18: Stakeholder Management	Effective MODERATE deficiency	<ul style="list-style-type: none"> More focus and better coordination needed with the Supply Chain and European institutions stakeholders. 	<ul style="list-style-type: none"> The reorganisation of F4E that will be effective as of 1st July 2024 aims to address this issue.
MICS 20: Correction of Deficiencies and Corrective Action	Effective MODERATE deficiency	<ul style="list-style-type: none"> In some cases, the follow ups of the internal auditors (IAS and IAC) resulted in the reopening of audit actions implemented by F4E. 	<ul style="list-style-type: none"> F4E will reinforce the monitoring of the implementation of the audit actions while improving communication with the internal auditors.

For 2022 a major deficiency had been identified on MICS 11 Infrastructure and Work Environment, which in 2023 has been downgraded to a moderate deficiency. During 2023 F4E has continued implementing specific actions in the domain of wellbeing and reporting regularly to its Governing Board:

- The medical annual check-ups at F4E increased from 43% of staff in 2020 to 75% in 2023.
- F4E included a psychosocial questionnaire in the annual check-up.
- F4E offers the specialised support of a psychologist on-site 2 days/week – accessible to staff for personal or professional concerns.
- F4E enforced mandatory attendance of the training on prevention of harassment (passing from 67% of staff in 2021 to 94% by end of 2022) and added it as obligatory during the probationary period.
- F4E delivered the active bystander’s capability training.

The different actions undertaken in the fields of mental health and wellbeing showed to be appreciated by the members of staff. 64.9% are satisfied or very satisfied with the actions undertaken.

F4E endeavours to continue improving the staff wellbeing, and in particular, it will continue monitoring the situation in view of the upcoming events that might have an impact (reorganisation, further integration and rebaseline exercise).

On the level of the System

All the MICS are operating together in an integrated manner. As a combination of one major and several moderate deficiencies exists, it can be concluded that the system is partially effective.

3.1.4 Prevention, Detection, Correction of Fraud

The Anti-Fraud (OLAF) and Ethics Officer oversees the implementation of the F4E Anti-Fraud Strategy (AFS) and the accompanying Anti-Fraud Action Plan. In this context, the Anti-Fraud (OLAF) and Ethics Officer has notably monitored and guided the execution of the actions outlined in the current Anti-Fraud Action Plan for 2023 through targeted communications, individual meetings with action owners, and transversal compliance-oriented meetings. The implementation of the actions in the Anti-Fraud Action Plan has been systematically followed up using a dedicated database (RAPID) which documents further progress as regards the implementation of anti-fraud actions in 2023.

Throughout the year, the Anti-Fraud (OLAF) and Ethics Officer provided information and support on fraud prevention matters to staff involved in procurement, contracts management, finance, and human resource management. Anti-fraud awareness-raising events were organised for F4E staff and management, including training sessions for newcomers. The implementation status was reported at Audit Committee meetings. In addition, the F4E internal network of fraud correspondents was kept informed individually and in the context of the regular Assurance Network meetings.

The Anti-Fraud (OLAF) & Ethics Officer also coordinated and drafted the updated F4E's AFS, including its new Action plan for the next 4 years. The Governing Board adopted it end of 2023. The updated AFS builds on the previous one and concentrates on fraud prevention and detection by further improving the effective implementation of existing rules. The comprehensive risk assessment done by the Risk Officer in close collaboration with the Ethics Officer and the correspondents of the respective departments showed that the 2019 AFS successfully mitigated the risks as it was designed to. Nevertheless, as F4E continues to operate in a narrow market – both for specialised staff and companies. the mitigation of the risk of possible conflicts of interest and favouritism remains one of the priorities of the updated F4E AFS, as evidenced by the proposed measures concerning procurement, contract implementation as well as selections/recruitments.

Finally, following the new Commission 2023 revision of its Anti-Fraud Strategy Action Plan, actions are included to strengthen cooperation with OLAF and the Commission.

3.1.5 Ethics and Prevention & Management of Conflicts of Interest (CoI)

Rules, procedures, processes, and best practices related to Ethics and Conflict of Interest Prevention & Management were communicated to staff, notably through the F4E Manual on the F4E intranet.

The Anti-Fraud (OLAF) and Ethics Officer instructed F4E staff and managers on the purpose, correct use, and assessment of declarations of interest to prevent and manage conflicts of interest. Individually on an *ad hoc* basis, he also guided staff in the preparation, and managers in the assessment, of declarations of interest and maintained a Conflict of Interest Register. From 2022 on, all F4E staff have been obliged to issue a General Declaration of Interest every year. The issuing and assessment of the declarations is now managed through a newly created digitalised F4E

Conflict of Interest Register, improving follow-up and traceability, and thereby the prevention and management of conflicts of interest at F4E.

Furthermore, the Anti-Fraud and Ethics Officer advised on the prevention of conflicts of interest as regards F4E committee chairs and members.

The F4E Charter of Engagement, an intra-organisational code of conduct for staff, was revised to reflect updated corporate values and their prioritisation in the context of the F4E Change Agenda. The Charter identifies a catalogue of concrete dos and don'ts based on the values of integrity, trust, respect, teamwork, high achievement, contribution, flexibility, and innovation, and foresees recourse to the Ethics Officer and/or the F4E Ethics Committee. In 2023, the Ethics Officer and the Ethics Committee intervened in a number of cases, and awareness-raising communications and information sessions were organised.

3.2 Conclusions of assessment of internal control systems

F4E continues to implement a recognised, mature and well-functioning internal control system. All the components of the F4E internal control system are operating together in an integrated manner. As a combination of a major deficiency (in MICS # 5 Human Resources, Competence and Continuity), and several moderate deficiencies exist, it can be concluded that the system is partially effective.

The major deficiency relates to the risks in relation to the use of external resources. The need to deliver on a critical project such as ITER and the associated workload requires substantial use of external resources. F4E is striving to find an optimal balance between the mitigation of the legal risks (amongst other the retention of key competences, unclear accountability, possible judicial disputes, and lower staff efficiency due to decentralised management) and the delivery of the European contribution for the completion of the ITER project.

F4E Senior Management is continuously monitoring the actions launched in the area of use of external resources and considers that it has significantly mitigated the related risks during 2023. In applying the principle of prudence, it has rated this area as having a major deficiency, also in recognition of the fact that further work will be needed during 2024 to strengthen the related control systems while addressing the concerns raised by the ECA. All in all, F4E considers that this deficiency does not impact the declaration of assurance of F4E as a whole.

3.3 Statement of the Senior Manager in charge of risk management

I, Neil Collings, the undersigned, make the following declaration.

In my capacity as Senior Manager in charge of risk management, I declare that in accordance with F4E's Internal Control System, I have reported my advice and recommendations on the corporate and project risks and opportunities to the Director and to the F4E governance bodies.

Neil Collings
Head of Project Management Department

Barcelona, 9 April 2024

3.4 Statement of the Senior Manager in charge of internal control

I, the undersigned, Alessia Vecchio, Head of Administration Department of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E), in my capacity as Senior Manager in charge of internal control, I declare that in accordance with F4E's Internal Control System, I have reported my advice and recommendations on the overall state of internal control in F4E to the Director.

The overall assessment of the Internal Control System resulted in MICS # 5 Human Resources, Competence and Continuity having a major deficiency related to the use of external resources. F4E, in applying the principle of prudence, has rated this area as having a major deficiency, also in recognition of the fact that further work will be needed during 2024 to strengthen the related control systems while addressing the concerns raised by the ECA. The overall control system is considered as partially effective, but this does not have an impact on the overall assurance given.

I hereby certify that the information provided in the present Consolidated Annual Activity Report and in its annexes is, to the best of my knowledge, accurate, reliable and complete.

Alessia Vecchio
Head of Administration

Barcelona, 21 June 2024

Part IV. Management assurance

4.1 Review of the elements supporting assurance

The Internal Control System comprising F4E's Integrated Management System is based on the 3 layers of defence of the IIA (Institute of Internal Auditors) and combines the two control environments within which F4E operates - the ITER-wide quality system which is intended to ensure the performance of ITER and the compliance with the nuclear safety requirements, and the European Commission Internal Control Framework which is inspired in the internationally recognised COSO framework. The main elements supporting the assurance of the F4E Director are the following:

- 1st LAYER (or 1st LINE OF DEFENCE) ESTABLISH AND INFORM: Internal controls as defined by F4E Management for application by all F4E Staff and providing adequate training and raising awareness.
- 2nd LAYER (or 2nd LINE OF DEFENCE) MANAGEMENT ASSURANCE: The Management (in its role of 1st line of defence) puts in place the 2nd layer of defence by establishing risk management and assurance functions to help build and/or monitor the first line-of-defence controls.
- 3rd LAYER (or 3rd LINE OF DEFENCE) INDEPENDENT ASSURANCE Internal auditors (IAS/IAC) who provide the Governance bodies and Senior Management with comprehensive assurance based on the highest level of independence and objectivity within the organisation. IAS/IAC activities (including ex post audit on contracts) are described in the IAS/IAC annual audit plan. OLAF carries out independent investigations.

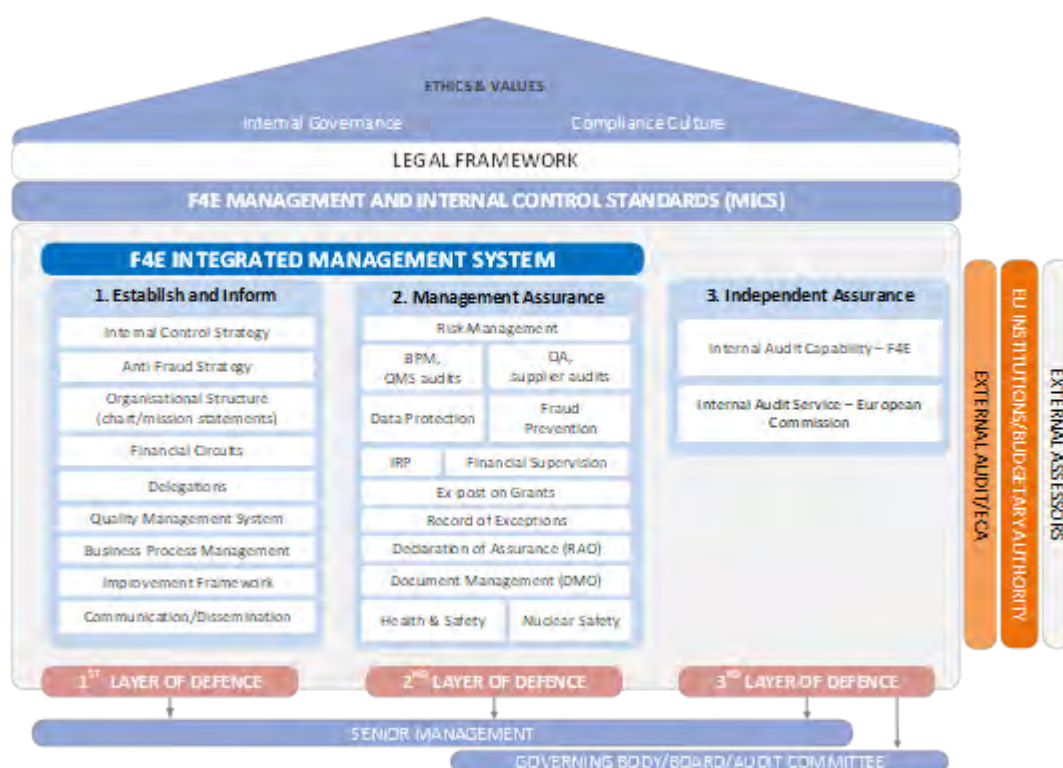


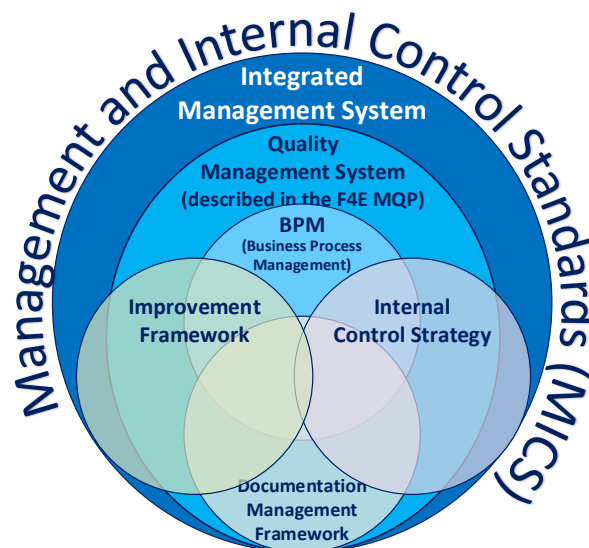
Figure 78: F4E Internal Control System.

The F4E Internal Control Strategy defines internal control roles and responsibilities and outlines how the Internal Control System provides reasonable assurance of achieving the objectives based on Article 30 of the F4E FR.

4.1.1 Integrated Management System

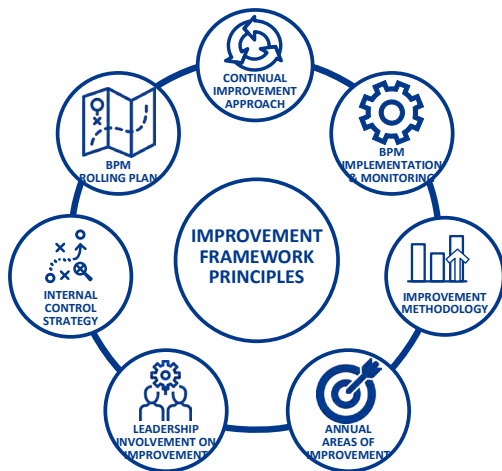
The development and establishment of a Quality Management System is part of the F4E overall management strategy included in the obligations as ITER Project items provider (ITER International Organization – IO - and Host Country Authority Regulations requirements) and to assist compliance with the European Commission (EC) Internal Control Framework.

The Management and Internal Control Standards (MICS) are the backbone of the Integrated Management System, implemented with the objective to provide reasonable assurance regarding the achievement of the organisation’s mission and objectives in line with the EC Internal Control Framework and the ITER-wide quality system based on the ISO standards.



Operationally, this Integrated Management System is implemented through the Quality Management System (as described in the F4E Management and Quality Programme) that provides an effective and efficient method to perform the tasks, a perspective on the organisation and its risks. It allows F4E to continually improve the way of working and to reinforce the F4E corporate culture towards the stakeholder’s expectations.

Improvement is an integral part of the MICS and its requirements, in particular: MICS#3 Oversight Responsibility, MICS#19 Assessments and MISC#20 Correction of Deficiencies and Corrective Action.



The F4E Improvement framework defines the frame of activities to enhance performance and has seven principles: Continual Improvement approach; Business Process Management (implementation and monitoring), Improvement Methodology, Annual Focus on Areas of Improvement, Leadership Involvement on Improvement (Improvement Steering Committee), Internal Control Strategy and Continuous Improvement Action Plan (BPM Rolling Plan).

These principles ensure the standardisation of the system implemented to enhance performance in F4E, to ensure compliance with the Internal Control framework and overall maintenance of the Integrated Management System.

These principles ensure the standardisation of the system implemented to enhance performance in F4E, to ensure compliance with the Internal Control framework and overall maintenance of the Integrated Management System.

<p>The Director continually improves the Quality Management System, by planning and managing the necessary processes. Continual improvement is achieved through the use of the Quality policy, BPM policy, audit results, data analysis, stakeholders' feedback, continuous training, corrective and preventive actions and the Improvement Steering Committee review.</p>	
<p>Continual Improvement approach in F4E is based on the following concepts: Improvement Inputs; Evidence-based decision, Activity Owner validation; Learning and Development Culture; Improvement is made in measurable projects; and Results must be disseminated.</p>	

4.1.1.1 Quality Management System and Supplier Audits

A Quality Management System Audit aims to provide F4E and its stakeholders reasonable assurance that the system is adequately implemented according to the standards. The objective of Supplier Audits is to ensure that F4E Suppliers comply with the approved Quality Plan and that it is effectively implemented.

A Quality Management system and Supplier Audit process frames the methodology to be followed for each key step of those audits (planning, preparation, implementation, follow-up of actions and recording). The audit result is presented in an audit report, which includes the identification of any strong areas describing the strengths of the implemented quality system, improvement areas and nonconformities. When improvements or nonconformities are identified, the report is followed by an

action plan from the auditee to address the findings. Once the action plan is approved it is followed to ensure correct implementation and closure of the audit.

In 2023, out of the:

- 3 planned Quality Management System audits: 2 were performed with result above the audit criteria. These audits resulted in 13 findings, classified as follows: 6 strong areas and 7 improvement areas.
- 13 planned Supplier Audits: 11 Supplier audits were performed (10 with result meeting the audit criteria, and 1 with result below expectation). These audits resulted in 100 findings, classified as follows: 26 strong areas, 55 improvement areas, 19 nonconformities and 15 observations for F4E. As foreseen in the related process, all the Supplier nonconformities found triggered a Nonconformity Report issued by the auditee with the action to address the weaknesses.

All the reported situations were of a technical nature (documentation, performance and/or planning) and were adequately processed (including remedial and corrective actions) and monitored by F4E at the contract or procurement arrangement level.

4.1.2 Corporate Risk Management

The Integrated Management System (IMS) and its Management and Internal Control Standards (MICS) provide the basis for the Risk Management framework at F4E. MICS # 8 specifies that F4E has a system to manage risks and opportunities at corporate and project level. In particular, F4E performs regular risk analysis at project and corporate level, proposes mitigating actions and monitors and reports on its implementation.

Overview of Risk and Opportunity Management (ROM) activities in 2023

The process to identify, assess and monitor the risks and opportunities is based on the “market standard” process and ISO 31000 for risk management.

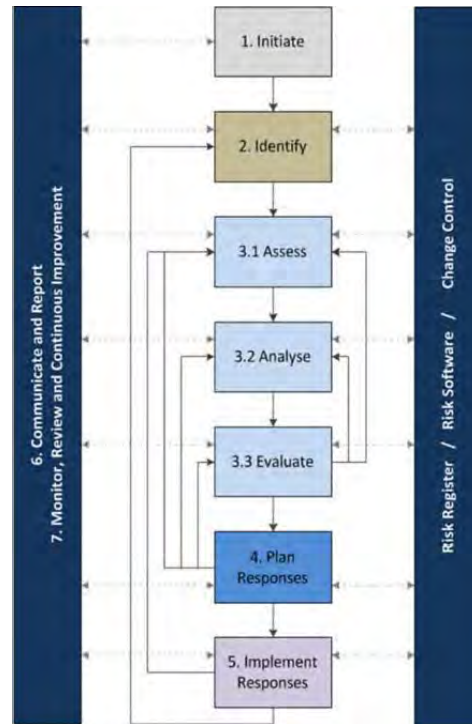


Figure 79: Risk & Opportunity Management Procedure

With the support of the tool Active Risk Management (ARM), risks and opportunities are included in the Risks register and evaluated with an assessment in the following categories: Probability, Cost impact, Schedule impact, technical impact and reputational impact.

This information is then analysed on the three levels of the current framework: Corporate, Project and Supplier level depending on the needs.

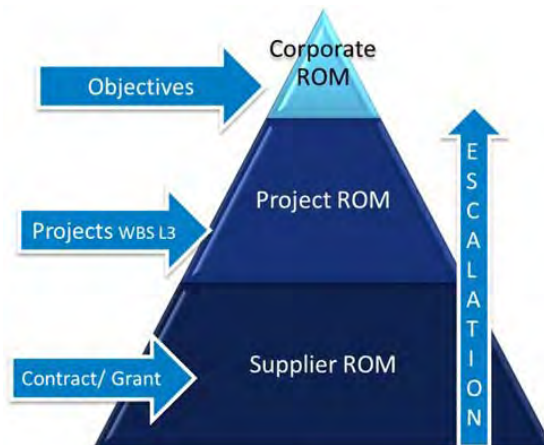


Figure 80: Risk & Opportunity Management Framework

During 2023, F4E participated in several risk management forums. The risks identified have been sufficiently addressed with appropriate mitigating measures. The material risks have been included in the declaration of assurance of the F4E Director (see Part V. Declaration of assurance),

Part V. Declaration of assurance

I, the undersigned, Marc Lachaise,

Director of the European Joint Undertaking for ITER and the Development of Fusion Energy (F4E),

In my capacity as authorising officer,

- Declare that the information contained in this report gives a true and fair view.
- State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the annual assessment of the Internal Control System. It also takes into account the reports from:

- the Internal Audit Service;
- the Internal Audit Capability;
- the observations of the European Court of Auditors (ECA); and,
- the recommendations from the Governing Board annual assessment.

Without qualifying this reasonable assurance, I would like to highlight the fact raised by the ECA in the “Emphasis of Matter” section of their 2022 Annual Report *“the 2022 Estimate at Completion is still based on 2016 milestone and cost assumptions and will be subject to significant revision, once the new ITER project baseline and requirements are finalised, approved by the ITER Council, and formally communicated to F4E.”*

I confirm that the ITER Organization (IO) and the Domestic Agencies (including F4E) are working together on a new scope, cost and schedule baseline of the ITER Project. This baseline will be submitted by the IO Director General to the ITER Council for consideration by the international ITER parties (where Euratom is represented by the European Commission).

During 2023 F4E has been addressing the risks on the in-kind delivery of ITER buildings and the ITER vacuum vessel by the implementation of several mitigation actions including reinforced monitoring of the industrial supply chain and closer integration with the IO. The biggest type of risks affecting F4E in-kind contributions to ITER remain the changes of requirements or additional scope and performance limitations of F4E in terms of schedule or costs.

Looking ahead, F4E will undergo a significant reorganization in 2024, with the aim to improve the performance of the organisation and instil a new culture, while implementing the renewed long-term vision of F4E and consolidating the actions undertaken to address the staff wellbeing. A closer integration with IO is also underway. This will enable F4E to better deliver its contribution to ITER and other projects in the very challenging landscape of fusion development, which remains a unique technical and engineering challenge to be addressed.

I confirm that I am not aware of anything not reported here which could harm the interests of the Joint Undertaking.

Marc Lachaise
F4E Director

Barcelona, 7 May 2024

Annexes

Annex I Core Business Statistics

Key Performance Indicators for 2023

ITER Project Progress

- Progress for First Plasma in December 2025 :
 - Capitals 91.81%
 - IO Assembly 32.86%
- For all work required for the construction of ITER:
 - Capitals 75.66%
 - IO Assembly 24.36%

Broader Approach Project Progress

- 65% of the EU contributions to the Satellite Tokamak (JT-60SA) delivered.
- 93% of the EU contributions to the IFMIF/EVEDA project delivered.
- 100% of the EU contributions to the IFERC project delivered.

F4E Project Performance

- F4E's current and planned budget compared to Estimate at Completion is 84%.
- 67% Annual Schedule Performance achieved on a basket of reference milestones.
- For the main ITER Council and Governing Board milestones, F4E has:
 - 32 achieved.
 - 1 which is expected to be delivered on time.
 - 24 at risk of being delayed.

F4E Procurement

- 72 contracts signed in 2023 for a value of €634m.
- Total cumulative value of contracts €6,7bn.

F4E Annual Budget Performance

- Annual Commitments 73 %, 58 % compared to original budget.
- Annual Payments 95 %, 73 % compared to original budget.

F4E Quality

F4E has 199 F4E Non-Conformity Reports (NCRs) open for > 12 months compared to 502NCRs still open giving a ratio of 39% (not achieving the 2023 target of ≤22%)

F4E Human Resources

- Assignment of human resources to different areas:
 - 56% for ITER and PM
 - 7% Broader Approach and DEMO.
 - 37% Commercial and Administration.
- 6,7% Vacancy Rate, (target 4%).
- 4,1% Turnover Rate.
- 4,2% Absenteeism.

F4E Organisational Improvement

- Implemented 82% of Corporate Actions.
- Implemented 96% of Internal Audit Actions.

Background

F4E has identified specific Key Performance Indicators (KPI) in order to measure how effectively the organisation achieves the target set in different project (i.e. schedule, cost, risk, etc.) and programmatic areas (i.e. annual budget consumption, quality, etc.). F4E updates these KPIs on a monthly basis and reviews them at the level of its Senior Management and takes action to address events or risk that could threaten their achievement.

For the EU contributions to ITER, the basis for the adopted KPIs is the F4E current baseline, in schedule, cost and budget. F4E ensures that the baseline is maintained through change control processes together with the ITER Organization. Dashboards are available with the possibility of drilling down for more details, both at a global F4E level and individually per Programme. KPI information is included in many F4E documents and reports to its governing bodies.

Key Performance Indicators

In relation to F4E's obligation to provide in kind contributions to the **ITER Project**:

- The ITER Council approves, monitors and updates a set of high-level monitoring milestones, the so-called **ITER Council (IC) milestones**, which track the overall progress of the project in all the seven ITER Domestic Agencies (including F4E) and the ITER Organization. These milestones are suitable for tracking progress as they cover a larger group of components at different stages of their development. Most of them are key to achieve the ITER First Plasma, but some of them also relate to post-First Plasma systems;
- To complement the ITER Council milestones, an expanded set of high-level milestones are approved, monitored and updated by F4E's Governing Board – the **Governing Board (GB) milestones** which are solely applicable to F4E. Their status is reported to F4E's Governing Board and other governance bodies on a monthly basis and subject to change control by the Governing Board. The complete list of F4E's Governing Board and ITER Council milestones for 2023 is provided in F4E's Single Programming Document (SPD);
- Annual M-SPI is an SPI index expressing in percentage terms progress F4E made achieving milestones planned for a given year.
- In addition, F4E uses a basket of **additional technical milestones** to monitor more precisely its own performance. F4E has selected such milestones by making sure that they cover important activities inside the organisation and therefore can provide a meaningful measure of F4E performance. These include Procurement Arrangement signatures,

commitments >€ 2m, Calls for tender, contract signatures >€ 2m and project execution milestones. These are described in Table 35.

PA Signature	Signatures of PAs. ITA signatures and PA amendment signatures are not included.
Call for Tender	Publication of a Call for Tender.
Commitments above €2m	Any commitment above 2 million Euros.
Project Execution Milestones	Milestone in the on-going execution of a project. These milestones are selected by the project teams at the end of the previous year.
Work Programme Objectives	Objectives set in the Work Programme
F4E Gates Design Review	F4E Gates Design Reviews
Delivery	Delivery Milestones

Table 29: Technical objectives and KPIs used for monitoring purposes.

- To monitor projects against their budgets, the **Estimate at Completion (EAC)** is calculated by F4E on a monthly basis using three elements (a) actual costs already incurred, (b) estimate of future costs, (c) estimate of likely impact of future risks. F4E follows an industry standard process for its EAC. The monthly update process is complemented by biannual deep-dive reviews to assess in more detail the quality of the estimates and the associated assumptions at programme and project level. F4E systematically presents the EAC at each biannual Governing Board meeting.

Contributions to Broader Approach (BA) projects are formalised under Procurement Arrangements between F4E and the Japanese Implementing Agency (QST), which in turn are backed by Agreements of Collaboration between F4E and institutions chosen by the Voluntary Contributors. The accounting of contributions is tracked by an Earned Value Management approach using credits. In addition, the Broader Approach projects are monitored by the achievement on time of the milestones defined in the Project Plan approved by the Broader Approach Steering Committee. The complete list of F4E's Broader Approach milestones for 2022 are provided in F4E's SPD. Each

of these milestones is assigned a credit value that is used to allow an Earned Value calculation of the overall level of achievement against the Planned Value.

Multiannual and annual Indicators

F4E has defined a set of multiannual objectives that are shown in Table 30: Multiannual objectives and KPIs used by F4E and a set of annual objectives that are show in Table 31: Annual objectives and KPIs used by F4E.

Other indicators but for which targets are not currently set but are monitored internally and, in some cases, reported on a biennial basis to F4E's Governing Board, include the staff attrition rate, gender balance, time to place contracts and grants and time to recruit.

AREA	Objective
GB/IC milestones	Achieve the GB and IC milestones within "agreed quarters"
Overall Costs	Cost estimation for ITER + Broader Approach for period up to 2027 should be less than the total budget available for this period.

Table 30: Multiannual objectives and KPIs used by F4E.

AREA	Objective
Annual M-SPI	Reach a minimum SPI value by end of the year
Quality	Reduce percentage of long aging NCRs compared to total number of open NCRs.
Annual budget	Implement a defined percentage of Commitment Appropriations by end of the year
Annual payment	Implement a defined percentage of Payment Appropriations by end of the year
Human Resources	Vacancy rate to be less than a defined value by end of the year

Table 31: Annual objectives and KPIs used by F4E.

To ensure the widespread awareness of F4E's performance against the above annual and multiannual objectives, F4E has created a 'dashboard' showing the most important KPIs which is not only used for monthly reporting to the Project Steering Meeting and stakeholders but also shown on screens located on every floor of F4E's offices at the Barcelona headquarter offices.

The F4E dashboard consists of three parts:

1. **General part on the overall progress.** It provides a summary of the progress against the baseline, for the achieved ITER credits for EU in-kind procurements, annual milestones completion, ratio of assigned budget vs cost, commitments and payments implementation;

2. **A multiannual part:** It shows the evolution of indexes such as the achieved ITER credit, the estimate at completion (EAC) and provides the forecast of completion of the key milestones selected by the F4E and ITER Organization supervising boards;
3. **An annual part:** For the current year it shows the Annual M-SPI performance and implementation of commitments and payments;

Annex II Achievement of 2023 Work Programme Objectives

Action 1. Magnets

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU11.1A.24960	TF-EU10 Delivery to ITER before final repair	Q4 2023	Predecessor of GB54	Achieved
EU11.3B.01140	IPL > Delivery of PF4 Coil by EU-DA to IO	Q3 2023	WP23 objective	Achieved
EU11.3B.571190	PF3 Winding Pack VPI Completed	Q3 2023	WP23 objective	Achieved
EU11.3B.571210	PF3 Final Assembly Completed	Q4 2023	WP23 objective	Achieved

Action 2. Vacuum Vessel

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU15.1A.3093980	S9PS4 - Machining Complete	Q2 2023	Predecessor of GB25	Achieved
EU15.1A.3104560	Sector 5 - Bolted ribs and IWS blocks installation complete	Q1 2023	Predecessor of GB16	Achieved
EU15.1A.3104580	Sector 5 - Outer shell welding complete	Q3 2023	Predecessor of GB16	Achieved
EU15.1A.3104860	S2 PS4_RT inspection & evtl. corresponding repairs completed	Q4 2023	Predecessor of GB25	Achieved

Action 3. In Vessel – Blanket

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU15.2A.12100	Task Order Signed for Task 1 - Qualif. and Manuf. of 1st Pipe Bundles - Contractor #1	Q2 2023	WP23 objective	Achieved
EU16.01.100860	HP Process qualification - Readiness review for series manufacturing	Q4 2023	GB37	Achieved
EU16.01.209280	Evaluation of Final tender for Procurement of Standard Parts	Q3 2023	WP23 objective	Achieved
EU16.01.83060	MS3.A.2 - PPRR2 / MRR - OMF-900 LOT 1 Approved	Q4 2023	WP23 objective	Achieved
EU16.01.83920	MS3.A.2 - PPRR2 / MRR - OMF-900 LOT 3 Approved	Q4 2023	WP23 objective	Achieved

Action 4. In Vessel – Divertor

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU17.01.1169340	HPC - Approval of Deliverable TP (61-120)_15 of the Transition Pieces 61-120 (M_TP (61-120)_15)	Q3 2023	WP23 objective	Achieved
EU17.01.1227460	MRR for CBLV Stage II Approved (MSII_CBLV_S13)	Q4 2023	WP23 objective	Achieved
EU17.2B.566420	QA Plan approved for OMF-1139-01-01	Q2 2023	WP23 objective	Achieved
EU17.2B.654580	Test Assembly of Additional Proto Lot 1 ready for shipment to HHFT facility (OPE-567#01)	Q3 2023	WP23 objective	Achieved

Action 5. Remote Handling

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU23.03.14057020	EU CPRHS FDR Machine Assembly 1 Items meeting completed	Q2 2023	Predecessor of GB40	Achieved
EU23.03.902905	Task Order Signed for OMF-1034-01-06 for Manufacturing and Commissioning of CPRHS for MA	Q4 2023	GB32	Achieved
EU23.05.28190	Contract Signed for Final Design of MCS OPE-1252 (MM AND CAS)	Q4 2023	Predecessor of GB42	Not achieved
EU57.01.50560	[M3] DS Requirement Readiness Review (RRR) completed	Q4 2023	Predecessor of GB47	Achieved

Action 6. Cryoplant and Fuel Cycle

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU31.01.12098	IPL > Delivery of T&C FECDS and Cryojumpers 5-8 (4 no.) Batch 2 by EU-DA to IO	Q2 2023	GB28	Achieved
EU31.01.12230	EU.EU IPL > Delivery of MITICA Cryopump to RFX and SAT completed (M15)	Q1 2023	Predecessor of GB50	Achieved
EU31.01.44380	Start of final assembly with pump plug #1	Q3 2023	Predecessor of GB33	Achieved
EU31.03.25770	M.17 - Final Design Analysis report completed.	Q4 2023	Predecessor of GB18	Not achieved
EU31.03.43280	Mechanical and I&C design complete for Direct Leak Detection Systems	Q2 2023	Predecessor of GB35	Achieved

Action 7. Plasma Engineering & Operations

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
NA	NA	NA	NA	NA

Action 8. Heating & Current Drive

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU52.01.2001322	Completion of Mechanical Redressing of UL Body - Phase 1	Q2 2023	Predecessor of GB46	Achieved
EU52.01.422055	ADP #2 TO 729-02: Series production of Diamond Disks for EC Windows	Q4 2023	WP23 objective	Achieved
EU52.02.11780	Task Order 1 Signed for European Gyrotrons Procurement (MS-01)	Q4 2023	Predecessor of GB48	Achieved
EU52.04.23065	IPL > Delivery of ECPS 52HV12 (AAG Set #8) to ITER Site by EU-DA (GB43)	Q2 2023	GB43	Achieved
EU53.06.08530	Start of Manufacture of EU-HVD1 & EU-Bushing of IHNB-1 & IHNB-2 (last items)/MRR Closure	Q2 2023	Predecessor of GB30	Achieved
EU53.TF.4443820	Assembly of ERID panels completed and tested (B4000000) - (M67)_ MITICA ERID	Q3 2023	WP23 objective	Achieved

Action 9. Diagnostics

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU55.01.1000120	IPL > Delivery of Electronics and Software for Magnetics by EU-DA to IO ITER Site	Q3 2023	GB39	Achieved
EU55.06.702380	M1b - Availability of Technical Specification for "Procurement of Raw Material and COTS"	Q3 2023	Predecessor of GB36	Achieved
EU55.09.102790	Preliminary Design Review Meeting for CPTS components (PDR Meeting)	Q3 2023	WP23 objective	Achieved
EU55.11.222090	PDR Meeting for CXRS Fibres and Ex-Vessel Optical/Mechanical (PDR meeting)	Q4 2023	WP23 objective	Achieved

Action 10. Test Blanket Modules

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU56.01.1227620	Final Acceptance Data Package (ADP) F4E-OFC-0950-01-03 Approved by F4E Technical Responsible Officer (TRO)	Q3 2023	WP23 objective	Achieved
EU56.01.1232120	F4E-OFC-0950-03-02 - Acceptance Data Package 2 (ADP) Completed	Q3 2023	WP23 objective	Achieved
EU56.01.1238080	TO 01 Preliminary Design of Water Cooled Lead Lithium (WCLL) Ancillary Systems Completed	Q1 2023	WP23 objective	Achieved
EU56.01.1259280	F4E-OFC-0950-02-03 Acceptance Data Package (ADP) Approved by F4E Technical Responsible Officer (TRO)	Q3 2023	WP23 objective	Achieved
EU56.02.1240040	ADP 2 Approved of TO2 for Handling, Cutting Storage Serv for Steel Products related to the EU TBMs	Q2 2023	WP23 objective	Achieved

Action 11. Site and Buildings and Power Supplies

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU62.05.272720	Construction of Cryoline Bridge (between B52 & B11) Completed	Q2 2023	GB57	Achieved
EU62.705323	Completion of the main civil works for B46	Q4 2023	Predecessor of GB24	Achieved
EU62.705334	Completion of the main civil works for B47	Q4 2023	Predecessor of GB26	Achieved
EU62.749685	IPL > Bus-Bar bridges B32&B74 - Early Access for IO	Q4 2023	Predecessor of GB58	Achieved

Action 12. Cash Contributions

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EUCC.01.260	Cash Contributions to ITER Organization 2024	Q4 2023	WP23 objective	Achieved

Action 13. Technical Support Activities

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU.ES.02.95280	FWC Signed for Prov. of Eng. Sup. in the area of Electromagnetic and Electromechanical	Q3 2023	WP23 objective	Achieved
EU.PM.3080540	Technical deliverables for 1st year System Engineering Support of Specific contract F4E-OMF-1127-01-01 approved	Q3 2023	WP23 objective	Achieved
EU.PM.3101620	TO 10 signed under FwC F4E-OMF-1220-01 for PPC Cost and Planning (1) Support (cont.TO 25/10 OMF-0895-LOT1-01)	Q3 2023	WP23 objective	Achieved
EU.PM.3115560	TO #12.3 for IV OMF-1220 Int. Planning Support Divertor (cont.TO17 0895-Lot3) -firm part up to 12/2024 signed	Q4 2023	WP23 objective	Achieved
EU.PM.3147780	Framework Contract F4E-OMF-1461 signed for Risk Management Support (2023-2027)	Q4 2023	WP23 objective	Achieved
EU.TR.132520	Task Order Signed for TO 18 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2023	WP23 objective	Achieved
EU.TR.132700	Task Order Signed for TO 19 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2023	WP23 objective	Achieved

Action 14. Broader Approach

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU.BA.01.25100	Release of Stage 2 for Supply of the Solid State Amplifier prototype for RFQ	Q3 2023	WP23 objective	Achieved
EU.BA.01.28220	Delivery of Polychromators for JT-60SA Thomson Scattering	Q2 2023	WP23 objective	Achieved
EU.BA.01.35860	Remote participation tests REC-IFMIF	Q4 2023	WP23 objective	Achieved
EU.BA.01.39680	Completion of the 1st stage of High-Heat-Flux elements for the JT-60SA Actively Cooled Divertor	Q4 2023	WP23 objective	Not achieved
EU.BA.01.39700	First set of electro cyclotron resonance heating power supply on-site acceptance test	Q4 2023	WP23 objective	Achieved
EU.BA.01.39720	Final design review of the Machine Protection System Renewal contract for the LIPAc control system	Q3 2023	WP23 objective	Achieved

Action 15. DONES

Milestone ID	Scope Description	Forecast Date	Milestone Type	End 2023 Status
EU.DO.00240	Specific contract signed for TO100 for Engineering Support for the BA/DONES Projects (2023-2025)	Q4 2023	WP23 objective	Achieved

Annex III. Statistics on Financial Management

Annex III. a. Evolution of Expenditure in Commitments

Heading of the 2023 Budget Commitment Expenditure	Evolution of the statement of expenditure										Implementation		Variation in % of the initial budget	
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	Execution (11)	% (12)= (11)/(10)		
A1 STAFF EXPENDITURE														
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	43 500 000.00			0.01		-1 117 303.37	42 382 696.64				42 382 696.64	42 382 696.64	100.0%	-2.6%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	11 732 000.00					1 330 707.06	13 062 707.06				13 062 707.06	13 062 707.06	100.0%	11.3%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	836 500.00					-114 602.50	721 897.50				721 897.50	721 897.50	100.0%	-13.7%
A13 MISSION EXPENSES	647 000.00					153 000.00	800 000.00				800 000.00	800 000.00	100.0%	23.6%
A14 SOCIO-MEDICAL INFRASTRUCTURE	531 900.00					70 090.00	601 990.00				601 990.00	601 990.00	100.0%	13.2%
A15 TRAINING	850 000.00					0.00	850 000.00				850 000.00	850 000.00	100.0%	0.0%
A16 EXTERNAL SERVICES	580 000.00					50 000.00	630 000.00				630 000.00	630 000.00	100.0%	8.6%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	10 000.00					-7 500.00	2 500.00				2 500.00	2 500.00	100.0%	-75.0%
A18 SOCIAL WELFARE	50 000.00					11 520.00	61 520.00				61 520.00	61 520.00	100.0%	23.0%
A19 OTHER STAFF RELATED EXPENDITURE	3 921 000.00					-397 068.01	3 523 931.99	20 963.50			3 544 895.49	3 544 895.49	100.0%	-9.6%
TITLE A1 - Total	62 658 400.00	0.00	0.00	0.01	0.00	-21 156.82	62 637 243.19	20 963.50	0.00		62 658 206.69	62 658 206.69	100.0%	-0.0%
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE							0.00							
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	1 632 000.00					247 000.00	1 879 000.00	2 625.31			1 881 625.31	1 881 624.31	100.0%	15.3%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	4 981 750.00					256 531.66	5 238 281.66				5 238 281.66	5 238 281.66	100.0%	5.1%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	387 840.00					-167 100.00	220 740.00				220 740.00	220 740.00	100.0%	-43.1%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	2 138 100.00					-354 188.45	1 783 911.55				1 783 911.55	1 783 911.55	100.0%	-16.6%
A25 POSTAGE / TELECOMMUNICATIONS	738 500.00					-167 078.00	571 422.00				571 422.00	571 422.00	100.0%	-22.6%
A26 MEETING EXPENSES	533 000.00					56 120.00	589 120.00				589 120.00	589 120.00	100.0%	10.5%
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES						0.00	0.00		14 530.88		14 530.88		0.0%	-
A28 INFORMATION AND PUBLISHING	38 700.00					-25 700.00	13 000.00				13 000.00	13 000.00	100.0%	-66.4%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	266 000.00					-78 593.80	187 406.20				187 406.20	187 406.20	100.0%	-29.5%
TITLE A2 - Total	10 715 890.00	0.00	0.00	0.00	0.00	-233 008.59	10 482 881.41	2 625.31	14 530.88		10 500 037.60	10 485 505.72	99.9%	-2.1%
TITLE A1 & A2 - Total Administrative Expenditure	73 374 290.00	0.00	0.00	0.01	0.00	-254 165.41	73 120 124.60	23 588.81	14 530.88		73 158 244.29	73 143 712.41	100.0%	-0.3%

(EUR)

Heading of the 2023 Budget Commitment Expenditure	Evolution of the statement of expenditure							Implementation			Variation in % of the initial budget		
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)		Execution (11)	% (12)= (11)/(10)
B3 OPERATIONAL EXPENDITURE													
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	671 627 305.00	-10 000 000.00	6 559 970.30	-254 466 462.91	49 129 199.25	-447 096.81	462 402 914.83	218 004.43	693.93	462 621 613.19	326 585 852.47	70.6%	-51.4%
B32 TECHNOLOGY FOR ITER AND DEMO	6 136 511.00		646 077.00	-2 919 416.00		250 000.00	4 113 172.00			4 113 172.00	3 899 736.01	94.8%	-36.5%
B33 TECHNOLOGY FOR BROADER APPROACH	58 101 587.00		-10 667 577.00	-14 139 479.00		0.00	33 294 531.00			33 294 531.00	32 798 899.08	98.5%	-43.5%
B34 TECHNOLOGY FOR DONES	2 000 000.00		-1 050 000.00	-935 000.00		0.00	15 000.00			15 000.00	0.00	0.0%	-100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	18 738 413.00		4 431 908.20	-1 993 723.00		0.00	21 176 598.20		7 732.80	21 184 331.00	20 275 776.03	95.7%	8.2%
B36 OTHER OPERATIONAL EXPENDITURE	10 177 279.00		79 621.50	-5 264 457.55		451 262.22	5 443 705.17	98 436.95		5 542 142.12	5 519 465.56	99.6%	-45.8%
Title B3 - Total	766 781 095.00	-10 000 000.00	0.00	-279 718 538.46	49 129 199.25	254 165.41	526 445 921.20	316 441.38	8 426.73	526 770 789.31	389 079 729.15	73.9%	-49.3%
B4 EARMARKED EXPENDITURE													
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	178 492 669.21	93 670.41	0.00	-70 000 000.00	1 218 548.12		109 804 887.74	935 253.35	46 420 765.47	157 160 906.56	109 511 278.97	69.7%	-38.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	p.m.				-50 347 747.37		-50 347 747.37	30 845 738.75	69 388 544.85	49 886 536.23	14 442 969.55	29.0%	-
B43 OTHER EARMARKED EXPENDITURE	p.m.						0.00		0.00	0.00	0.00		-
Title B4 - Total	178 492 669.21	93 670.41	0.00	-70 000 000.00	-49 129 199.25	0.00	59 457 140.37	31 780 992.10	115 809 310.32	207 047 442.79	123 954 248.52	59.9%	-30.6%
Titles B3 & B4 - Subtotal	945 273 764.21	-9 906 329.59	0.00	-349 718 538.46	0.00	254 165.41	585 903 061.57	32 097 433.48	115 817 737.05	733 818 232.10	513 033 977.67	69.9%	-45.7%
Total BUDGET in Commitment appropriations	1 018 648 054.21	-9 906 329.59	0.00	-349 718 538.45	0.00	0.00	659 023 186.17	32 121 022.29	115 832 267.93	806 976 476.39	586 177 690.08	72.6%	-42.5%

Annex III. b. Evolution of Expenditure in Payments

Heading of the 2023 Budget Payment Expenditure	Evolution of the statement of expenditure										Implementation				Variation in % of the original budget
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	On B2023 commitments (11)	On B2022 commitments (12)	Execution (13)=(11)+(12)	% (14)= (13)/(10)	
A1 STAFF EXPENDITURE															
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	43 500 000.00	109 700.00	-109 700.00	0.01		-1 117 303.37	42 382 696.64	1 700 000.00	44 082 696.64	42 292 696.63	1 559 616.78	43 852 313.41	99.5%	See comments	
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	11 732 000.00					1 330 707.06	13 062 707.06	611 183.12	13 673 890.18	12 905 703.67	555 432.16	13 461 135.83	98.4%		
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	836 500.00					-114 602.50	721 897.50	66 163.63	788 061.13	684 570.16	20 487.05	705 057.21	89.5%		
A13 MISSION EXPENSES	647 000.00					153 000.00	800 000.00	74 090.44	874 090.44	722 494.39	64 426.46	786 920.85	90.0%		
A14 SOCIO-MEDICAL INFRASTRUCTURE	531 900.00					70 090.00	601 990.00	208 399.22	810 389.22	440 202.17	169 608.57	609 810.74	75.2%		
A15 TRAINING	850 000.00					0.00	850 000.00	387 124.24	1 237 124.24	244 059.68	342 502.82	586 562.50	47.4%		
A16 EXTERNAL SERVICES	580 000.00					50 000.00	630 000.00	269 786.06	899 786.06	523 423.39	153 412.49	676 835.88	75.2%		
A17 RECEPTIONS/EVENTS AND REPRESENTATION	10 000.00					-7 500.00	2 500.00	3 548.81	6 048.81	1 151.54	0.00	1 151.54	19.0%		
A18 SOCIAL WELFARE	50 000.00					11 520.00	61 520.00	27 151.98	88 671.98	50 855.90	9 996.43	60 852.33	68.6%		
A19 OTHER STAFF RELATED EXPENDITURE	3 921 000.00					-397 068.01	3 523 931.99	20 963.50	3 830 532.34	2 800 995.18	144 525.01	2 945 520.19	76.9%		
TITLE A1 - Total	62 658 400.00	109 700.00	-109 700.00	0.01	0.00	-21 156.82	62 637 243.19	20 963.50	3 633 084.35	66 291 291.04	3 020 007.77	63 686 160.48	96.1%		
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE															
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	1 632 000.00					247 000.00	1 879 000.00	2 625.31	596 969.24	2 478 594.55	1 322 125.70	472 119.88	1 794 245.58		72.4%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	4 981 750.00					256 531.66	5 238 281.66	1 482 533.92	6 720 815.58	3 366 648.20	1 290 260.63	4 656 908.83	69.3%		
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	387 840.00					-167 100.00	220 740.00	73 016.31	293 756.31	76 845.76	51 007.74	127 853.50	43.5%		
A24 CURRENT ADMINISTRATIVE EXPENDITURE	2 138 100.00					-354 188.45	1 783 911.55	636 914.60	2 420 826.15	1 181 030.57	500 037.80	1 681 068.37	69.4%		
A25 POSTAGE / TELECOMMUNICATIONS	738 500.00					-167 078.00	571 422.00	240 434.89	811 856.89	380 078.88	90 937.25	471 016.13	58.0%		
A26 MEETING EXPENSES	533 000.00					56 120.00	589 120.00	160 574.08	749 694.08	348 556.37	117 526.94	466 083.31	62.2%		
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES						0.00	0.00	14 530.88	14 530.88			0.00	0.0%		
A28 INFORMATION AND PUBLISHING	38 700.00					-25 700.00	13 000.00	3 770.85	16 770.85	8 806.59	6.71	8 813.30	52.6%		
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	266 000.00					-78 593.80	187 406.20	84 240.43	271 646.63	114 331.62	62 031.48	176 363.10	64.9%		
TITLE A2 - Total	10 715 890.00	0.00	0.00	0.00	0.00	-233 008.59	10 482 881.41	2 625.31	3 292 985.20	13 778 491.92	6 798 423.69	2 583 928.43	9 382 352.12	68.1%	
TITLE A1 & A2 - Total Administrative Expenditure	73 374 290.00	109 700.00	-109 700.00	0.01	0.00	-254 165.41	73 120 124.60	23 588.81	6 926 069.55	80 069 782.96	67 464 576.40	5 603 936.20	73 068 512.60	91.3%	

Heading of the 2023 Budget Payment Expenditure	Evolution of the statement of expenditure										Implementation				Variation in % of the initial budget
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	On B2023 commitments (11)	On B2022 commitments (12)	Execution (13)=(11)+(12)	% (14)= (13)/(10)	
B3 OPERATIONAL EXPENDITURE															
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	547 009 284.00	-10 000 000.00		-253 718 538.05	49 129 199.25	6 805 482.53	339 225 427.73	218 004.43	693.93	339 444 126.09	339 443 432.16	693.93	339 444 126.09	100.0%	-37.9%
B32 TECHNOLOGY FOR ITER AND DEMO	5 300 000.00					-1 920 865.52	3 379 134.48			3 379 134.48	3 379 134.38		3 379 134.38	100.0%	-36.2%
B33 TECHNOLOGY FOR BROADER APPROACH	31 000 000.00					-7 200 730.43	23 799 269.57			23 799 269.57	23 799 269.57		23 799 269.57	100.0%	-23.2%
B34 TECHNOLOGY FOR DONES	500 000.00					-500 000.00	0.00			0.00	0.00		0.00	100.0%	-100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	15 000 000.00					2 820 278.83	17 820 278.83		20 833.08	17 841 111.91	17 820 278.83	20 833.08	17 841 111.91	100.0%	18.9%
B36 OTHER OPERATIONAL EXPENDITURE	5 000 000.00					250 000.00	5 250 000.00	98 436.95	51 070.41	5 399 507.36	5 214 761.71	51 070.41	5 265 832.12	97.5%	5.3%
Title B3 - Total	603 809 284.00	-10 000 000.00	0.00	-253 718 538.05	49 129 199.25	254 165.41	389 474 110.61	316 441.38	72 597.42	389 863 149.41	389 656 876.65	72 597.42	389 729 474.07	100.0%	-35.5%
B4 EARMARKED EXPENDITURE													0.00		
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	143 400 000.00		-30 000 000.00		1 218 548.12		114 618 548.12	0.00	2 160 714.82	116 779 262.94	115 279 262.94		115 279 262.94	98.7%	-19.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	p.m.				-50 347 747.37		-50 347 747.37	26 979 145.20	67 455 002.79	44 086 400.62	19 284 882.82		19 284 882.82	43.7%	-
B43 OTHER EARMARKED EXPENDITURE	p.m.						0.00	0.00	736 527.90	736 527.90	347 536.43		347 536.43	47.2%	-
Title B4 - Total	143 400 000.00	0.00	-30 000 000.00	0.00	-49 129 199.25	0.00	64 270 800.75	26 979 145.20	70 352 245.51	161 602 191.46	134 911 682.19	0.00	134 911 682.19	83.5%	-5.9%
Titles B3 & B4 - Subtotal	747 209 284.00	-10 000 000.00	-30 000 000.00	-253 718 538.05	0.00	254 165.41	453 744 911.36	27 295 586.58	70 424 842.93	551 465 340.87	524 568 558.84	72 597.42	524 641 156.26	95.1%	-29.8%
Total BUDGET in Payment appropriations	820 583 574.00	-9 890 300.00	-30 109 700.00	-253 718 538.04	0.00	0.00	526 865 035.96	27 319 175.39	77 350 912.48	631 535 123.83	592 033 135.24	5 676 533.62	597 709 668.86	94.6%	-27.2%

Annex III. c. Transfers Adopted by the F4E Director

In EUR

Fusion for Energy 2023 TRANSFERS	Type of appropriation	Transfer N°1 F4E.20834 17-01-2023	Transfer N°2 F4E.20952 31-05-2023	Transfer N°3 F4E.21192 06-11-2023	Transfer N°4 F4E.21239 16-11-2023	Transfer N°5 F4E.21325 04-12-2023	Transfer N°6 F4E.21416 14-12-2023	Transfer N°7 F4E.21482 20-12-2023	Transfer N°8 F4E.21484 20-12-2023	Transfer N°9 F4E.21489 20-12-2023	Transfer N°10 F4E.21512 21-12-2023	TOTAL TRANSFERS
10 SALARIES AND ALLOWANCES OF WHICH ESTABLISHMENT PLAN POSTS	commitments and payments	5,000.0	-500,000.0			-622,303.4						-1,117,303.4
11 SALARIES AND ALLOWANCES OF WHICH EXTERNAL PERSONNEL	commitments and payments			214,450.0		1,128,677.2		-12,420.2				1,330,707.1
12 EXPENDITURE RELATING TO STAFF RECRUITMENT	commitments and payments			-80,000.0		-25,602.5		-9,000.0				-114,602.5
13 MISSIONS EXPENSES	commitments and payments			53,000.0				100,000.0				153,000.0
14 SOCIAL-MEDICAL INFRASTRUCTURE	commitments and payments		135,000.0			-42,410.0		-22,500.0				70,090.0
15 TRAINING	commitments and payments											0.0
16 EXTERNAL SERVICES	commitments and payments		250,000.0			-100,000.0		-100,000.0				50,000.0
17 RECEPTION, EVENTS AND REPRESENTATION	commitments and payments	-5,000.0				-2,500.0						-7,500.0
18 SOCIAL WELFARE	commitments and payments			13,000.0				-1,480.0				11,520.0
19 OTHER STAFF RELATED EXPENDITURE	commitments and payments			-320,000.0		-42,205.0		-34,863.0				-397,068.0
SUB TOTAL TITLE 1	commitments and payments	0.0	-115,000.0	-119,550.0	0.0	293,656.3	0.0	-80,263.2	0.0	0.0	0.0	-21,156.8
21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	commitments and payments			247,000.0								247,000.0
22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	commitments and payments			257,250.0				-718.3				256,531.7
23 MOVABLE PROPERTY AND ASSOCIATED COSTS	commitments and payments			-120,000.0		-7,500.0		-39,600.0				-167,100.0
24 CURRENT ADMINISTRATIVE EXPENDITURE	commitments and payments		115,000.0	-150,000.0		-245,684.5		-73,503.9				-354,188.5
25 POSTAGE AND TELECOMMUNICATIONS	commitments and payments			-140,000.0		-10,378.0		-16,700.0				-167,078.0
26 MEETING EXPENSES	commitments and payments			69,500.0				-13,380.0				56,120.0
27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES	commitments and payments											0.0
28 INFORMATION AND PUBLISHING	commitments and payments			-14,200.0		-11,500.0						-25,700.0
29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	commitments and payments			-30,000.0		-18,593.8		-30,000.0				-78,593.8
SUB TOTAL TITLE 2	commitments and payments	0.0	115,000.0	119,550.0	0.0	-293,656.3	0.0	-173,902.3	0.0	0.0	0.0	-233,008.6
TOTAL TITLE 1 + TITLE 2	commitments and payments	0.0	0.0	0.0	0.0	0.0	0.0	-254,165.4	0.0	0.0	0.0	-254,165.4
31 PREPARATION	commitments						-250,000.0	-197,096.8				-447,096.8
	payments				-3,000,000.0		-750,000.0	934,290.6	1,920,865.5	7,449,361.8	250,964.6	6,805,482.5
32 TECHNOLOGY FOR ITER AND DEMO	commitments						250,000.0					250,000.0
	payments								-1,920,865.5			-1,920,865.5
33 TECHNOLOGY FOR BROADER APPROACH	commitments											0.0
	payments									-7,449,361.8	248,631.3	-7,200,730.4
34 TECHNOLOGY FOR DONES	commitments											0.0
	payments										-500,000.0	-500,000.0
35 EXTERNAL SUPPORT ACTIVITIES	commitments											0.0
	payments				3,000,000.0		500,000.0	-680,125.2			404.1	2,820,278.8
36 OTHER OPERATIONAL EXPENDITURE	commitments							451,262.2				451,262.2
	payments						250,000.0					250,000.0
SUB TOTAL TITLE 3	commitments	0.0	0.0	0.0	0.0	0.0	0.0	254,165.4	0.0	0.0	0.0	254,165.4
SUB TOTAL TITLE 3	payments	0.0	0.0	0.0	0.0	0.0	0.0	254,165.4	0.0	0.0	0.0	254,165.4
TOTAL	commitments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	payments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Annex III. d. Resources allocated to F4E Work Programme 2023

2023 Work Programme		Grant		Procurement		Cash Contribution		TOTAL	
		Amount (€)	Variation (%)	Amount (€)	Variation (%)	Amount (€)	Variation (%)	Amount (€)	Variation (%)
B3-1 & B4-1 ITER Construction	Original WP	3,516,178	-	640,229,588	-	206,374,208	-	850,119,974	-
	Last amended WP	4,576,373	30%	453,441,531	-29%	162,024,705	-21%	620,042,609	-27%
	Execution	3,937,108	-14%	270,182,390	-40%	161,977,633	0%	436,097,131	-30%
B3-2 Technology for ITER	Original WP	0	-	6,136,511	-	0	-	6,136,511	-
	Last amended WP	0	-	3,863,172	-37%	0	-	3,863,172	-37%
	Execution	0	-	3,899,736	1%	0	-	3,899,736	1%
B3-3 Technology for Broader Approach	Original WP	0	-	45,256,587	-	12,845,000	-	58,101,587	-
	Last amended WP	0	-	20,334,987	-55%	12,959,544	1%	33,294,531	-43%
	Execution	0	-	19,840,355	-2%	12,958,544	0%	32,798,899	-1%
B3-4 Technology for DONES	Original WP	0	-	2,000,000	-	0	-	2,000,000	-
	Last amended WP	0	-	15,000	-	0	-	15,000	-
	Execution	0	-	0	-100%	0	-	0	-100%
B3-5 External Support Activities	Original WP	0	-	18,738,413	-	0	-	18,738,413	-
	Last amended WP	0	-	21,184,331	-	0	-	21,184,331	-
	Execution	0	-	20,275,776	-4%	0	-	20,275,776	-4%
B3-6 Other Expenditure	Original WP	0	-	10,177,279	-	0	-	10,177,279	-
	Last amended WP	0	-	5,077,424	-50%	0	-	5,077,424	-50%
	Execution	0	-	5,519,466	9%	0	-	5,519,466	9%
B4-2 Activities linked to ITER Organization	Original WP	0	-	11,853,982	-	0	-	11,853,982	-
	Last amended WP	0	-	48,371,158	-	0	-	48,371,158	308%
	Execution	0	-	14,442,970	-70%	0	-	14,442,970	-70%
B4-3 Other earmarked expenditure	Original WP	0	-	0	-	0	-	0	-
	Last amended WP	0	-	0	-	0	-	0	-
	Execution	0	-	0	-	0	-	0	-
TOTAL	Original WP	3,516,178	-	734,392,360	-	219,219,208	-	957,127,746	-
	Last amended WP	4,576,373	30%	552,287,603	-25%	174,984,249	-20%	731,848,225	-24%
	Execution	3,937,108	-14%	334,160,693	-39%	174,936,177	0%	513,033,978	-30%

Variations: Last amended WP compared to Original WP and Execution to Last amended WP

Annex III. e. Statistics on Financial Management Budget – Procurement Data

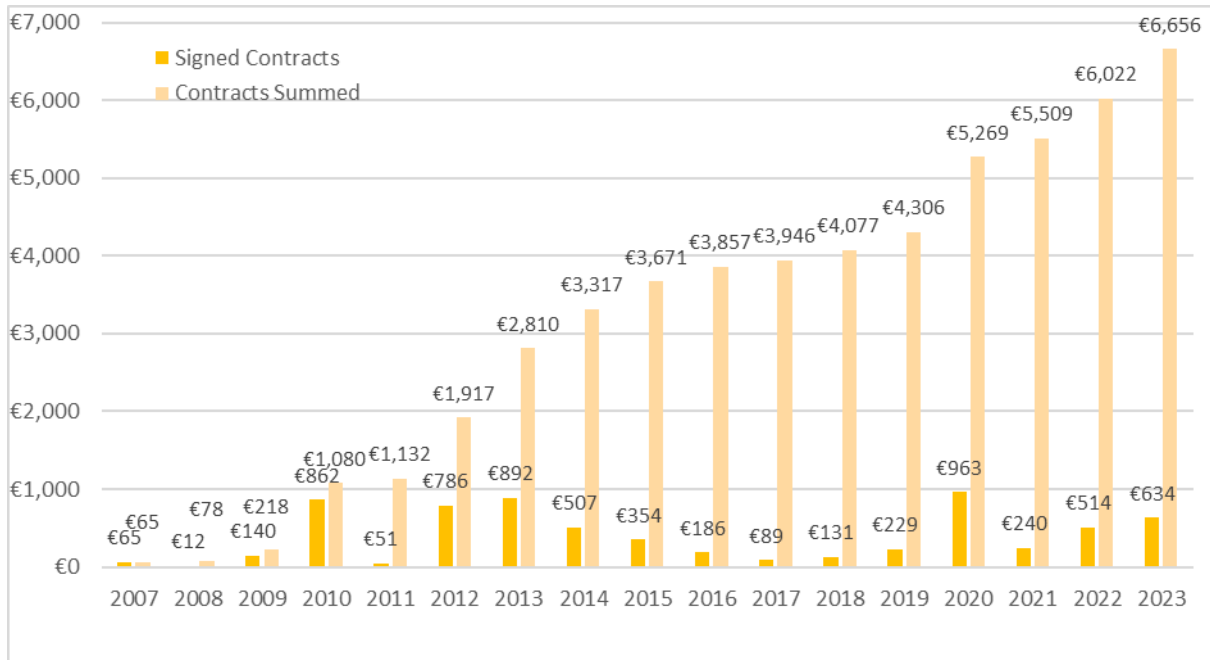


Figure 81: Annual and cumulative value of operational and administrative contracts and grants signed by F4E (€ million, in-year values).

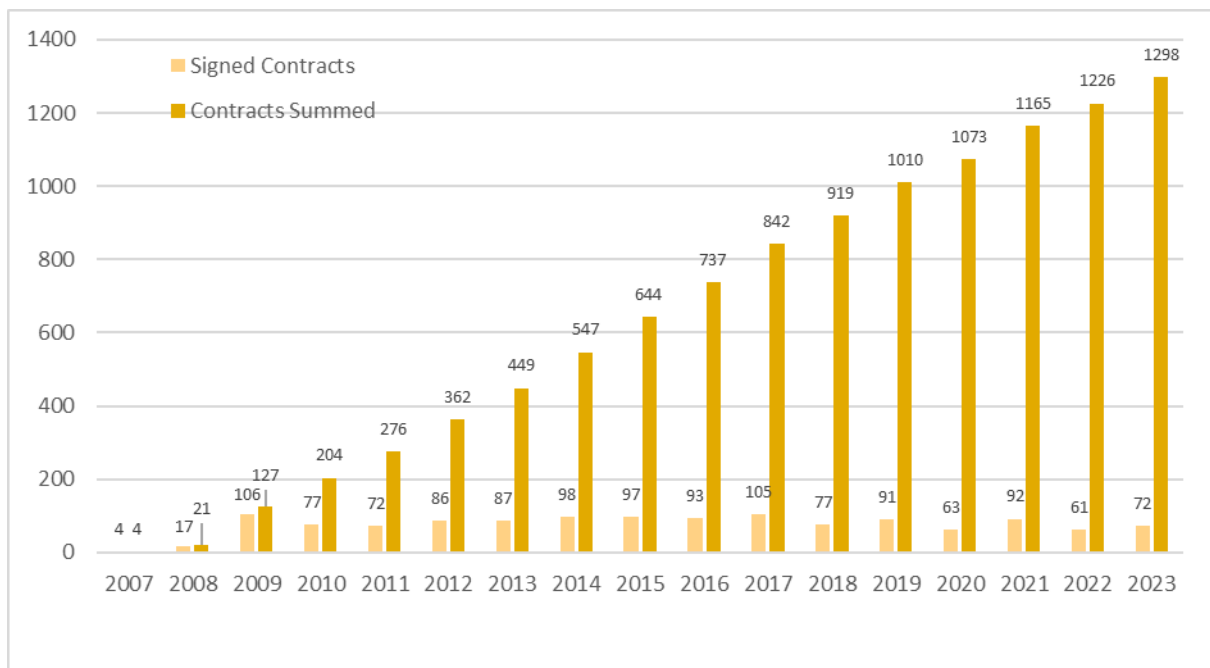


Figure 82: Annual and cumulative number of operational and administrative contracts and grants signed by F4E (in-year values).

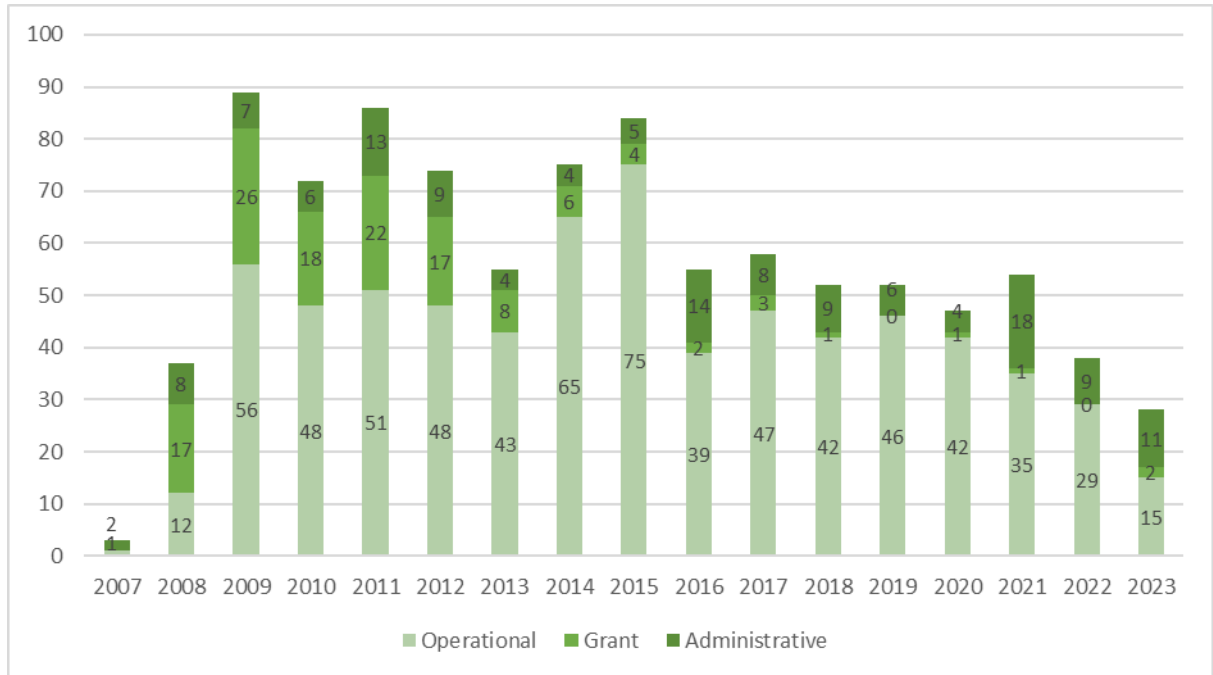


Figure 83: Operational and Administrative Procurement and Grant procedures launched.

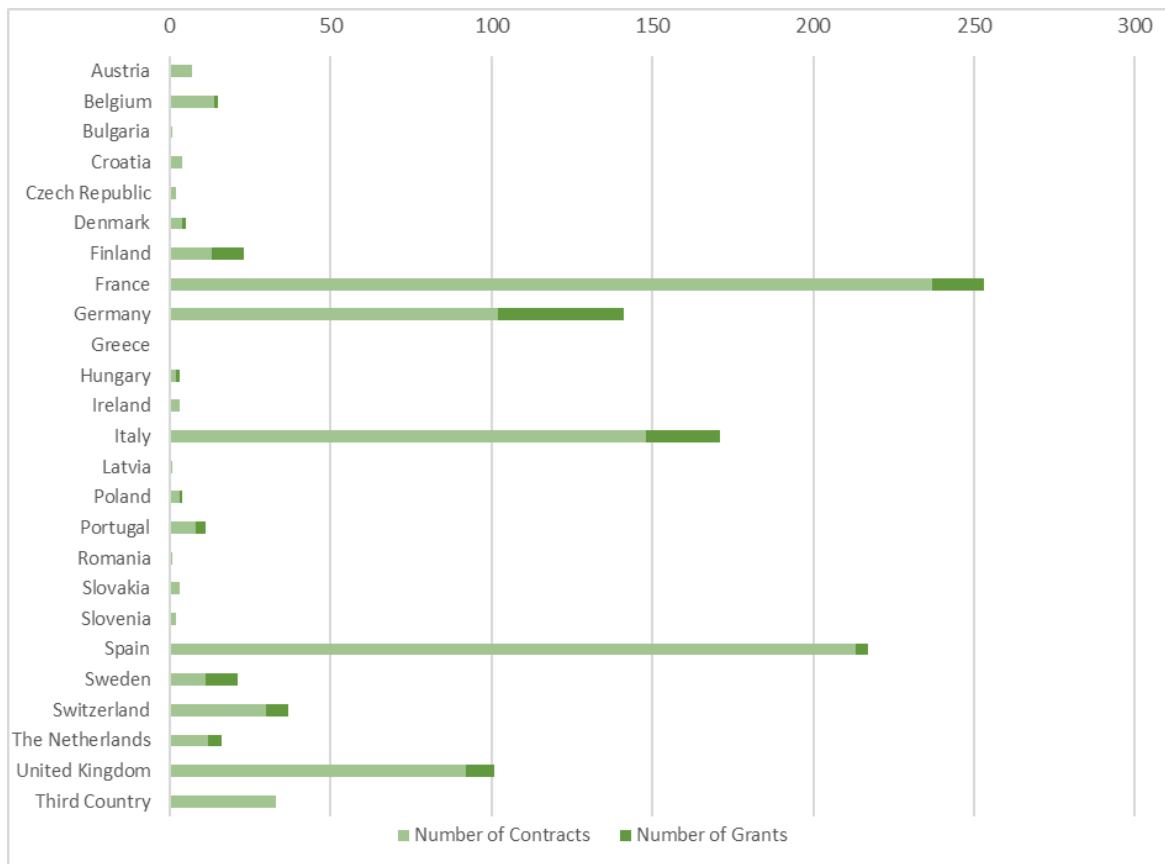
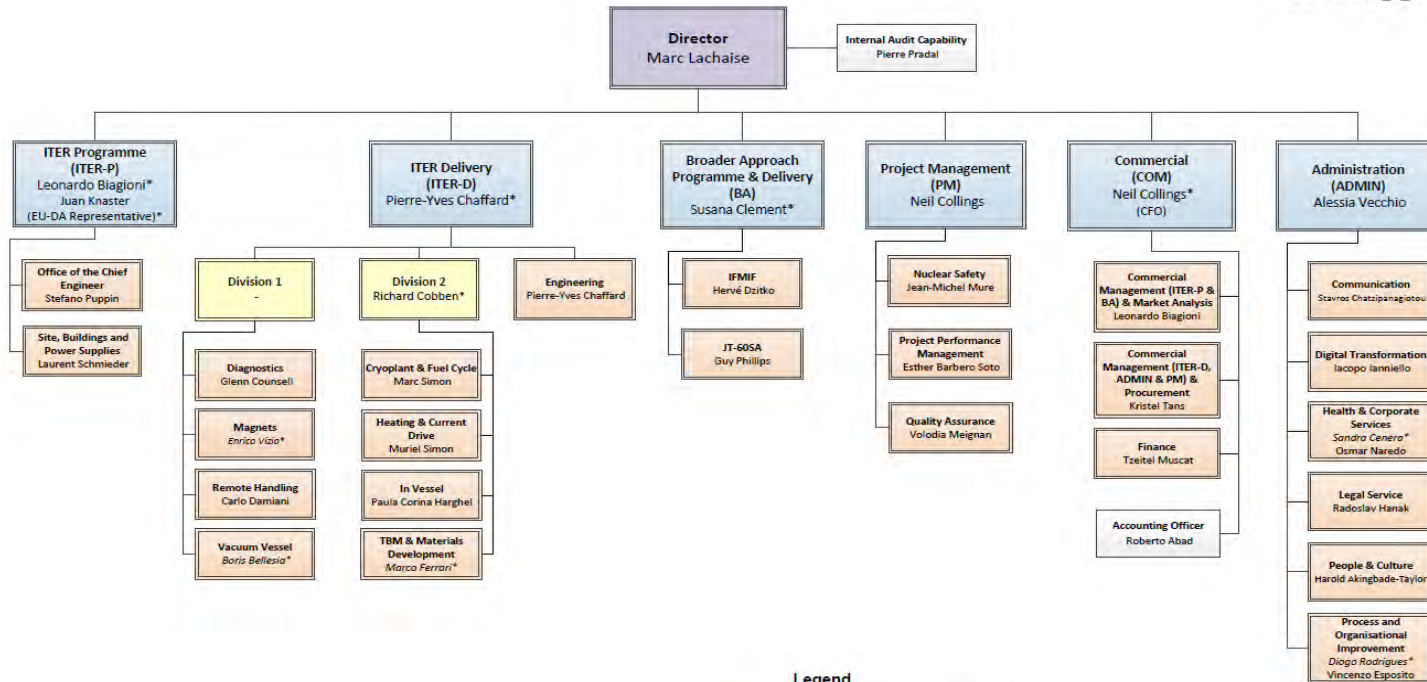


Figure 84: Geographical distribution of awarded contracts and grants (Number in the period 2007-2023). Please note that the contribution of UK and CH since 2021 is included in "Third Country".

Annex IV Organisational chart



Organisational Chart
Effective from 1 November 2023
IDM Ref. F4E_D_2PCCXS



Legend



* Acting

Annex V. Establishment Plan and Additional Information on Human Resources Management

Annex V a. Establishment Plan

	Authorised under the EU Budget (EP 2023)		Actually filled as of 31/12/2023	
	FO	TA	FO	TA
AD 16				
AD 15		1		
AD 14	4	3	2	1
AD 13	7	9	4	2
AD 12	11	24	11	24
AD 11	3	24	1	19
AD 10	3	49	8	52
AD 9	4	50	2	41
AD 8		24		23
AD 7	1	20	1	15
AD 6		19		24
AD 5				
AD Total	33	223	29	201
AST 11	2		1	
AST 10	2		1	
AST 9	2	1	4	
AST 8	1	3		1
AST 7	1	7		4
AST 6		9	2	8
AST 5	3	11	3	6
AST 4	1		1	4
AST 3		6		7
AST 2				
AST 1				
AST Total	12	37	12	30
TOTAL	45	260	41	231
GRAND TOTAL	305		272	

Annex V b. Table: Job Screening/Benchmarking Against Previous Year Results

Job type	Sub-category	Year 2023 (%)	Year 2022 (%)
Administrative Support and Coordination	Administrative support	13.49 %	13.57 %
	Coordination	1.50 %	1.53 %
	Total	14.99 %	15.10 %
Operational	Top level operational coordination	6.00 %	6.35 %
	Programme management and implementation	65.10 %	64.33 %
	Evaluation and impact assessment	1.07 %	1.09 %
	General operational activities	3.00 %	3.06 %
	Total	75.16 %	74.84 %
Neutral	Finance, Control	9.85 %	10.07 %
	Linguistics	0.00 %	0.00 %
	Total	9.85 %	10.07 %

Annex V c. Indicative Table - Information on Recruitment Grade/Function Group for Each Type of Post

Key functions (examples – terminology should be adjusted to each agency's job titles)	Type of contract (official, TA or CA)	Function group, grade of recruitment *	Indication whether the function is dedicated to administrative support or operations [subject to definitions used in screening methodology]
<i>Adviser / Senior Expert</i>	FO/TA	AD13-14	Administrative/Operations
<i>Head of Department (level 2, taking the Director as level 1)</i>	FO/TA	From AD12 to 14	Administrative/Operations
<i>Head of Division??/Head of Unit/Project Team Manager (level 3)</i>	FO/TA	From AD9 to AD14	Administrative/Operations
<i>Group Leader (level 4)</i>	FO/TA	From AD5 to AD12	Operations/Neutral
<i>Officer</i>	FO/TA	From AD5 to AD12	Administrative/Operations/Neutral
<i>Assistant</i>	FO/TA	From AST1 to AST9	Administrative/Operations/Neutral
<i>Senior Assistant</i>	FO/TA	AST10-11	Administrative/Operations/Neutral
<i>Head of Administration</i>	TA	AD12 (external)	Administrative
<i>Head of Human Resources</i>	TA	AD11 (external)	Administrative
<i>Head of Finance</i>	FO	AD10	Neutral
<i>Head of ICT</i>	TA	AD 9 to 14 (internal)	Administrative
<i>Secretary/Clerk</i>	CA	II	Administrative/Operations/Neutral
<i>Data Protection Officer</i>	FO	AD11	Administrative
<i>Accounting Officer</i>	FO	AD7	Neutral
<i>Internal Auditor</i>	TA	AD9	Administrative
<i>Assistant to the Director</i>	CA	III	Operations

Annex V d. Flexitime Scheme in 2023

Category / Grade	Overtime (days)	Recuperation (days)
AD		
10	850.77	187.25
11	554.76	55.00
12	98.02	65.50
13	141.28	0.00
14	49.09	0.00
6	293.48	80.00
7	363.77	118.00
8	265.92	108.77
9	660.65	153.50
AST		
10	0.63	0.00
11	24.52	3.00
3	55.77	16.50
4	45.26	25.00
5	37.20	16.31
6	153.18	41.50
7	79.32	18.00
8	27.33	19.00
9	71.76	25.13
GFII		
5	42.09	21.00
6	16.66	8.50
7	41.91	6.50
GFIII		
10	134.91	43.38
11	142.11	59.38
12	70.18	31.50
9	12.82	4.50
GFIV		
14	165.87	65.00
15	254.81	114.00
16	245.35	128.63
17	107.19	52.00
Average F4E	172.64	50.58

Annex VI. Human and Financial Resources by Work Programme Actions

The projects of F4E are divided in actions, defining the structure of the Annual Work Programme (WP). F4E staff is assigned to each action. F4E applies a **'flexibility' clause** to the total resources allocated in the Annual Work Programme with the purpose to limit the changes in the implementation of the actions compared to the substance of the Work Programme adopted by the Governing Board.

The budget 2023 has been implemented in full respect of that flexibility clause, with the following breakdown of human and financial resources per WP action:

Budget implementation by Work Programme actions

in EUR

Action #	Action	Staff 2023	Original Budget/Budgeted forecast WP23	Final Budget/Budgeted forecast WP23	Execution	Variation Original [2] %	Variation Final [3] %
1	Magnets	21.5	6,727,721	3,301,777	3,298,963	-51%	0%
2,3,4,10 [1]	Main Vessel	99.8	166,897,558	56,693,785	62,571,302	-63%	10%
5	Remote Handling	45.0	20,241,263	15,816,606	15,726,835	-22%	-1%
6	Cryoplat and Fuel Cycle	33.2	13,536,532	7,763,734	8,116,799	-40%	5%
7	Plasma Engineering Operations	0.0	2,307,115			-100%	
8	Heating and Current Drive	68.2	127,045,977	62,293,119	62,466,492	-51%	0%
9	Diagnostics	44.7	16,719,545	17,659,975	13,391,928	-20%	-24%
11	Site and Buildings and Power Supplies	68.1	195,432,489	125,944,498	135,164,952	-31%	7%
12	Cash Contributions	2.4	205,185,634	155,949,959	155,949,959	-24%	0%
13	Supporting Activities	33.9	34,194,805	26,557,201	22,398,372	-34%	-16%
14	Broader Approach		58,101,587	34,177,127	33,811,295	-42%	-1%
15	Dones	50.2		273,080	137,080		-50%
	Sub-total Budget WP	467	846,390,205	506,430,861	513,033,978	-39%	1%
	Of which reserve stemming from cancelled appropriations to be entered in the Statement of revenue and expenditure of the following financial years as per Article 12.1 FR		100,947,036	133,346,729			
	Of which reserve stemming from appropriations corresponding to external assigned revenue from ITER IO as per Article 12.2.4 b FR		9,790,505	36,322,585			
	Of which reserve stemming from appropriations corresponding to external assigned revenue from ITER Host State as per Article 12.2.4 b FR			55,748,050			
	Total Budget		957,127,746	731,848,224			

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

[2] Variation Original: Execution compared to Original WP

[3] Variance Final: Execution compared to last amended WP

The evolution of the 2023 Work Programme is reflected in its amendments approved by the Governing Board in July and December 2023⁹. The KPI of the execution of the budgeted forecast allocated to the 2023 Work Programme in its last amendment is 101%.

The other changes (> +/-10%) in the Operational expenditure (variation of the final implementation in % of the last amended budgeted forecast WP) are:

- **Main Vessel:** variance consists of the signature of an amendment for the Vacuum vessel contract.
- **Diagnostic:** one task order for Front-End components was not implemented.
- **Supporting activities:** variance consists of minor commitments not implemented.
- **Dones:** One service support/support contract was not implemented.

⁹ Amendment 1 to Work Programme 2023 (F4E_D_3377E4) and Amendment 2 to Work Programme 2023 (F4E_D_34FJL9)

Annex VII Environmental Management

As Chair of the Greening Network, F4E multiplied efforts to raise the awareness on sustainability issues at all levels. As a result, the Greening Network has been recognised by its peers and sustainability has been integrated in the reflection and work programme of several EU Agencies subnetworks. Fruitful discussions among GN members have nurtured a global strategy "The EU Agencies and JUs towards a sustainable future" to implement the ambitions set in the EUAN 2021-2027 Strategy ("Greening and Sustainability in the EU Agencies Network") in the context of the European Green Deal and the Commission's ambitions.

At local level, fruitful exchanges took place with the Building Management of Barcelona premises on energy efficiency (air condition and ventilation) and mobility (installation of plugs for electric cars). Some steps have also been taken to further investigate the implementation of environmental certification (e.g. EMAS, ISO) within the building, our procurement practice and, in general, F4E as a whole.

Annex VIII Contribution, grant and service level agreements. Financial Framework Partnership Agreements¹⁰

On going Grants signed before 31.12.2023

Grant Agreements Reference	Date of Signature	Total Amount		Duration (In months)
		Commitment Value (Euros)	of which committed in 2023	
F4E-FPA-327 (PMS-DG)-07	20/02/2020	€2,100,941.00	€19,304.00	50
F4E-FPA-364-06	22/10/2018	€1,485,307.76	€94,882.00	68
F4E-FPA-384 (DG)-05	30/07/2018	€2,661,530.56	€375,398.00	74
F4E-GRT-0901-01	09/03/2018	€2,024,913.50	€293,354.00	76
F4E-GRT-1146-01	25/07/2021	€2,346,561.37	€85,987.00	48
F4E-GRT-553	09/07/2014	€2,562,993.00	€0.00	88
F4E-GRT-1446-01	06/10/2023	€3,099,974.00	€3,099,974.00	22
F4E-GRT-1530-01	13/12/2023	€75,670.00	€75,670.00	13

¹⁰ F4E does not provide to other entities Contribution and service level agreements nor Financial Framework Partnership Agreements

Annex IX – Annual Accounts



**FUSION
FOR
ENERGY**

FINAL ANNUAL ACCOUNTS

Financial statements & Budget implementation

Sixteenth financial year – 2023

THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY

Josep Pla nº 2 · Torres Diagonal Litoral · Edificio B3· 08019 Barcelona · Tel. +34 93 320 18 00

www.fusionforenergy.europa.eu

These annual accounts have been drawn up by the Accounting Officer of the European Joint Undertaking for ITER and the development of Fusion Energy (F4E).

The final accounts, together with the opinion of the F4E Governing Board (GB), are sent to the Commission's Accounting Officer, the European Court of Auditors, the European Parliament and the Council.

The final accounts are published on F4E's website:

<https://fusionforenergy.europa.eu/key-reference-documents/>

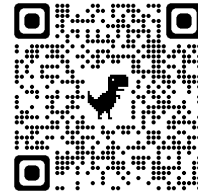


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Certification letter from F4E Accounting Officer

I acknowledge my responsibility for the preparation and presentation of the annual accounts of Fusion for Energy (F4E) in accordance with Article 102 of the Framework Financial Regulation ('FFR')¹ and I hereby certify that the annual accounts of F4E for the year 2023 have been prepared in accordance with Title IX of the FFR and the accounting rules adopted by the Commission's Accounting Officer, as are to be applied by all the Institutions and Union bodies.

I have obtained from the Authorising Officer, who certified its reliability, all the information necessary for the production of the accounts that show the F4E's assets and liabilities and the budgetary implementation. Based on this information, and on such checks as I deemed necessary to sign off the accounts, I have a reasonable assurance that the accounts present fairly, in all material aspects, the financial position, the results of the operations and the cash-flow of F4E.

Mr Roberto Abad Villanueva
Accounting Officer

Done in Barcelona, 23rd May 2024

¹ COMMISSION DELEGATED REGULATION (EU) 2019/715 of 18 December 2018 on the framework financial regulation for the bodies set up under the TFEU and Euratom Treaty and referred to in Article 70 of Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council.

1. Introduction

F4E is a Joint Undertaking created under the Euratom Treaty by a decision of the Council of the European Union (EU)².

F4E was established for a period of 35 years from 19th April 2007 and its seat is located in Barcelona, Spain.

The main tasks of F4E are as follows:

- In relation to the obligations stemming from the ITER International Agreement: to provide the contribution of the European Atomic Energy Community (Euratom) to the ITER International Organisation (IO).
- In relation to the obligations stemming from the Broader Approach Agreement with Japan (BA): to provide components, equipment, materials and other resources for BA activities and to prepare and coordinate Euratom's participation in the implementation of BA activities.
- In relation to DEMO: to prepare and coordinate a programme of research, development and design activities other than ITER and BA activities, in preparation for the construction of a demonstration fusion reactor and related facilities, including the IFMIF (International Fusion Materials Irradiation Facility).

Regarding the ITER project, in November 2016 the Council of IO approved a new ITER project baseline for the scope, schedule and the cost of the project. The overall project schedule is based on a progressive four-stage approach with the so-called 'First Plasma' in December 2025 and culminating in the 'Deuterium-Tritium' phase in December 2035. Following the approval of the new ITER project baseline, F4E set the new timetable and recalculated the related cost at completion of the F4E's contribution to the project construction phase.

In addition to the construction of the machine, F4E will have to contribute to the ITER operational phase and to the subsequent ITER deactivation and decommissioning phases. The F4E contribution to the deactivation and the decommissioning phases are defined as EUR 95 540 000 (in 2001 values) and EUR 180 200 000 (in 2001 values).

For the Multiannual Financial Framework (MFF) period 2021-2027, the European Council has agreed a budget for the Euratom contribution to ITER amounting to a total value of EUR 5 614 million (in current values) of which EUR 5 560 million (in current value) of direct contribution to the project. The ITER Host State and Membership contributions will be added to this figure, subject to the final decision by the relevant Budgetary Authorities.

² Council decision 2021/281/Euratom of 22 February 2021 Amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it.

a) **F4E revenue is made up of the:**

- **Euratom contribution**

The contribution from Euratom constitutes the main source of revenue for F4E.

The annual contribution is determined in the European Union General Budget in commitment and in payment appropriations, as well as the F4E establishment plan. The revenue received from Euratom is earmarked for operational expenditure and for administrative expenditure (running costs).

- **The ITER Host State Contribution (France)**

The contribution from the ITER Host State constitutes the second source of revenue for F4E. France as the ITER Host State covers 9.09% of the total costs of the ITER construction phase, this is equivalent to 20% of the total European participation to the construction of ITER. New principles and methodology to calculate the French contribution are established in the exchange of letter³ from 2022, with retroactive effect in 2021. It is calculated on the EURATOM contribution to F4E minus the domains of exclusion as agreed in the exchange of letter and defined as follows:

- Administrative expenditure,
- Test Blanket Modules cost,
- DONES cost,
- Broader Approach cost,
- The Transportation cost.

Compared to the 2011 agreement, covering the period until the end of 2020, this new methodology is no longer limited in time and covers the remaining lifetime of the project.

- **The Membership contributions (F4E Members except Euratom)**

The Annual Membership Contributions are established and adopted annually within the budget. It corresponds to 10% of the administrative budget and are universal (not assigned) revenue.

- **Reserve Fund and other tasks requested and financed by IO**

The revenue from the Reserve Fund managed by the IO is assigned to the implementation of change orders originating from IO which take place in the framework of the contractual relationships between F4E and the various suppliers.

The revenue from the Reserve Fund and from other requested tasks is earmarked for financing the corresponding requests for change from IO introduced after 5th March 2015.

³ Contribution financière française à la construction d'ITER : Lettre du Haut Représentant Français pour ITER (formal exchange of letters on 17 June 2022 and 29 July 2022 between France and the European Commission).

b) United Kingdom and Switzerland Participation in ITER Programme

Following the United Kingdom's withdrawal from Euratom, the UK's membership in F4E depends on the adoption of Articles 7 and 8 of draft Protocol I (Programmes and activities in which the UK participates) of the Joint Declaration on Participation in Union Programmes and Access to Programme Services under the EU-UK Trade and Cooperation Agreement. However, as the parties could not conclude the Protocol, the UK is still not associated with the Euratom research and training programme and the F4E's activities. Therefore, the UK is currently not a member of F4E.

In addition to Euratom and the EU Member States, Switzerland was a full F4E member based on a cooperation agreement in the field of controlled nuclear fusion. Switzerland ceased being an F4E member in December 2020, when the agreement expired. In 2022, F4E concluded an agreement with the Ecole Polytechnique Fédérale de Lausanne regarding scientific and technological co-operation.

c) Main achievements during 2023

IO is currently working on the creation of a new ITER project Baseline (scope, schedule and cost) that will be presented to the ITER Council for a decision during the second half of 2024. F4E is devoting significant efforts to support the IO during this challenging period and to support initiatives to bring the two organisations closer together to increase the overall efficiency and performance of the project.

During an extraordinary GB in February 2023, Marc LACHAISE was appointed as the new F4E Director and started his appointment on 16th of May. F4E notes that the mission letter from the GB to the new Director asks for action along six axes: (1) One Team, One Objective between F4E and the IO, (2) a modern, diverse & flexible organisation, (3) a renewed engagement to deliver, (4) transparent & flexible working method, (5) sound & transparent financial management, budget planning & reporting and (6) a renewed engagement with scientific & industrial stakeholders & F4E's long-term perspective.

During 2023 F4E has further progressed in the work and continued the delivery of some of the major components to ITER to continue the assembly activities for achievement of First Plasma.

Notably in 2023 F4E delivered the Torus and Cryostat Front-End Cryopump Distribution System and Cryojumpers to the ITER site (GB28). As far as In-Vessel is concerned, F4E completed the qualification phase prior to start of Blanket First Wall series production (GB37).

F4E also made available to IO the Cryoline Bridge for installation of systems (GB57) and the Diagnostics Programme delivered the Electronics and Software for Magnetics (GB39).

F4E also signed the Task Order for Manufacturing the Cask and Plug Remote Handling System (GB32).

Both design and manufacturing activities have progressed in Europe in laboratories and industry.

In 2023 F4E achieved an Annual M-SPI:

$$\text{Annual } M - \text{SPI} = \frac{\text{Number of milestones with Status = Completed}}{\text{Number of milestones with reference date } \leq \text{Current month}} = 0.67$$

The achievements during the year are detailed in the 2023 Consolidated Annual Activity report (with the annual accounts in annex).

d) Impact of international situation

During 2022 and 2023 F4E experienced strong inflationary effects, initially due to COVID-19 induced supply chain issues and then (after February 2022) due to the war in Ukraine. The estimated impact of these on the total F4E EAC amounts to €258M (2008 value) per the latest estimate. This EAC increase is expected to materialize as additional expenditure in the years 2024-2026. This inflationary effect is clear in raw material prices, both in existing contracts and tenders received in 2023, and is likely to continue in the future depending on the developing international situation.

e) 2023 Accounts

The 2023 financial statements of F4E and its reports on budget implementation for 2023 have been prepared in conformity with:

- The Council Decision establishing F4E,
- The Financial Regulation (FR) applicable to the general budget of the European Union⁴,
- The F4E FR⁵,
- The « Inventory directive » (EC n° 643/2005),
- The European Commission's consolidation manual for the 2023 closure.

The accounts have also been drawn up in accordance with the accounting rules adopted by the Accounting Officer of the European Commission (EC). As an EU body, F4E is fully consolidated in the EU accounts. Articles 80.1 and 82.1 of the general FR state that the Accounting Officer of the EC adopts the accounting rules and the harmonised chart of accounts to be applied by all institutions and EU bodies. They are accrual based accounting policies derived from International Public Sector Accounting Standard (IPSAS) or by default, International Financial Reporting Standards (IFRS).

F4E has implemented the ABAC system (Accrual Based Accounting) owned by the EC and used by many EU bodies. The accounting and budgetary information is integrated in one system which has SAP as a back-end for the accounting part. The workflow system in ABAC allows the Authorising Officer to ensure that the "four eyes" principle has been observed for each transaction.

The representation letter related to the accounts 2023 has been transmitted to the President of the European Court of Auditors (ECA) in a separate note. It includes no reservation from the F4E Accounting Officer.

⁴ Financial Regulation (EC, Euratom) n° 966/2012 of the European Parliament and of the Council of 25 October 2012, last amended on 18/07/2018 (EU, Euratom) n° 2018/1046.

⁵ F4E Financial Regulation adopted by F4E Governing Board on 9-10/12/2019 – F4E(19)-GB45-45.

In line with Article 70.6 of the FR applicable to the general budget of the EU, Baker Tilly has been appointed as independent external auditor to verify that the 2023 annual accounts properly present the income, expenditure and financial position of F4E.

ECA shall prepare a specific Annual Report in line with the requirement of Article 287 (1) TFEU. When preparing this report, ECA shall consider the audit work performed by the independent external auditor and the action taken in response to the auditor's findings.

The European Parliament is the discharge authority within the EU. This means that, following the audit and finalisation of the annual accounts, it falls under the responsibility of the Council to recommend and then to the European Parliament to give a discharge to F4E.

Section I. 2023 Financial Statements

2. Balance Sheet

As at 31 December 2023

EUR thousands

	Note	2023	2022
CURRENT ASSETS			
Cash and cash equivalents	6.2.1.	25	25
Receivables	6.2.2.	192 080	310 904
Pre-financing	6.2.3.	19 879	13 393
		211 984	324 322
NON-CURRENT ASSETS			
Pre-financing	6.2.3.	77 745	67 308
Property, plant and equipment	6.2.4.	388	467
Intangible assets	6.2.4.	73	45
		78 206	67 821
TOTAL ASSETS		290 190	392 143
CURRENT LIABILITIES			
Accounts payable	6.2.5.	126 337	79 960
Accrued charges and deferred income	6.2.6.	122 750	119 642
Current provisions	6.2.7.	0	76
		249 087	199 678
NON-CURRENT LIABILITIES			
Non-Current provisions	6.2.7.	206 903	185 560
		206 903	185 560
TOTAL LIABILITIES		455 991	385 238
NET ASSETS		-165 801	6 905
NET ASSETS/EQUITY			
Accumulated surplus/deficit		6 905	23 297
Economic result of the year - Profit (+)/Loss (-)		-172 706	-16 392
NET ASSETS	6.2.8.	-165 801	6 905

Fig. 1 Balance Sheet

3. Statement of Financial Performance

As at 31 December 2023

EUR thousands

	Note	2023	2022
NON-EXCHANGE REVENUES			
Revenue from Euratom		404 387	596 754
Revenue from other contributors (Member States)		120 700	155 500
Other non exchange revenue		182	701
		525 268	752 955
EXCHANGE REVENUES			
Reserve Fund		22 272	69 549
Other revenues		199	16
		22 471	69 565
TOTAL REVENUE	6.3.1.	547 740	822 520
OPERATIONAL EXPENSES			
	6.3.2.		
Expenses with third parties		623 371	752 147
		623 371	752 147
OTHER EXPENSES			
	6.3.3.		
Staff costs		59 504	64 994
Provisions - additions and adjustments		21 344	2 576
Property, plant and equipment related expenses		1 986	2 118
Other expenses		14 242	17 076
		97 075	86 765
TOTAL EXPENSES		720 446	838 912
SURPLUS (+) / DEFICIT (-) OF THE YEAR		-172 706	-16 392

Fig. 2 Statement of Financial Performance

4. Cash Flow Statement (indirect method)

As at 31 December 2023

EUR thousands

	2023	2022
Surplus/(deficit) from ordinary activities	-172 706	-16 392
Operating activities		
Amortization (intangible fixed assets) +	33	-11
Depreciation (tangible fixed assets) +	-520	159
Increase/(decrease) in Provisions for risks and liabilities	21 267	-60 296
Increase/(decrease) in Value reduction for doubtful debts	0	0
(Increase)/decrease in Stock	0	0
(Increase)/decrease in Long term Pre-financing	-10 436	3 048
(Increase)/decrease in Short term Pre-financing	-6 486	24 380
(Increase)/decrease in Long term Receivables	0	0
(Increase)/decrease in Short term Receivables	118 824	-21 035
Increase/(decrease) in Other Long term liabilities	0	0
Increase/(decrease) in Accounts payable	49 486	70 033
	-538	-114
Investing activities		
Increase of tangible and intangible fixed assets (-)	-285	-200
Proceeds from tangible and intangible fixed assets (+)	823	293
	538	93
Net increase/(decrease) in cash and cash equivalents	0	-21
Cash and cash equivalents at the beginning of the period	25	46
Cash and cash equivalents at the end of the period	25	25

Fig. 3 Cash Flow Statement

5. Statement of Changes in Net Assets

As at 31 December 2023

EUR thousands

Net assets	Accumulated Surplus (+) / Deficit (-)	Economic result of the year	Net assets (Total)
Balance as of 31 December 2022	23 297	-16 392	6 905
Balance as of 1 January 2023	23 297	-16 392	6 905
Fair value movements	0	0	0
Allocation of the Economic Result of Previous Year	-16 392	16 392	0
Economic result of the year	0	-172 706	-172 706
Balance as of 31 December 2023	6 905	-172 706	-165 801

Fig. 4 Statement of Changes in Net Assets

6. Notes to the Financial Statements

6.1. Accounting Principles

The Financial statements provide information about the financial position, performance and cash flow of an entity that is useful to a wide range of users. For a public sector entity such as F4E, the objectives are more specifically to provide information useful for decision-making, and to demonstrate the accountability of the entity for the resources entrusted to it.

The accounts of the Joint Undertaking comprise the general accounts and budget accounts. These are kept in euro on the basis of the calendar year. The budget accounts give a detailed picture of the implementation of the budget. They are based on the modified cash accounting principle. The general accounts allow for the preparation of the financial statements which consist in a statement of financial performance, showing all income and expenditure for the financial year, and a balance sheet designed to establish the financial position of F4E at 31 December.

Article 98 of F4E FR sets out the accounting principles to be applied in drawing up the financial statements.

Use of estimates

In accordance with IPSAS and generally accepted accounting principles, the financial statements include amounts based on estimates and assumptions by management based on the most reliable information available.

Significant estimates include, but are not limited to, amounts for provisions, accounts receivables, accrued income and charges, contingent assets and liabilities, and the degree of impairment of intangible assets and property, plant and equipment. Actual results could differ from those estimates. Changes in estimates are reflected in the period in which they become known.

IPSAS 11 – Construction contracts

Most of the components that make up ITER will be delivered by the ITER parties (including F4E) “in-kind” (providing directly the components rather than contributing only cash).

The EU contribution to IO through F4E is established on the ITER Agreement and Common Understanding on Procurement Allocation and its amendments, and it comprises mainly buildings, magnets, vessels and other engineering components.

On the basis of the Procurement Arrangements (PA), F4E launches procurements and concludes contracts with the industry. The industry delivers usually directly to IO, which also performs the acceptance. IO then informs F4E about the acceptance, i.e. IO recognises the credits to F4E. In order to consider that the PA obligations have been fulfilled by each party, the PA value has to be fully earned, independently of the actual cost incurred for executing the scope of work of each PA.

For each PA key milestone an ITER credit is associated and this is released to the specific Party whenever the milestone has been achieved and the related documentation verified by IO. Therefore the progress in the execution of the work and in discharging the EU from its obligation toward the ITER Agreement is recognized by means of credit earned by F4E depending on the achievement of project milestones laid down in each PA.

As there is no specific EC accounting rule covering those operations, F4E refers to IPSAS rule n° 11 “Construction contracts”.

The ITER Agreement and Common Understanding on Procurement Allocation and its amendments together with the F4E Statutes can be considered as a binding arrangement and therefore as a construction contract according to IPSAS 11.

From an IPSAS 11 perspective, F4E can be considered as contractor and the agreement with Euratom as a construction contract.

Based on the accounting guidance applicable to the type of transactions managed by F4E, the cost of the items, acquired or constructed, incurred with the purpose of the final manufacture of the research components that F4E agreed to deliver **should be expensed when incurred**.

The recognition as an expense is the approach that better capture the nature of the transaction given that :

- in most of the cases the suppliers hold the economic ownership (i.e., is not presently controlled by F4E);
- F4E does not foresee using the assets for other purpose, or
- F4E agrees/foresees to provide the legal ownership to the subcontractors for no consideration after delivery.

It is to be noted that the use of IPSAS rule n° 11 (Construction contracts) is extended to the accounting of all operational contributions within the ITER and BA agreements.

6.2. Notes to the Balance Sheet

6.2.1. Cash and Cash Equivalents

Description	31.12.2023	31.12.2022
Bank accounts:		
Current accounts	0.00	0.00
Imprest accounts/Cash in hand	25 000.00	25 000.00
Short-term deposits	0.00	0.00
TOTAL	25 000.00	25 000.00
EC Central treasury:	20 147 122.03	50 889 047.15

Fig. 5 Central treasury and Cash Equivalents

The cash position at the end of 2023 is composed of two imprest accounts (petty cash).

No bank interests have been generated in 2023.

In view to increase the efficiency, F4E has externalised its treasury to the EC in May 2019. In line with the accounting guidance, those funds belonging to F4E are accounted as Sundry receivables.

6.2.2. Current Receivables

All receivables are carried out at the original amount less write-down for impairment when there is objective evidence that F4E will not be able to collect all amounts due according to the original payment terms.

Current receivables: EUR 14 682 131.66 referring mainly to the recoverable VAT from France.

Sundry receivables: EUR 20 213 618.67 composed mainly of the funds belonging to F4E but managed by the EC Central treasury (see also above point 6.2.1.).

Deferrals: EUR 157 183 906.82 corresponding to the deferred charges related to the 2024 cash contribution to IO (EUR 153.8 million) and deferred charges for insurance premiums paid in advance (EUR 3.1 million).

6.2.3. Pre-Financing

Pre-financing is a payment intended to provide the beneficiary with a cash advance, i.e. a float (related mainly to operational procurement contracts). It may be split into a number of payments over a period defined in the specific pre-financing agreement. The float or advance is repaid or used for the purpose for which it was provided during the period defined in the agreement. If the beneficiary does not incur eligible expenditures, he has the obligation to return the pre-financing to F4E.

The amount of the pre-financing is reduced (wholly or partially) by the acceptance of eligible costs and amounts returned.

At year-end, outstanding pre-financing amounts are valued at the original amount(s) paid less: amounts returned, eligible amounts cleared, estimated eligible amounts not yet cleared at year-end, and value reductions.

		EUR
Pre-financing without interest for F4E	31.12.2023	31.12.2022
Pre-financing given to third parties (non-current)	77 744 567.36	67 308 376.45
Pre-financing given to third parties (current)	49 166 474.12	62 946 478.82
Accrued charges on Pre-financing given to third parties	-29 287 145.75	-49 553 151.76
TOTAL	97 623 895.73	80 701 703.51

Fig. 6 Pre-Financing

It is estimated that EUR 77.7 million of the pre-financing open at 31/12/2023 will be cleared with eligible amounts after 2024.

6.2.4. Fixed Assets

An asset shall be recognised only if it is probable that the expected future economic benefits or service potential that are attributable to that asset will flow to F4E and the cost or fair value of the asset can be measured reliably. Service potential would refer to assets that are used to achieve an objective but which do not directly generate net cash inflows. In the context of F4E this comprises all assets that are used by F4E to fulfil its objectives.

F4E books as fixed assets only items with a purchase price above EUR 5 000.00. Items with a lower value, such as monitors, digital cameras, etc., are treated as expenses of the year but are however registered in the physical inventory. All assets are stated at cost less accumulated depreciation and impairment losses.

F4E has introduced the module ABAC Assets in 2008. ABAC Assets has been developed to meet the requirements of the EC "Inventory Directive" (EC n° 643/2005) and its content is replicated in SAP Assets Accounting module.

All fixed assets are depreciated monthly, with zero residual value, over a variable useful lifetime:

Asset type	Annual depreciation rate
Intangible fixed assets	25%
Tangible fixed assets	
Buildings	4%
Plant and equipment	12.5%, 25%
Furniture and vehicles	
Office furniture	10%
Transport, electrical office, printing and mailing equipment	25%
Kitchen, Printshop and postroom equipment	12.5%
Computer hardware	25%
Other fixtures and fittings	
Audiovisual and Telecommunications equipment	25%
Computer, scientific and general books, documentation	25%, 33%
Health, safety, protective, security and medical equipment,	12.5%
Other	10%
Tangible fixed assets under construction	0%

Fig. 7 Depreciation Rate

Intangible fixed assets:

An intangible asset is an identifiable non-monetary asset without physical substance.

Regarding the internally developed intangible assets (e.g. software), the requirements of the accounting rule n°6 from 1/1/2010 onwards are:

- costs directly linked to an internally developed intangible asset, providing they meet the necessary criteria, must be capitalised as asset under construction. Once the project goes live, the resulting asset will be amortised over its useful life,
- the amount of research expenses incurred on IT projects and development costs not capitalised (e.g. for small projects below threshold, see Fig.10 under note 6.3.3. below) must be disclosed in the financial statements.

As of 31/12/2023, all projects identified were below the threshold of EUR 500 000.00 used by F4E for the capitalisation of internally generated intangible assets.

Tangible fixed assets:

A tangible asset is an identifiable non-monetary asset with physical substance.

The following table Fig.8 provides the variation of the fixed assets in 2023 :

ASSETS		Intangible fixed assets			Tangible fixed assets							Fixed assets
		Intangible fixed assets internally generated	Computer Software	Total Intangible fixed assets	Buildings	Plant and Equipment	Computer hardware	Furniture and vehicles	Other Fixtures and Fittings	Tangible Fixed Assets under Construction	Total Tangible fixed assets	Total fixed assets
2023												
Gross carrying amounts 01.01.2023	+	0.00	2 876 815.02	2 876 815.02	0.00	852 654.39	4 246 209.90	742 391.82	812 984.20	0.00	6 654 240.31	9 531 055.33
Additions	+		61 207.75	61 207.75		53 200.00	165 746.10	5 085.88			224 031.98	285 239.73
Disposals	-			0.00			-1 168 897.19	-31 067.57	-273 288.78		-1 473 253.54	-1 473 253.54
Transfer between headings	+/-			0.00							0.00	0.00
Other changes :	+/-			0.00							0.00	0.00
Gross carrying amounts 31.12.2023		0.00	2 938 022.77	2 938 022.77	0.00	905 854.39	3 243 058.81	716 410.13	539 695.42	0.00	5 405 018.75	8 343 041.52
Accumulated amortization and impairment 01.01.2023	-	0.00	-2 831 409.02	-2 831 409.02	0.00	-734 501.39	-4 026 993.90	-716 146.82	-709 789.20	0.00	-6 187 431.31	-9 018 840.33
Depreciation	-		-33 414.75	-33 414.75		-76 778.00	-152 785.10	-11 629.88	-50 618.00		-291 810.98	-325 225.73
Write-back of depreciation	+			0.00							0.00	0.00
Disposals	+			0.00			1 168 897.19	30 965.57	264 622.78		1 464 485.54	1 464 485.54
Impairment	-			0.00							0.00	0.00
Write-back of impairment	+			0.00							0.00	0.00
Transfer between headings	+/-			0.00							0.00	0.00
Other changes :	+/-			0.00					-2 281.00		-2 281.00	-2 281.00
Accumulated amortization and impairment 31.12.2023		0.00	-2 864 823.77	-2 864 823.77	0.00	-811 279.39	-3 010 881.81	-696 811.13	-498 065.42	0.00	-5 017 037.75	-7 881 861.52
Net carrying amounts 31.12.2023		0.00	73 199.00	73 199.00	0.00	94 575.00	232 177.00	19 599.00	41 630.00	0.00	387 981.00	461 180.00
Accounts				210000	221000	230000	241000	240000	242000	244000	200000	

Fig. 8 Intangible and Tangible Fixed Assets

6.2.5. Accounts Payable

Current and sundry payables are **EUR 124 840 507.11** and are composed of the balance of the 2024 cash contribution to IO (EUR 124.7 million) and suppliers' invoices received but not paid at year end and reimbursements to staff.

Pre-financing received from Euratom totalled **EUR 1 496 811.56** refers to the balance of the budget outturn account 2023, to be reimbursed to the EC in 2024 (Cf. point 7.6. Budget outturn account).

6.2.6. Accrued Charges and Deferred Income

In accordance with EU Accounting Rule n° 3, accruals are made to recognize the amounts to be paid for goods or services that have been received or supplied but have not been paid, invoiced or formally agreed with the supplier, including amounts due to employees. The accruals are based on project analysis performed by the Authorizing Officer and cross-checked with the amounts actually invoiced at the time of finalization of the accounts.

The amount of **EUR 122 750 170.82** which represents mainly invoices to be received in 2024 for services rendered in 2023, includes:

- EUR 113 342 556.06 for services rendered in 2023 on operational activities and not invoiced at 31/12/2023,
- EUR 5 936 486.88 for services rendered in 2023 on administrative expenditures and not invoiced at 31/12/2023,
- EUR 1 878 808.88 for F4E staff's untaken leave as at the end of December 2023. In conformity with EC Accounting Rule n° 12, an entity shall recognize the cost of holidays carried over to the following years during the year the services were rendered by the staff members,
- EUR 1 592 319.00 as deferred income, for the revenue received from IO for the Reserve fund for which the works have not been performed at 31/12/2023.

6.2.7. Provisions

Provisions are recognised when F4E has a legal or constructive obligation towards third parties as a result of past events, for which it is more likely than not that an outflow of resources will be required to settle the obligation, and when the amount can be reliably estimated. Provisions are not recognised for future operating losses. The amount of the provision is the best estimate of the expenditures expected to be required to settle the present obligation at the reporting date. The EU Accounting rule n°10 (Provision, contingent assets and liabilities) is applicable.

As at 31 December 2023

EUR

Description	Amounts at 31.12.2022	Amounts used	Amounts cancelled	Transfer to current	Addition and value adjustments	Amounts at 31.12.2023
Decommissioning fund	176 264 776.54	0.00	0.00	0.00	20 667 066.52	196 931 843.06
Additional contribution to Japan/QST	9 295 115.82	0.00	0.00	0.00	676 448.58	9 971 564.40
TB04 Contract	76 338.00	-76 338.00	0.00	0.00	0.00	0.00
Total	185 636 230.36	-76 338.00	0.00	0.00	21 343 515.10	206 903 407.46

Fig. 9 Non-current and current Provision

Provision for the decommissioning fund :

When the construction of an asset requires removal after the end of its useful life and restoration of the site, then a present obligation arises at the time of its construction.

F4E shall contribute jointly through the Budget of the IO to the accumulation of the Decommissioning Fund from the date of First Plasma through the Operation Phase. This will be done by making regular payments through the IO budget.

Based on the Overall Project Cost approved by the ITER Council⁶, the Decommissioning cost is estimated to EUR 530.0 million in 2001 value (not including the Deactivation cost). The EU share of the estimated costs for Decommissioning is EUR 180.2 million (34 % of EUR 530.0 million).

The following assumptions have been made for the calculation :

- the percentage of completion, discharge of obligations to ITER is 65.53 % as of 31.12.2023 (according to the F4E Monthly Dashboard),
- the cost contributions will be done in equal annual instalments of EUR 15.0 million in 2001 value (180.2 divided by 12 years) during the Operation Phase 2026 to 2037,
- EU HICP annual inflation rate from 2001 to 2023,
- an annual inflation rate of 2.0 % provided by Eurostat to reflect future prices,
- the contributions in future prices are discounted on average 2.0 % (ECB – 3 to 10 years zero coupon rate).

Other provision - Additional financial contribution to Japan :

Regarding the arrangements signed between F4E, the JAEA and IO, the transfer of procurement responsibilities from Europe to Japan is implemented through annual cash contributions.

In addition to the original agreements, in January 2014, Euratom and the Japanese Ministry of Science and Technology reached an agreement for settling the transfer of procurement responsibilities, following the request by Japan for an additional financial contribution of EUR 75.0 million (2014 value).

In line with the specific agreement signed in 2020, the provision has been consumed with two payments (EUR 70.0 million in 2020 and EUR 1.4 million in 2021). The balance is estimated to be executed in 2027.

Therefore, in compliance with the accounting rules, the provision has been adjusted based on :

- EU HICP annual inflation rate from 2014 to 2023,
- an annual inflation rate of 2.0 % provided by Eurostat to reflect future prices,
- the contributions in future prices are discounted 1.9 % (ECB – 4 years zero coupon rate).

Other provision – TB04 Contract

The TB04 contract covers for the most part the design and supply of the equipment for electrical and HVAC services in the ITER Tokamak Building.

⁶ Updated Overall Project Cost (OPC) – ITER_D_9H37J3 v1.0 presented to IC-33

Following several Disputes, F4E won the adjudication against the TB04 Contractor. According to the binding decision of the Adjudication Panel issued on 11 May 2023, F4E had to pay EUR 76 338.00 (corresponding to 20% of the adjudicators' fee). More details are provided below under point 6.4.2. Contingent liabilities.

6.2.8. Net Assets

F4E net assets are decreased by the negative financial performance of the year (EUR 172.7 million) totalling **EUR -165 801 164.07** as of 31 December 2023.

The resources of F4E consist of contributions from Euratom and from the ITER Host State, annual membership, voluntary contributions from the Members other than Euratom and additional resources.

It is to be noted that according to F4E FR, if the balance of the outturn account is positive, it shall be repaid to the EC up to the amount of the Euratom contribution paid during the financial year (see point 7.6. Budget outturn account).

6.3. Notes to the Statement of Financial Performance

6.3.1. Revenue

F4E's revenues consist mainly of contributions granted by Euratom as a participation in the financing of F4E, the ITER Host State, annual membership contributions from other members than Euratom, the ITER Reserve Fund, recoveries of expenses as well as revenue from liquidated damages.

A distinction is made in the Statement of financial performance between :

- revenue from **non-exchange transactions** (mainly from contributors) : the related receivables and revenue are recognized when the recovery orders are issued by F4E (in line with the payment needs and within the Budget approved by F4E's GB). At the end of each financial year, the surplus assessed for budget purposes on a modified cash basis is returned to Euratom (see point 7.6. Budget outturn account). The EU Accounting rule 17 – Revenue from non-exchange transactions is applicable.
- revenue from **exchange transactions** (mainly from the ITER Reserve Fund) : the revenue recognition criteria applied are those described in the EU Accounting rule n° 4.

It is to be noted that the revenue from ITER Reserve Fund is recognised subject to the:

- authorisation for financing from the Reserve Fund, implemented through the decisions of the Executive Project Board;
- approval of the related contractual amendment, given by the IO-DG;
- implementation of the related actions by F4E's suppliers (allowing to match the cost with the revenue from ITER).

The operating revenues, **EUR 547 739 621.38** (EUR 822 519 609.35 in 2022), include mainly the 2023:

- Euratom contribution: EUR 404 386 762.86
- ITER Host State contribution: EUR 113 400 000.00
- Membership contributions: EUR 7 300 000.00
- Revenue from ITER: EUR 22 272 414.52

6.3.2. Operational Expenses – EUR 623 370 650.55 (EUR 752 146 997.45 in 2022)

The types of expenses that F4E reports include exchange expenses (where F4E receives goods or services in return) and non-exchange expenses (where F4E transfers value to another entity without receiving anything in exchange).

In line with IPSAS rule n° 11, the construction contracts for which no inflow of service potential will arise to F4E are accounted as expense (operational items that are being built by F4E's contractors and directly handed over to IO after acceptance by the latter – including tooling and work in progress).

6.3.3. Other Expenses – EUR 97 075 159.61 (EUR 86 764 677.87 in 2022)

- Staff expenses: **EUR 59 503 941.06** (EUR 64 994 272.16 in 2022)
It includes the total gross salaries (including allowances, social contributions, taxes and pension contributions), employer's contribution for social security, allowances for seconded national experts and other staff related costs. The above social contributions and taxes are transferred to and managed by the EU Paymaster Office (PMO).
- Provision for liabilities: **EUR 21 343 515.10** refers to the yearly addition and value adjustment of the provisions described here above under point 6.2.7.
- Property, plant and equipment related expenses: **EUR 1 985 666.09** refers to the yearly depreciation of fixed assets and the cost for building rent, maintenance and security.
- Other administrative expenses: the amount of **EUR 14 242 037.36** includes mainly the following items:

	2023	2022	Variation
IT costs – operational/support	4 273 936.34	4 011 602.54	262 333.80
IT costs - development	1 182 960.89	882 896.57	300 064.32
Missions	2 242 585.73	1 313 947.63	928 638.10
Legal expenses	1 277 092.20	6 219 229.20	-4 942 137.00
Office supplies & maintenance	1 266 832.05	652 980.93	613 851.12
Training	779 519.16	513 078.37	266 440.79
Service level agreement with EU Paymaster Office/DG HR	585 967.60	434 566.51	151 401.09
Experts and related expenditure	573 488.02	401 952.30	171 535.72
Interim staff	544 642.76	900 531.15	-355 888.39
Communications & publications	284 429.89	505 992.50	-221 562.61
Recruitment	100 395.45	39 387.08	61 008.37
Car and transport expenses	42 476.64	30 977.72	11 498.92
Interest expense on late payment	27 634.34	6 102.83	21 531.51

Fig. 10 Other Administrative Expenses

6.4. Off Balance Sheet Items and Notes

6.4.1. Contingent Assets

A contingent asset is a possible asset that arises from past events and the existence of which will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of F4E. A contingent asset is disclosed when an inflow of economic benefits or service potential is probable.

Contingent assets are assessed at each balance sheet date to ensure that developments are appropriately reflected in the financial statements. If it has become virtually certain that an inflow of economic benefits or service potential will arise and the asset's value can be measured reliably, the asset and the related revenue are recognised in the financial statements of the period in which the change occurs.

Performance guarantees

Guarantees are possible assets (or obligations) that arise from past events and whose existence will be confirmed by the occurrence or non-occurrence of the object of the guarantee. Performance guarantees received can thus qualify as contingent assets. A guarantee is settled when the object of the guarantee no longer exists. It is crystallised when the conditions are fulfilled for calling a payment from the guarantor.

Performance guarantees are sometimes requested to ensure that beneficiaries of F4E funding meet the obligations of their contracts with F4E.

Description	31.12.2023	31.12.2022
Performance guarantees	139 629 524.98	168 242 435.58

Fig. 11 Performance guarantees

Other

An operational contract has been terminated for cause in 2019. F4E has a contractual entitlement to recover all the sums paid, as well as to claim damages suffered that amounts in total to EUR 6.4 million approximately. So far, no commercial agreement has been reached and both parties agreed to initiate a mediation process (as a last step to reach a settlement agreement). There is a high probability that if no agreement is reached by the end of the year 2024, it will go to litigation.

To be noted that as per legal opinion of an external firm, the likelihood to win the case if F4E goes to the court and have the sums/damages recovered fully or partially is between 70-90%.

6.4.2. Contingent Liabilities and Significant Legal Commitment

Contingent liabilities - TB04 Contract

A contingent liability is:

- A possible obligation that arises from past events and of which the existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of F4E; or
- A present obligation that arises from past events but is not recognised because:
 - It is not probable that an outflow of resources embodying economic benefits or service potential will be required to settle the obligation; or
 - The amount of the obligation cannot be measured with sufficient reliability.

On 8 July 2013, F4E and the TB04 Contractor entered into a contract for the Design, Construction and Maintenance of the HVAC (Heating, Ventilation & Air Conditioning), Electrical, I&C (Instrumentation and Control) Handling Equipment and Gas and Liquid Networks for the Tokamak Complex and Surrounding Buildings (the TB04 Contract).

The scope of Works was heavily varied via Variations procedure set out in the TB04 Contract.

The TB04 Contractor has submitted a number of claims to the Engineer and has constituted a number of Disputes under the TB04 Contract.

The actual Dispute referral was issued on 5 May 2022 bringing new documents, substantiation and explanations to the same claims. The aggregate request of the TB04 Contractor is around EUR 22 million plus interest, recovery of legal fees incurred by the TB04 Contractor and payment of the adjudicators' fees by F4E.

F4E asked the external law firm White&Case LLP to review, provide legal and expert advice, represent F4E in the related proceedings and prepare the F4E submissions in relation to the Disputes.

The binding decision of the Panel was issued on 11 May 2023, together with an award of costs, according to which F4E won the adjudication against the TB04 Contractor.

F4E has nothing to pay to the TB04 Contractor and the TB04 Contractor did not receive any extension of time for completion of the works.

The decision of the Panel was brought by the TB04 Contractor before the General Court of the EU, who has the authority to review the Disputes in their entirety. While the decision of the Panel was clearly in F4E's favour, F4E decided to settle the matters in dispute with the TB04 Contractor. The settlement agreement was signed with the TB04 Contractor in December 2023, and the settlement amount (around EUR 3 million in 2023 after full recovery of the remaining advance payment amount) was paid at the end of the financial year. According to the settlement agreement, the Parties jointly requested the General Court of the EU to close the case with a view to their amicable settlement of the Disputes. The Court's confirmation is awaited.

Other – Future obligations

The information provided under this note refers to the F4E open obligations under the ITER and BA activities. Those future obligations are considered as net deficits from future operating activities and reported as significant legal commitment.

ITER is being constructed at Cadarache in the South of France. Europe supports 45.46% of the construction cost and 34% of the cost of operation, deactivation and decommissioning of the facility as well as preparing the site.

Most of the components that make up the ITER facility are to be manufactured by each of the ITER Parties and contributed in-kind to ITER through Domestic Agencies. F4E will provide components to ITER on behalf of the EU.

In addition to the in-kind procurements F4E has also an obligation to finance the transportation of the non-EU components from the entry site in France (i.e. either Fos-sur-Mer or the Marignane airport) to Cadarache. Additionally, as far as the Test Blanket System is concerned, in 2014 F4E has signed two TBM Arrangements for the delivery of two systems to the ITER site.

The contractual commitments for which budgetary commitments have not yet been placed refers to the outstanding activities which have not yet been awarded as procurement contracts to European industry.

F4E maintains an estimate of the cost of completing its obligations to ITER. This comprises the costs already committed, and the estimate of the future commitments. This is managed in EcoSys and an extract is presented to each of the biannual GB meetings.

The table below shows an update of these figures with a cut-off date of December 2023, and expressed in EUR 2008 (used as basis to ensure a comprehensive financial monitoring).

Cost Estimate at 31/12/23 (MEUR-2008 value)	Actual Commitment (1)	Estimate to Complete (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	65.63	0.00	65.63
BA Phase 2	43.52	344.21	387.74
IFMIF/DONES Construction	0.09	197.10	197.19
ITER Construction	7 908.36	4 778.91	12 687.27
ITER Operation	0.00	1 538.20	1 538.20
ITER Support 2036-2042	0.00	241.30	241.30
TOTAL	8 017.61	7 099.73	15 117.34

Fig. 12 Cost Estimate in Commitment (in 2008 value)

The F4E Estimate at Completion (EaC) comprises two major elements – (a) the costs incurred directly by F4E and (b) the cash contributions representing the EU share of the IO costs. EaC covers the costs of the full Construction Phase and the costs of the Operations Phase and the Decommissioning Phase that will be incurred in the same timeframe. The only costs expected after 2035 are the final parts of the cash contributions towards the Operations Phase and Decommissioning Phases and the full costs of the Deactivation Phase.

The following key assumptions have been made in the compilation of the EaC :

- The requirement changes (PCR's, which have been a major problem for F4E over previous years) will be funded via the Reserve Fund or any other IO budget.
It is recognised that despite strong management pressure at IO and F4E it is impossible to reduce the rate of changes to zero. These changes may cause further delays and cost impacts to ongoing and future construction activities.
- The nuclear safety requirements: F4E is working with IO to ensure that the designs being developed respect the various nuclear safety requirements. Nevertheless, the French nuclear safety authority (ASN) has the ultimate authority and interacts only with IO, and any future changes required could have a high cost impact.
- There are no increases to the required cash contributions to IO, either in total or within each Multi-Annual Financial Framework (MFF) period, compared to the figures communicated to F4E by IO in 2023, subject to any adjustments to reflect changes to the In-kind contributions.
- The budget that will finally be allocated to F4E for the current MFF period (2021-27) is consistent to the decision made by the European Council^[1], with the associated ITER Host State (France) contribution and subsequent annual budget cuts for 2023 and 2024. No compensation for cuts to annual budget for 2023 and 2024 will be received in current MFF.
- The budget that will be allocated to F4E for the next period after 2027 is treated as undecided and management reserve for the period post 2027 is not calculated. However, the EAC for the period post 2027 is an indication of the amount of funding required.
- High level work on defining the approach to the Hot Cell complex is on-going, with updated scope to be decided on at ITER Council level where EU interests are represented by EURATOM. An exercise to re-estimate the cost of the original 2010 PA scope of Hot Cell complex was done, with a conclusion that F4E could deliver the original scope within the Project Budget available to F4E of EUR 322 million [2008], equivalent to EUR 438 million [2020].
- The current ITER baseline is obsolete and date for First Plasma was assumed to be in early 2030, while the start of the DT phase in December 2035 is maintained. This assumption will be updated when the ITER revised baseline integrating the updated schedule to First Plasma and beyond, and the updated Overall project Cost, will have been proposed by IO and approved by the ITER Council.
- F4E's internal running costs (administration costs) are allocated to the construction phase until 2029, and to the operation phase from 2030 onwards.
- No other fundamental programmatic or technical changes to ITER baseline currently under discussion were reflected in this EAC except for stoppage to Blanket First Wall Beryllium activities and shifting parts of TBM activities.

^[1] Council decision 2021/281/Euratom of 22 February 2021 Amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it.

Regarding the structure, the EaC is calculated as the sum of the EaC Base and the Risk Exposure over all activities. The EaC Base is the most likely commitment estimate for a given activity, plus the cost of planned risk mitigation activities. The Risk Exposure is the estimated impact value of the risk(s), multiplied by the probability of the risk(s) associated to a given activity.

Indicatively, the estimate to complete in commitments amounts to EUR 10 104.47 million in 2023 value.

Cost Estimate at 31/12/23 (MEUR-2023 value)	Actual Commitment (1)	Estimate to Complete (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	91.07	1.82	92.90
BA Phase 2	60.37	494.81	555.17
IFMIF/DONES Construction	0.13	284.62	284.75
ITER Construction	10 896.50	6 926.25	17 822.75
ITER Operation	0.00	2 070.22	2 070.22
ITER Support 2036-2042	0.00	326.75	326.75
TOTAL	11 048.08	10 104.47	21 152.54

Fig. 13 Cost Estimate in Commitment (in 2023 value)

In payments, the estimate to complete amounts to EUR 11 327.01 million in 2023 value.

Cost Estimate at 31/12/23 (MEUR-2023 value)	Actual Payment (1)	Estimate to be Paid (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	87.91	4.99	92.90
BA Phase 2	30.66	524.51	555.17
IFMIF/DONES Construction	0.03	284.73	284.75
ITER Construction	9 706.93	8 115.82	17 822.75
ITER Operation	0.00	2 070.22	2 070.22
ITER Support 2036-2042	0.00	326.75	326.75
TOTAL	9 825.53	11 327.01	21 152.54

Fig. 14 Cost Estimate in Payment (in 2023 value)

More details on the actual advancement of the works achieved at the end of the year are available in the F4E Annual report 2023.

6.4.3. Guarantees for pre-financing

Guarantees are possible assets (or obligations) that arise from past events and whose existence will be confirmed by the occurrence or non-occurrence of the object of the guarantee. A guarantee is settled when the object of the guarantee no longer exists. It is crystallised when the conditions are fulfilled for calling a payment from the guarantor.

In order to avoid double-counting, guarantees received on pre-financing amounts given are not disclosed as contingent assets since these amounts are already shown as pre-financing assets in the balance sheet.

Description	31.12.2023	31.12.2022
Guarantees for pre-financing (nominal-on going)	126 842 865.16	192 973 953.42

Fig. 15 Guarantees for pre-financing

These are guarantees that F4E in certain cases requests from beneficiaries when paying out advance payments (pre-financing). There are two values to disclose for this type of guarantee, the “nominal” and the “on-going” values. For the “nominal” value, the generating event is linked to the existence of the guarantee. For the “on-going” value, the guarantee’s generating event is the pre-financing payment and/or subsequent clearings.

6.4.4. Service in-kind

Under the Host agreement with Spain, the office building used by F4E is free of charge. For the year 2023, this service in-kind amounts to EUR 2 941 161.70.

6.5. Financial Instruments

Financial instruments comprise cash, current receivables and recoverables, current payables, amounts due to and from consolidated entities. Financial instruments give rise to liquidity, credit, interest rate and foreign currency risks. Information about which and how they are managed is set out below. Pre-financings and deferrals are not included.

The carrying amounts of financial instruments are as follows:

	EUR	
Financial assets	2023	2022
Receivables with Member States	13 994 283.51	27 642 694.17
All receivables with third parties including accruals (excluding deferrals)	20 901 466.82	54 989 143.37
Cash and deposits	25 000.00	25 000.00
TOTAL	34 920 750.33	82 656 837.54
Financial liabilities	2023	2022
Current payables	124 840 507.11	78 773 267.33
Other payables	0.00	0.00
Accounts payable with EU entities	1 496 811.56	1 186 246.02
TOTAL	126 337 318.67	79 959 513.35

Fig. 16 Financial Instruments

6.5.1. Liquidity Risk

Liquidity risk is the risk that arises from selling an asset; for example, the risk that a given security or asset cannot be traded quickly enough in the market to prevent a loss or meet an obligation. Liquidity risk arises from the ongoing financial obligations, including the settlement of payables.

Details of contractual maturities for assets and liabilities form an important source of information for the management of liquidity risk.

Bank accounts opened in the name of F4E may not be overdrawn. Treasury and payment operations are highly automated and rely on modern information systems. Specific procedures are applied to guarantee system security and to ensure segregation of duties in line with the FR, the internal control standards, and audit principles. EU budget principles ensure that overall cash resources for a given year are always sufficient for the execution of all payments.

F4E's liabilities have remaining contractual maturities as summarised below:

EUR				
31 December 2023	< 1 year	1 - 5 years	> 5 years	Total
Payables with third parties	124 840 507.11	0.00	0.00	124 840 507.11
Payables with consolidated entities	1 496 811.56	0.00	0.00	1 496 811.56
Total liabilities	126 337 318.67	0.00	0.00	126 337 318.67

Fig. 17 Liquidity Risk – Payables

6.5.2. Credit Risk

Credit risk is the risk of loss due to a debtor's/borrower's non-payment of a loan or other line of credit (either the principal or interest or both) or other failure to meet a contractual obligation. The default events include a delay in repayments, restructuring of borrower repayments and bankruptcy.

Treasury resources are kept with the EC since May 2019. F4E recovers contributions from Euratom and the ITER Host State in average 3 times per year to ensure appropriate cash management, taking into account payment time limits for the recovery of contributions and the total of payments executed in 2023. Requests to the EC and ITER Host State are accompanied by cash forecasts.

Following the externalisation of the treasury to the EC the counterparty risk to which F4E is exposed is minimized.

The table below shows the maximum exposure to credit risk by F4E.

EUR	
Credit quality/rating	Amount of receivables with Member States
Prime and high grade	13 994 283.51
Upper medium grade	0.00
Lower medium grade	0.00
Non-investment grade	0.00
Receivable from IO	680 284.05
EC treasury	20 147 122.03

Fig. 18 Credit Risk – Receivables

6.5.3. Market Risk

Market Risk can be split into interest rate risk and currency risk.

Interest rate risk arises from cash. F4E treasury has been externalised to the EC and consequently it is not exposed to interest rate risk. F4E's treasury does not borrow any money.

The vast majority of transactions are executed in EUR. It is recognised that exchange rates fluctuate and F4E accepts the risk and does not consider it to be material.

6.6. Related Party Disclosure

The related parties of F4E are the key management personnel. Transactions between F4E and the key management personnel take place as part of the normal operations and as this is the case, no specific disclosure requirements are necessary for these transactions in accordance with the EU Accounting rules.

Highest grade description	Grade	Number of persons of this grade
Director	AD14	1

Fig. 19 Related Party Disclosure

The transactions of F4E with key management personnel during financial year 2023 consist only of the payment of their remuneration, allowances and other entitlements in accordance with the EU Staff Regulations.

Section II. Budget Implementation 2023

7. Budget Implementation

7.1. Main Facts on the Implementation of the 2023 Budget of F4E

Commitments	73% execution of the final available budget	Final Budget: 806.98	Execution: 586.18	EUR million
	58% compared to the original budget	Original Budget: 1 018.65	Execution: 586.18	EUR million
	76% without additional revenue from ITER IO	Standard Budget: 757.09	Execution: 571.73	EUR million
	99% in individual commitments	Execution: 586.18	Ind. Commit.: 578.68	EUR million
Payments	95% execution of the final available budget	Final Budget: 631.54	Execution: 597.71	EUR million
	73% compared to the original budget	Original Budget: 820.58	Execution: 597.71	EUR million
	98% without additional revenue from ITER IO	Standard Budget: 587.45	Execution: 578.42	EUR million

Fig. 20 Budget Implementation 2023

The execution rate of F4E's final available budget for 2023 is 73% in commitments and 95% in payments. The main factors impacting F4E's ability to execute it, were largely outside of its control.

This under-execution in commitments largely stemmed from the 2016 ITER baseline, which is currently under revision by the IO. Compounding these challenges were the necessary repairs for ITER's in-kind components and the interim cessation of assembly activities. These factors collectively contributed to a slowdown in the overall project. The revised ITER baseline, projected to be established in 2024, is likely to bring forth substantial alterations in the project's scope and timeline. An F4E-EURATOM task force has been established to assess the situation and devise strategies for managing the unused appropriations that have consequently increased, as well as to mitigate the risks of their further increases.

The main consequences from the current situation of the ITER project on the 2023 implementation of F4E commitment budget are the following:

- EUR 48.4 million decrease in the 2024 Cash Contribution to IO proposed in May 2023,
- EUR 120.9 million decrease in In-Vessel programme mainly due to on-going discussions on changing the First Wall (FW) armor material from Beryllium to Tungsten,
- Delays in contract signatures or reduction achieved during the successful clarification and negotiation phase concerning the programmes for Heating and Current Drive (EUR 64.8 million), Site and Building (EUR 69.5 million) and Broader Approach (EUR 21.9 million),
- F4E has been working on establishing a more realistic project schedule based on the available technical and commercial resources. This exercise also influenced the commitment execution in 2023,
- EUR 50.3 million carry overs from 2022 linked to revenue cashed from IO that were transferred to the chapters for contributions from EURATOM (EUR 49.1 million) and ITER Host State - IHS (EUR 1.2 million).

Following the conservative approach to using global commitments requested by Euratom based on commitment forecasts for 1st quarter of 2024 (and not the full year of 2024), F4E globally committed only EUR 7.5 million covering one well advanced procurement procedure.

7.2. Evolution of the Budget

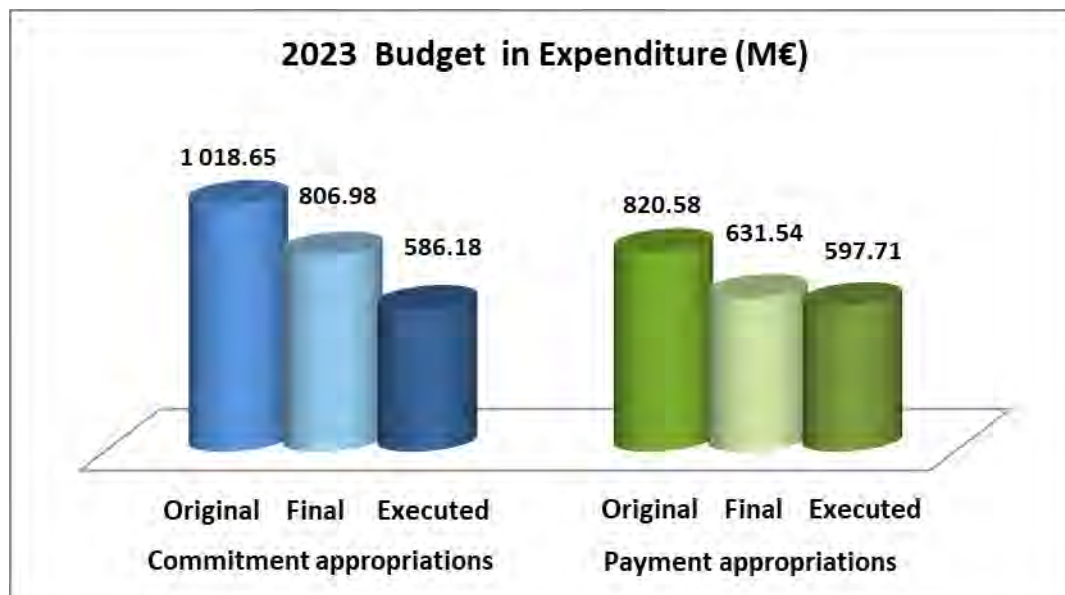


Fig. 21 Budget 2023 in Expenditure

F4E 2023 budget was originally adopted by F4E's Governing Board (GB) for the amount of EUR 1 018.6 million in commitment appropriations and EUR 820.6 million in payment appropriations.

It was modified via three amendments by F4E GB in May⁷, July and December 2023.

The final available appropriations, including the carry-over from the previous year are EUR 807.0 million in commitment appropriations and EUR 631.5 million in payment appropriations.

⁷ Amendment 1 was approved via written procedure on 16 May 2023

7.3. Statement of Revenue

7.3.1. Commitment Appropriations

Statement of Revenue 2023 in Commitment Appropriations		Original	Amendment	Amendment	Amendment	Final	Available	Carry over	Regularisation	Final
		Budget	1	2	3	Budget	assigned			Available
		(1)	(2)	(3)	(4)	(5)= Σ (1 to 4)	(6)	(7)	(8)	(9)= Σ (5 to 8)
1	PARTICIPATION FROM EUROPEAN UNION									
110	EURATOM CONTRIBUTION TO OPERATIONAL EXPENDITURE	766 781 095.00	-10 000 000.00		-280 000 000.00	476 781 095.00				476 781 095.00
111	RECOVERY FROM PREVIOUS YEARS OPERATIONAL EXPENDITURE					0.00			49 129 199.25	49 129 199.25
120	EURATOM CONTRIBUTION TO ADMINISTRATIVE EXPENDITURE	65 347 476.99			0.01	65 347 477.00				65 347 477.00
121	RECOVERY FROM PREVIOUS YEARS ADMINISTRATIVE EXPENDITURE	726 813.01				726 813.01				726 813.01
Title 1 - Total		832 855 385.00	-10 000 000.00	0.00	-279 999 999.99	542 855 385.01	0.00	0.00	49 129 199.25	591 984 584.26
2	OTHER CONTRIBUTIONS									
210	MEMBERSHIP CONTRIBUTIONS	7 300 000.00				7 300 000.00				7 300 000.00
220	UNITED KINGDOM CONTRIBUTION	p.m.				0.00				
Title 2 - Total		7 300 000.00	0.00	0.00	0.00	7 300 000.00	0.00	0.00	0.00	7 300 000.00
3	ASSIGNED REVENUE ACCRUING FROM THE CONTRIBUTION OF ITER HOST STATE									
310	CONTRIBUTION FROM ITER HOST STATE	178 492 669.21	93 670.41		-70 000 000.00	108 586 339.62	165 908.05	47 190 110.77	1 218 548.12	157 160 906.56
Title 3 - Total		178 492 669.21	93 670.41	0.00	-70 000 000.00	108 586 339.62	165 908.05	47 190 110.77	1 218 548.12	157 160 906.56
4	MISCELLANEOUS REVENUE									
410	MISCELLANEOUS REVENUE	p.m.			281 461.54	281 461.54	339 706.69	23 281.11		644 449.34
Title 4 - Total		p.m.	0.00	0.00	281 461.54	281 461.54	339 706.69	23 281.11	0.00	644 449.34
5	OTHER ASSIGNED REVENUE TO SPECIFIC ITEM OF EXPENDITURE									
510	OTHER REVENUE	p.m.				0.00				0.00
520	REVENUE FROM ITER ORGANIZATION	p.m.				0.00	30 713 074.77	69 521 208.83	-50 347 747.37	49 886 536.23
Title 5 - Total		p.m.	0.00	0.00	0.00	0.00	30 713 074.77	69 521 208.83	-50 347 747.37	49 886 536.23
TOTAL REVENUE		1 018 648 054.21	-9 906 329.59	0.00	-349 718 538.45	659 023 186.17	31 218 689.51	116 734 600.71	0.00	806 976 476.39

Note: Column (7) Carry Over from previous year also includes decommitments of assigned revenue done during the year 2023

Fig. 22 Evolution of Statement of Revenue in Commitment Appropriations

The evolution of statement of revenue in commitment appropriations is made of:

- The revenue collected or transferred back in the amendments to the main contributions Euratom, IHS and F4E Members. Each change in revenue is individually detailed and submitted to the GB for adoption.
- The miscellaneous revenue mainly corresponds to recoveries of undue payments. Defined as internal assigned revenue in F4E FR, it is not new additional revenue but re-collected revenue.
- The other revenue is assigned to the implementation of specific tasks, mainly requested by the IO. Defined as external assigned revenue in the F4E FR, it is new additional revenue for which the GB authorises the principle of collection, as shown with the p.m., 'pro memoria', in the original budget.

F4E reports to the GB on the status of miscellaneous and other revenue with each amendment to the annual budget, together with the carry-over from the previous year.

The main changes to the statement of revenue in commitment appropriations according to the table in Fig. 22 are the following:

- **Chapter 110: EUR -290 million** transfer back of Euratom contribution to F4E operational expenditure, due to the lower commitments execution in 2023,
- **Chapter 310: EUR -69.9 million**, including transfer back of EUR 70 million of IHS contribution due to the lower commitment execution in 2023,
- **Chapter 410: EUR +0.3 million** linked to recoveries and liquidated damages on F4E operational contracts, in commitments and payments,

The automatic carry-over of commitment appropriations from the 2022 budget, including the decommitments of commitments done in 2022 or before and regularisations, are the following:

- **Chapter 111: EUR +49.1 million** linked to regularisation from chapter 520 with the purpose to reconcile the transfer in expenditure approved with Budget Amendment 2,
- **Chapter 310: EUR +48.6 million** linked mainly to carry overs from 2022 and to the regularization from chapter 520 with the purpose to reconcile the transfer in expenditure approved with Budget Amendment 2,
- **Chapter 520: EUR +49.9 million mainly** linked to carry overs form 2022 and their regularisation along with decommitments and opened commitment appropriations for revenue coming from IO.

7.3.2. Payment Appropriations

Statement of Revenue 2023 in Payment Appropriations		Original	Amendment	Amendment	Amendment	Final	Available	Carry over	Regularisation	Final
		Budget	1	2	3	Budget	assigned			Available
		(1)	(2)	(3)	(4)	(5)= Σ (1 to 4)	revenue	(7)	(8)	Budget
							(6)			(9)=Σ (5 to 8)
1	PARTICIPATION FROM EUROPEAN UNION									
110	EURATOM CONTRIBUTION TO OPERATIONAL EXPENDITURE	598 161 524.59	-10 000 000.00		-253 999 999.59	334 161 525.00				334 161 525.00
111	RECOVERY FROM PREVIOUS YEARS OPERATIONAL EXPENDITURE	5 647 759.41				5 647 759.41			49 129 199.25	54 776 958.66
120	EURATOM CONTRIBUTION TO ADMINISTRATIVE EXPENDITURE	65 347 476.99			0.01	65 347 477.00		6 911 538.67		72 259 015.67
121	RECOVERY FROM PREVIOUS YEARS ADMINISTRATIVE EXPENDITURE	726 813.01				726 813.01				726 813.01
	Title 1 - Total	669 883 574.00	-10 000 000.00	0.00	-253 999 999.58	405 883 574.42	0.00	6 911 538.67	49 129 199.25	461 924 312.34
2	OTHER CONTRIBUTIONS									
210	MEMBERSHIP CONTRIBUTIONS	7 300 000.00	109 700.00	-109 700.00		7 300 000.00				7 300 000.00
220	UNITED KINGDOM CONTRIBUTION	p.m.								
	Title 2 - Total	7 300 000.00	109 700.00	-109 700.00	0.00	7 300 000.00	0.00	0.00	0.00	7 300 000.00
3	ASSIGNED REVENUE ACCRUING FROM THE CONTRIBUTION OF ITER HOST STATE									
310	CONTRIBUTION FROM ITER HOST STATE	143 400 000.00		-30 000 000.00		113 400 000.00		2 160 714.82	1 218 548.12	116 779 262.94
	Title 3 - Total	143 400 000.00	0.00	-30 000 000.00	0.00	113 400 000.00	0.00	2 160 714.82	1 218 548.12	116 779 262.94
4	MISCELLANEOUS REVENUE									
410	MISCELLANEOUS REVENUE	p.m.		0.00	281 461.54	281 461.54	339 706.69	87 451.80		708 620.03
	Title 4 - Total	p.m.	0.00	0.00	281 461.54	281 461.54	339 706.69	87 451.80	0.00	708 620.03
5	OTHER ASSIGNED REVENUE TO SPECIFIC ITEM OF EXPENDITURE									
510	OTHER REVENUE	p.m.				0.00		736 527.90		736 527.90
520	REVENUE FROM ITER ORGANIZATION	p.m.				0.00	26 979 145.20	67 455 002.79	-50 347 747.37	44 086 400.62
	Title 5 - Total	p.m.	0.00	0.00	0.00	0.00	26 979 145.20	68 191 530.69	-50 347 747.37	44 822 928.52
TOTAL REVENUE		820 583 574.00	-9 890 300.00	-30 109 700.00	-253 718 538.04	526 865 035.96	27 318 851.89	77 351 235.98	0.00	631 535 123.83

Note: Column (7) Carry Over from previous year also includes decommitments of assigned revenue done during the year 2023

Fig. 23 Evolution of Statement of Revenue in Payment Appropriations

The breakdown of revenue by contributors in 2023 in payment appropriations is:



Fig. 24 Revenue Breakdown in Payment Appropriations

Main changes to the statement of revenue in payment appropriations in 2023:

EURATOM and IHS contribution were reduced by EUR 294 million in total to neutralise the lower 2023 payment execution mainly due to:

- **EUR 173.7 million** decrease of the forecasts for Cash contributions to IO, including the balance payment due for 2023 and advance payment for 2024. The reference forecast from September 2022 has been significantly impacted by reductions in cash contributions approved by ITER Council at the end of 2022 and beginning of 2023,
- **EUR 215.5 million** decrease of forecasts for ITER delivery contracts, of which EUR 70 million were executed in 2022 instead of 2023 as initially planned and EUR 145.5 million were decreased due to delays of contractor's obligations or schedule changes that affected the progress of activities within ITER project. The payments advanced and delayed relate mainly to Buildings, Heating and current drive, In-Vessel and Magnets Programmes.

In detail, per budgetary chapter, the changes are:

- **Chapter 110: EUR - 263.9 million** transfer back of Euratom contribution to F4E operational expenditure, due to the lower payment execution for 2023,
- **Chapter 310: EUR - 30 million** transfer back of IHS contribution due to the lower execution,
- **Chapter 520: EUR 26.98 million** collected from IO as assigned revenue.

The automatic carry-overs of payment appropriations from the 2022 budget and regularisations were:

- **Chapter 111: EUR +49.1 million** linked to regularisation of carry overs from chapter 520 with the purpose to reconcile the transfer in expenditure approved with Budget Amendment 2,
- **Chapter 120: EUR +6.9 million** from the automatic carry-over of administrative expenditure committed,

- **Chapter 310: EUR +3.4 million** including carry over from IHS contribution and regularisation from chapter 520,
- **Chapter 510: EUR +0.7 million** related to the integration of the Upper Port 10 within the contribution from Japan Domestic Agency,
- **Chapter 520: EUR +17.1 million** including carry-over and regularisation of revenue from IO.

7.4. Statement of Expenditure

7.4.1. Expenditure in Commitment Appropriations

The statement of expenditure adopted with the original 2023 budget was aligned to the Single Programming Document 2023-2027, in particular the *Work Programme 2023 (WP)* that serves as financing decision for the operational budget 2023.

The statement of expenditure has been further adjusted with the modifications to the Statement of revenue and to the WP that were implemented through the amending budgets and with the transfers approved by the F4E Director within the limits foreseen in article 26 of the F4E FR.

The GB is duly informed about the transfers at each GB meeting, and in the Budgetary and Financial Management Report after the closure of the financial year. The appropriations accruing from assigned revenue and not used at the end of 2022 were automatically carried over to the budget 2023. No further carry-over was requested to the GB.

The final breakdown of the statement of expenditure in commitment appropriations is as follows:



Fig. 25 Final breakdown of the Expenditure in Commitments

(EUR)

Heading of the 2023 Budget Commitment Expenditure	Evolution of the statement of expenditure										Implementation		Variation in % of the initial budget	
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	Execution (11)	% (12)= (11)/(10)		
A1 STAFF EXPENDITURE														
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	43 500 000.00			0.01		-1 117 303.37	42 382 696.64				42 382 696.64	42 382 696.64	100.0%	-2.6%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	11 732 000.00					1 330 707.06	13 062 707.06				13 062 707.06	13 062 707.06	100.0%	11.3%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	836 500.00					-114 602.50	721 897.50				721 897.50	721 897.50	100.0%	-13.7%
A13 MISSION EXPENSES	647 000.00					153 000.00	800 000.00				800 000.00	800 000.00	100.0%	23.6%
A14 SOCIO-MEDICAL INFRASTRUCTURE	531 900.00					70 090.00	601 990.00				601 990.00	601 990.00	100.0%	13.2%
A15 TRAINING	850 000.00					0.00	850 000.00				850 000.00	850 000.00	100.0%	0.0%
A16 EXTERNAL SERVICES	580 000.00					50 000.00	630 000.00				630 000.00	630 000.00	100.0%	8.6%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	10 000.00					-7 500.00	2 500.00				2 500.00	2 500.00	100.0%	-75.0%
A18 SOCIAL WEALFARE	50 000.00					11 520.00	61 520.00				61 520.00	61 520.00	100.0%	23.0%
A19 OTHER STAFF RELATED EXPENDITURE	3 921 000.00					-397 068.01	3 523 931.99	20 963.50			3 544 895.49	3 544 895.49	100.0%	-9.6%
TITLE A1 - Total	62 658 400.00	0.00	0.00	0.01	0.00	-21 156.82	62 637 243.19	20 963.50	0.00	62 658 206.69	62 658 206.69	100.0%	-0.0%	
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE							0.00							
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	1 632 000.00					247 000.00	1 879 000.00	2 625.31			1 881 625.31	1 881 624.31	100.0%	15.3%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	4 981 750.00					256 531.66	5 238 281.66				5 238 281.66	5 238 281.66	100.0%	5.1%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	387 840.00					-167 100.00	220 740.00				220 740.00	220 740.00	100.0%	-43.1%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	2 138 100.00					-354 188.45	1 783 911.55				1 783 911.55	1 783 911.55	100.0%	-16.6%
A25 POSTAGE / TELECOMMUNICATIONS	738 500.00					-167 078.00	571 422.00				571 422.00	571 422.00	100.0%	-22.6%
A26 MEETING EXPENSES	533 000.00					56 120.00	589 120.00				589 120.00	589 120.00	100.0%	10.5%
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES						0.00	0.00		14 530.88		14 530.88		0.0%	-
A28 INFORMATION AND PUBLISHING	38 700.00					-25 700.00	13 000.00				13 000.00	13 000.00	100.0%	-66.4%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	266 000.00					-78 593.80	187 406.20				187 406.20	187 406.20	100.0%	-29.5%
TITLE A2 - Total	10 715 890.00	0.00	0.00	0.00	0.00	-233 008.59	10 482 881.41	2 625.31	14 530.88	10 500 037.60	10 485 505.72	99.9%	-2.1%	
TITLE A1 & A2 - Total Administrative Expenditure	73 374 290.00	0.00	0.00	0.01	0.00	-254 165.41	73 120 124.60	23 588.81	14 530.88	73 158 244.29	73 143 712.41	100.0%	-0.3%	

Heading of the 2023 Budget Commitment Expenditure	Evolution of the statement of expenditure										Implementation		Variation in % of the initial budget
	Original Budget	Amending budget 1	Amending budget 2	Amending budget 3	Regularisation Transfers adopted by GB	Transfers adopted by F4E Director	Final budget	Additional Revenue	Carried over	Final Appropriations	Execution	% (12)= (11)/(10)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=Σ(1 to 6)	(8)	(9)	(10)=Σ(7 to 9)	(11)	(11)/(10)	
B3 OPERATIONAL EXPENDITURE													
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	671 627 305.00	-10 000 000.00	6 559 970.30	-254 466 462.91	49 129 199.25	-447 096.81	462 402 914.83	218 004.43	693.93	462 621 613.19	326 585 852.47	70.6%	-51.4%
B32 TECHNOLOGY FOR ITER AND DEMO	6 136 511.00		646 077.00	-2 919 416.00		250 000.00	4 113 172.00			4 113 172.00	3 899 736.01	94.8%	-36.5%
B33 TECHNOLOGY FOR BROADER APPROACH	58 101 587.00		-10 667 577.00	-14 139 479.00		0.00	33 294 531.00			33 294 531.00	32 798 899.08	98.5%	-43.5%
B34 TECHNOLOGY FOR DONES	2 000 000.00		-1 050 000.00	-935 000.00		0.00	15 000.00			15 000.00	0.00	0.0%	-100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	18 738 413.00		4 431 908.20	-1 993 723.00		0.00	21 176 598.20		7 732.80	21 184 331.00	20 275 776.03	95.7%	8.2%
B36 OTHER OPERATIONAL EXPENDITURE	10 177 279.00		79 621.50	-5 264 457.55		451 262.22	5 443 705.17	98 436.95		5 542 142.12	5 519 465.56	99.6%	-45.8%
Title B3 - Total	766 781 095.00	-10 000 000.00	0.00	-279 718 538.46	49 129 199.25	254 165.41	526 445 921.20	316 441.38	8 426.73	526 770 789.31	389 079 729.15	73.9%	-49.3%
B4 EARMARKED EXPENDITURE													
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	178 492 669.21	93 670.41	0.00	-70 000 000.00	1 218 548.12		109 804 887.74	935 253.35	46 420 765.47	157 160 906.56	109 511 278.97	69.7%	-38.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	p.m.				-50 347 747.37		-50 347 747.37	30 845 738.75	69 388 544.85	49 886 536.23	14 442 969.55	29.0%	-
B43 OTHER EARMARKED EXPENDITURE	p.m.						0.00		0.00	0.00	0.00		-
Title B4 - Total	178 492 669.21	93 670.41	0.00	-70 000 000.00	-49 129 199.25	0.00	59 457 140.37	31 780 992.10	115 809 310.32	207 047 442.79	123 954 248.52	59.9%	-30.6%
Titles B3 & B4 - Subtotal	945 273 764.21	-9 906 329.59	0.00	-349 718 538.46	0.00	254 165.41	585 903 061.57	32 097 433.48	115 817 737.05	733 818 232.10	513 033 977.67	69.9%	-45.7%
Total BUDGET in Commitment appropriations	1 018 648 054.21	-9 906 329.59	0.00	-349 718 538.45	0.00	0.00	659 023 186.17	32 121 022.29	115 832 267.93	806 976 476.39	586 177 690.08	72.6%	-42.5%

Fig. 26 Evolution of the Expenditure in Commitments in 2023

Note: the figures for the budget Title 4 refer to the available appropriations for the 2023 budget only, whereas the details of the 2023 implementation by funds source provided in Fig. 39, Annex 8.4 from ABAC refers to the appropriations of the year plus the outstanding amounts on the commitments carried over from the previous years. This is due to the specific management of external assigned revenue in the accounting system.

7.4.1.1. Administrative Expenditure

The administrative expenditure are made of non-differentiated appropriations (commitment and payment appropriations are in unison), therefore any transfers or budget amendments are identical in commitment and payment appropriations.

The F4E Director approved a series of transfers resulting in a decrease of the administrative budget amounting in total to EUR -254 165.41.

The major changes (> +/-10%) in the administrative expenditure (variation of the final implementation in % of the initial budget) by chapter are:

Title 1 – Staff expenditure (+0%)

- **Chapter A11 Salaries and allowances for external personnel (+) 11%**
The increase is due to the payment of the 2023 employers pension contributions in accordance with the European Commission (EC) guidelines but not included in the draft budget. The increase is coming also from the fact that the conversion of some Contract agents positions into temporary agents posts did not take place in 2023 as priority was given to filling vacant posts,
- **Chapter A12 Expenditure relating to staff recruitment (-) 14%**
The expenses linked to taking up duties and departures (daily allowances, installation/reinstallation, removals and travel expenses) have decreased due to the lower number of requests from staff,
- **Chapter A13 Mission expenses (+) 24%**
The number of missions has been higher than forecasted following the post covid increase of travel,
- **Chapter A14 Social-Medical Infrastructure (+) 13%**
The variation is due to the increased cost of the different medical services (Annual Check-up, Psychologist on site),
- **Chapter A17 Receptions/events and representation (-) 75%**
F4E is traditionally making a very limited use of this budget chapter,
- **Chapter A18 Social Welfare (+) 23%**
This increase is linked to the number of recruitment of F4E staff and the indexation of the cost of all activities.

Title 2 – Infrastructure and operating expenditure (-2%)

- **Chapter A21 Rental of Buildings and Associated costs (+) 15%**
Increase in the costs of electricity; maintenance (cleaning); maintenance (UPS) and different common expenses,
- **Chapter A23 Movable property and associated cost (-) 43%**
Reduction mainly due to the postponed refurbishment of F4E's offices,
- **Chapter A24 Current Administrative Expenditure (-) 17%**
Savings have been made from less external expert recruitments from the External Service Provider and from some forecasted activities not done,

- **Chapter A25 Postage / Telecommunications** **(-) 23%**
 Savings have been done from switching from one old telephony services (PBX infrastructure) to Teams telephony,
- **Chapter A28 Information and publishing** **(-) 66%**
 The increase of the teleworking has also affected the production of publications, replaced sometimes by electronic publications/electronic information,
- **Chapter A29 Other infrastructure and operating expenditure** **(-) 30%**
 The main reasons for the reduction were that less events have been organised, lower participation to events and also some events were shared with IO.

7.4.1.2. Operational Expenditure in commitment

The statement of operational expenditure was modified with the amending budgets to reflect the changes in the statement of revenue and to align the operational budget in commitment appropriations with the successive amendments to the WP.

The major changes (> +/-10%) in the Operational expenditure (variation of the final implementation in % of the original budget) are:

Title 3 – Operational expenditure (-49%)

- **Chapter B31 ITER Construction including site preparation** **(-) 51%**
 Substantial reduction in different programmes as described in section 7.1. of this document,
- **Chapter B32 Technology for ITER and Demo** **(-) 36%**
 The decrease is related to the delay in the signature of a task order for the TBM-sets fabrication and feasibility of assembly processes,
- **Chapter B33 Technology for Broader Approach** **(-) 44%**
 The decrease is related to the postponement to 2024 of the Electron Cyclotron Resonance Heating Waveguides contract and the postponement to 2024 of stage 2 of the contract for the supply of JT-60SA actively cooled Divertor HHF elements,
- **Chapter B36 Other Operational Expenditure** **(-) 46 %**
 The decrease is related to reduced needs for additional external legal service support.

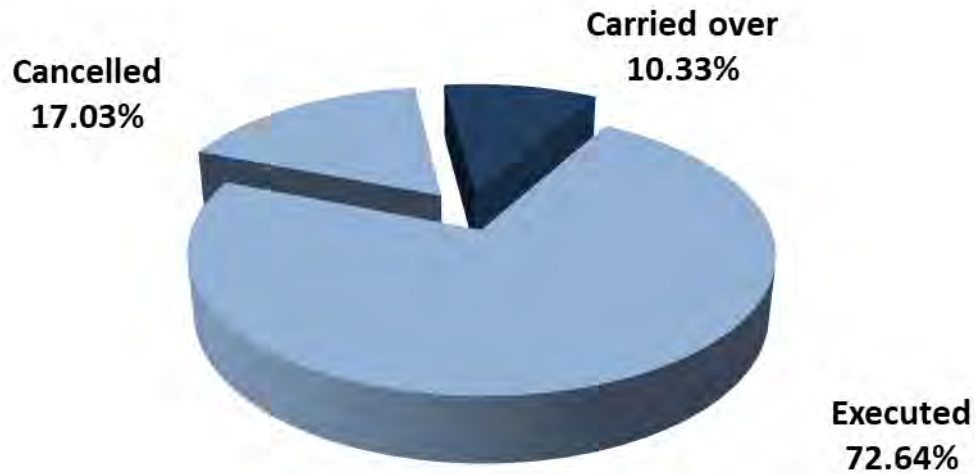
Title 4 – Earmarked expenditure

- **Chapter B41 ITER Construction – ITER Host State Contribution** **(-) 39%**
 Substantial reduction in different programmes as described in section 7.1. of this document.

The budget appropriations for earmarked expenditure from IO were created based on additional revenue linked to project changes, direct implementations and other change instruments requested and financed by IO. These are described in section 7.5 of this document.

7.4.1.3. Implementation of the Budget in Commitments

Commitments 2023: 807 M€



MEUR	Budget	Cancelled	Carried over	Executed
Commitment 2023	807.0	137.5	83.3	586.2

Fig. 27 Implementation of the Budget in Commitments

As per Art. 12 of F4E’s FR, given the needs of the Joint Undertaking, the cancelled appropriations may be entered in the estimate of revenue and expenditure of the following financial years.

7.4.1.4. Open Commitments at 31 December 2023

The F4E open commitments amount to EUR 1 194.9 million at the closure of the 2023 budget, representing a decrease of about EUR 79 million compared to the end of 2022.

Remarks:

- EUR 8.0 million out of the EUR 8.1 million committed globally in 2022 were implemented in 2023 as the on-going procurement procedures have been concluded,
- F4E made use of global commitment in 2023 for a total amount of EUR 7.5 million, for implementation in individual commitment in 2024. They are included in the total of the F4E obligations/open commitments at the end of 2023.

2023 budget Heading	(EUR)				
	from previous years (1)	from 2023 budget (2)	Open Commitments Total (3)=(1)+(2)	To be de-committed (4)	Net Total (5)=(3)-(4)
TITLE 1 - STAFF EXPENDITURE	0.00	1 992 053.98	1 992 053.98	0.00	1 992 053.98
TITLE 2 - INFRASTRUCTURE AND OPERATING EXPENDITURE	30 076.31	3 687 082.03	3 717 158.34	15 545.43	3 701 612.91
Total TITLE 1 & 2	30 076.31	5 679 136.01	5 709 212.32	15 545.43	5 693 666.89
B31 - ITER CONSTRUCTION INCLUDING SITE PREPARATION	569 673 615.15	267 502 173.77	837 175 788.92	0.00	837 175 788.92
B32 - TECHNOLOGY FOR ITER AND DEMO	3 422 703.45	3 460 176.27	6 882 879.72	0.00	6 882 879.72
B33 - TECHNOLOGY FOR BROADER APPROACH	15 667 239.19	16 154 526.70	31 821 765.89	0.00	31 821 765.89
B35 - EXTERNAL SUPPORT ACTIVITIES	15 984 656.19	14 974 757.93	30 959 414.12	0.00	30 959 414.12
B36 - OTHER OPERATIONAL EXPENDITURE	0.00	3 159 842.04	3 159 842.04	0.00	3 159 842.04
Total TITLE 3	604 748 213.98	305 251 476.71	909 999 690.69	0.00	909 999 690.69
B41 - ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	183 706 872.59	76 771 263.44	260 478 136.03	0.00	260 478 136.03
B42 - ACTIVITIES LINKED TO ITER ORGANIZATION	11 179 764.81	7 146 738.46	18 326 503.27	0.00	18 326 503.27
B43 - OTHER EARMARKED EXPENDITURE	388 991.47	0.00	388 991.47	0.00	388 991.47
Total TITLE 4	195 275 628.87	83 918 001.90	279 193 630.77	0.00	279 193 630.77
Total TITLE 3 & 4	800 023 842.85	389 169 478.61	1 189 193 321.46	0.00	1 189 193 321.46
Total	800 053 919.16	394 848 614.62	1 194 902 533.78	15 545.43	1 194 886 988.35

Fig. 28 Open Commitments Carried Forward from 2023 to 2024

7.4.1.5. Status of Unused Commitment Appropriations

According to the annuality principle of the F4E FR, the unused commitment appropriations at the end of each year and the de-commitments made on the budget of the previous years are cancelled, except for assigned revenue. The F4E FR also foresees the possibility to make the cancelled appropriations available again in future F4E budgets⁸. The situation for unused appropriations at 31/12/2023 is as follows:

(EUR)				
Operational Commitment Appropriations		Budgets (Title 3)	Assigned revenue (Title 4)	Total
Under execution (since 2008)	+	299 729 747.47	219 257 369.59	518 987 117.06
De-commitments (since 2008)	+	1 131 920 100.86	218 067 985.22	1 349 988 086.08
Carry-over (since 2008)	-	782 811.10	219 257 369.59	220 040 180.69
Made available again (since 2008)	-	765 632 662.39	134 974 790.95	900 607 453.34
Amount available for future budgets	=	665 234 374.84	83 093 194.27	748 327 569.11

Fig. 29 Status of Unused Commitment Appropriations

⁸ Article 12.1 F4E FR : "...Given the needs of the Joint Undertaking, the cancelled appropriations may be entered in the estimates of revenue and expenditure of the following financial years, in accordance with Article 32".

In 2023, the amount available for future budgets increased from EUR 577.7 million to EUR 748.3 million. See section 7.1 of this document, which provides the list of main factors contributing to this significant increase.

7.4.2. Expenditure in Payment Appropriations

The statement of expenditure was modified in the course of its implementation in accordance with the successive changes in the statement of revenue. Additional adjustments between budgetary chapters were implemented through transfers authorised by the F4E Director, to honour all contractual obligations toward suppliers and to reach the highest possible rate of budget implementation at the year-end.

Heading of the 2023 Budget Payment Expenditure	Evolution of the statement of expenditure										Implementation				Variation in % of the original budget
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	On B2023 commitments (11)	On B2022 commitments (12)	Execution (13)=(11)+(12)	% (14)= (13)/(10)	
A1 STAFF EXPENDITURE															
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	43 500 000.00	109 700.00	-109 700.00	0.01		-1 117 303.37	42 382 696.64	1 700 000.00		44 082 696.64	42 292 696.63	1 559 616.78	43 852 313.41	99.5%	
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	11 732 000.00					1 330 707.06	13 062 707.06	611 183.12		13 673 890.18	12 905 703.67	555 432.16	13 461 135.83	98.4%	
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	836 500.00					-114 602.50	721 897.50	66 163.63		788 061.13	684 570.16	20 487.05	705 057.21	89.5%	
A13 MISSION EXPENSES	647 000.00					153 000.00	800 000.00	74 090.44		874 090.44	722 494.39	64 426.46	786 920.85	90.0%	
A14 SOCIO-MEDICAL INFRASTRUCTURE	531 900.00					70 090.00	601 990.00	208 399.22		810 389.22	440 202.17	169 608.57	609 810.74	75.2%	
A15 TRAINING	850 000.00					0.00	850 000.00	387 124.24		1 237 124.24	244 059.68	342 502.82	586 562.50	47.4%	
A16 EXTERNAL SERVICES	580 000.00					50 000.00	630 000.00	269 786.06		899 786.06	523 423.39	153 412.49	676 835.88	75.2%	
A17 RECEPTIONS/EVENTS AND REPRESENTATION	10 000.00					-7 500.00	2 500.00	3 548.81		6 048.81	1 151.54	0.00	1 151.54	19.0%	
A18 SOCIAL WELFARE	50 000.00					11 520.00	61 520.00	27 151.98		88 671.98	50 855.90	9 996.43	60 852.33	68.6%	
A19 OTHER STAFF RELATED EXPENDITURE	3 921 000.00					-397 068.01	3 523 931.99	20 963.50		3 830 532.34	2 800 995.18	144 525.01	2 945 520.19	76.9%	
TITLE A1 - Total	62 658 400.00	109 700.00	-109 700.00	0.01	0.00	-21 156.82	62 637 243.19	20 963.50	3 633 084.35	66 291 291.04	60 666 152.71	3 020 007.77	63 686 160.48	96.1%	
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE													0.00		
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	1 632 000.00					247 000.00	1 879 000.00	2 625.31	596 969.24	2 478 594.55	1 322 125.70	472 119.88	1 794 245.58	72.4%	
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	4 981 750.00					256 531.66	5 238 281.66	1 482 533.92		6 720 815.58	3 366 648.20	1 290 260.63	4 656 908.83	69.3%	
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	387 840.00					-167 100.00	220 740.00	73 016.31		293 756.31	76 845.76	51 007.74	127 853.50	43.5%	
A24 CURRENT ADMINISTRATIVE EXPENDITURE	2 138 100.00					-354 188.45	1 783 911.55	636 914.60		2 420 826.15	1 181 030.57	500 037.80	1 681 068.37	69.4%	
A25 POSTAGE / TELECOMMUNICATIONS	738 500.00					-167 078.00	571 422.00	240 434.89		811 856.89	380 078.88	90 937.25	471 016.13	58.0%	
A26 MEETING EXPENSES	533 000.00					56 120.00	589 120.00	160 574.08		749 694.08	348 556.37	117 526.94	466 083.31	62.2%	
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES						0.00	0.00	14 530.88		14 530.88			0.00	0.0%	
A28 INFORMATION AND PUBLISHING	38 700.00					-25 700.00	13 000.00	3 770.85		16 770.85	8 806.59	6.71	8 813.30	52.6%	
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	266 000.00					-78 593.80	187 406.20	84 240.43		271 646.63	114 331.62	62 031.48	176 363.10	64.9%	
TITLE A2 - Total	10 715 890.00	0.00	0.00	0.00	0.00	-233 008.59	10 482 881.41	2 625.31	3 292 985.20	13 778 491.92	6 798 423.69	2 583 928.43	9 382 352.12	68.1%	
TITLE A1 & A2 - Total Administrative Expenditure	73 374 290.00	109 700.00	-109 700.00	0.01	0.00	-254 165.41	73 120 124.60	23 588.81	6 926 069.55	80 069 782.96	67 464 576.40	5 603 936.20	73 068 512.60	91.3%	

See commitments

Heading of the 2023 Budget Payment Expenditure	Evolution of the statement of expenditure										Implementation				Variation in % of the initial budget
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Amending budget 3 (4)	Regularisation Transfers adopted by GB (5)	Transfers adopted by F4E Director (6)	Final budget (7)=Σ(1 to 6)	Additional Revenue (8)	Carried over (9)	Final Appropriations (10)=Σ(7 to 9)	On B2023 commitments (11)	On B2022 commitments (12)	Execution (13)=(11)+(12)	% (14)= (13)/(10)	
B3 OPERATIONAL EXPENDITURE															
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	547 009 284.00	-10 000 000.00		-253 718 538.05	49 129 199.25	6 805 482.53	339 225 427.73	218 004.43	693.93	339 444 126.09	339 443 432.16	693.93	339 444 126.09	100.0%	-37.9%
B32 TECHNOLOGY FOR ITER AND DEMO	5 300 000.00					-1 920 865.52	3 379 134.48			3 379 134.48	3 379 134.38		3 379 134.38	100.0%	-36.2%
B33 TECHNOLOGY FOR BROADER APPROACH	31 000 000.00					-7 200 730.43	23 799 269.57			23 799 269.57	23 799 269.57		23 799 269.57	100.0%	-23.2%
B34 TECHNOLOGY FOR DONES	500 000.00					-500 000.00	0.00			0.00	0.00		0.00		-100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	15 000 000.00					2 820 278.83	17 820 278.83		20 833.08	17 841 111.91	17 820 278.83	20 833.08	17 841 111.91	100.0%	18.9%
B36 OTHER OPERATIONAL EXPENDITURE	5 000 000.00					250 000.00	5 250 000.00	98 436.95	51 070.41	5 399 507.36	5 214 761.71	51 070.41	5 265 832.12	97.5%	5.3%
Title B3 - Total	603 809 284.00	-10 000 000.00	0.00	-253 718 538.05	49 129 199.25	254 165.41	389 474 110.61	316 441.38	72 597.42	389 863 149.41	389 656 876.65	72 597.42	389 729 474.07	100.0%	-35.5%
B4 EARMARKED EXPENDITURE													0.00		
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	143 400 000.00		-30 000 000.00		1 218 548.12		114 618 548.12	0.00	2 160 714.82	116 779 262.94	115 279 262.94		115 279 262.94	98.7%	-19.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	p.m.				-50 347 747.37		-50 347 747.37	26 979 145.20	67 455 002.79	44 086 400.62	19 284 882.82		19 284 882.82	43.7%	-
B43 OTHER EARMARKED EXPENDITURE	p.m.						0.00	0.00	736 527.90	736 527.90	347 536.43		347 536.43	47.2%	-
Title B4 - Total	143 400 000.00	0.00	-30 000 000.00	0.00	-49 129 199.25	0.00	64 270 800.75	26 979 145.20	70 352 245.51	161 602 191.46	134 911 682.19	0.00	134 911 682.19	83.5%	-5.9%
Titles B3 & B4 - Subtotal	747 209 284.00	-10 000 000.00	-30 000 000.00	-253 718 538.05	0.00	254 165.41	453 744 911.36	27 295 586.58	70 424 842.93	551 465 340.87	524 568 558.84	72 597.42	524 641 156.26	95.1%	-29.8%
Total BUDGET in Payment appropriations	820 583 574.00	-9 890 300.00	-30 109 700.00	-253 718 538.04	0.00	0.00	526 865 035.96	27 319 175.39	77 350 912.48	631 535 123.83	592 033 135.24	5 676 533.62	597 709 668.86	94.6%	-27.2%

Fig. 30 Evolution of the Expenditure in Payment Appropriations

7.4.2.1. Administrative Expenditure

As mentioned previously, the administrative expenditure are of non-differentiated nature with the following consequences:

- The main changes made during the year compared to the original budget are identical in commitment and in payment. The changes for the 2023 budget are described in section 7.4.1.1,
- The statement of expenditure in payment appropriations includes the carry-over of appropriations corresponding to administrative contracts committed but not yet paid at the end of the previous year. This carry-over amounted to EUR 6 926 069.55,
- The current budget committed but not paid at the end of the year is automatically carried over and entered in the statement of expenditure of the following year (total amount of EUR 5 693 667.89).

7.4.2.2. Operational Expenditure in payments

The budget for operational expenditure was reduced by 35 % compared to the original budget due to the lower payment implementation.

Title 3 – Operational expenditure

- **Chapter B31 ITER Construction including site preparation** **(-) 38%**
Substantial reduction of IO cash contribution and the various programmes as described in section 7.1. of this document,
- **Chapter B32 Technology for ITER and Demo** **(-) 36%**
The decrease is related to procurement implementation issue, postponing contract signature from 2023 to 2024 and the initially forecasted TBM fund cash contribution was not requested by IO for 2023,
- **Chapter B33 Technology for Broader Approach** **(-) 23%**
The decrease is related to the technical issues with the supply of JT-60SA actively cooled divertor elements and the delay in the second set of Power Supply. Delay in provision of documentation and delay in placement of contracts due to change in priorities which caused delays in payments,
- **Chapter B34 Technology for DONES** **(-100) %**
The decrease is related to the delay in the signature of the contract for the RFQ Couplers, that will only happen in the first half of 2024, as well as the fact that all the other service/support contracts for DONES were committed under chapter B35,
- **Chapter B35 External Support Activities** **(+) 19%**
The increase is related to additional external support needs in most of the F4E's Programme Teams.

Title 4 – Earmarked expenditure

The budget from the IHS, allocated to the domain of ITER construction in full, was reduced by EUR 30 million due to reasons explained in section 7.1. The Budget chapters for other earmarked expenditure and from IO arose from the cashing of the respective call for funds.

7.4.2.3. Implementation of the budget in payment



Fig. 31 Final Implementation in PA

94.6% of the available budget has been implemented.

7.4.2.4. Cancelled Payment Appropriations

2023 budget Heading	(EUR)		
	Unused Appropriations (1)	Carry over to 2024 (2)	Cancelled appropriation (3)=(1)-(2)
TITLE 1 - STAFF EXPENDITURE	2 605 130.56	1 992 053.98	613 076.58
TITLE 2 - OPERATING EXPENDITURE	4 396 139.80	3 701 613.91	694 525.89
Total TITLE 1 & 2 Payment	7 001 270.36	5 693 667.89	1 307 602.47
TITLE 3 - OPERATIONAL EXPENDITURE	133 675.34	12 676.56	120 998.78
TITLE 4 - EARMARKED EXPENDITURE	26 690 509.27	26 690 509.27	0.00
Total TITLE 3 & 4 Payment	26 824 184.61	26 703 185.83	120 998.78
Total BUDGET in Payment	33 825 454.97	32 396 853.72	1 428 601.25

Fig. 32 Cancelled Payment Appropriations

The payment appropriations not used by the 31/12/2023 are cancelled except the amount automatically carried over for non-differentiated appropriations (Title 1 and Title 2) and assigned revenue, according to the F4E FR.

7.4.3. Additional Information on the Final Implementation of the 2022 Budget

7.4.3.1. Final Implementation of the Administrative Expenditure 2022

The definitive execution of the administrative budget 2022 is determined at the end of 2023, when the amounts carried over from the previous year corresponding to administrative actions committed but not yet paid are executed or cancelled. The execution of the payment appropriations carried over is shown with the implementation of the statement of expenditure above, column (12) of Fig.30.

The final execution of the 2022 administrative budget is therefore as follows:

(EUR)	Title 1	Title 2	Total
Final 2022 Administrative Budget	67 255 901.16	8 086 063.81	75 341 964.97

Fig. 33 Final Implementation of the Administrative Expenditure 2022

7.4.3.2. Global Commitments from 2022

No global commitments remained open at the end of 2023.

7.5. Tasks financed by the ITER Organization

F4E budget coming from Assigned Revenue funds is used to finance the costs of changes requested by IO and according to the procedures established by them. This also facilitates a proper management of tasks financed by IO. In 2023 F4E continued to collect revenue for any tasks requested and financed by IO.

The new commitment appropriations opened in 2023 represented a total amount of EUR 30.8 million. The payments recovered from IO represented a total amount of EUR 26.9 million.

The regularisation which started in 2022, continued in 2023 with a budget transfer of EUR 50,3 million both in commitment and payment appropriations from the revenue from IO (chapter B42) to the appropriations of Euratom (chapter B31) and of the IHS (chapter B41) previously used to cover the urgency of the requested changes.

More details about tasks financed by the IO are provided in Annex 8.1.

7.6. Budget Outturn Account 2023

The outturn for the financial year is calculated according to the total revenue actually cashed minus the total payment incurred during the year, minus the appropriations carried over to the following year.

		(EUR)	
Budget Outturn Account		2023	2022
REVENUE			
Euratom contribution	+	405 883 574.42	597 940 017.09
ITER Host state contributions	+	113 400 000.00	148 800 000.00
Membership contributions	+	7 069 300.00	6 590 300.00
ITER Organization	+	26 979 145.20	76 973 579.10
Other revenue	+	837 148.61	355 276.17
Other non budgeted revenue	+	79 383.48	339 540.24
TOTAL REVENUE (a)		554 248 551.71	830 998 712.60
EXPENDITURE			
<i>Title I: Staff</i>			
Payments	-	60 666 152.71	64 235 893.39
Appropriations carried over to the following year	-	1 992 053.98	3 633 084.35
<i>Title II: Infrastructure Expenditure</i>			
Payments	-	6 798 423.69	5 502 135.38
Appropriations carried over to the following year	-	3 701 613.91	3 292 985.20
<i>Title III: Operational Expenditure</i>			
Payments	-	389 729 474.07	528 289 679.49
Appropriations carried over to the following year	-	12 676.56	72 597.42
<i>Title IV Earmarked revenue</i>			
Payments	-	134 911 682.19	163 858 565.96
Appropriations carried over to the following year	-	26 690 509.27	70 352 245.51
<i>Total Payments (b)</i>		<i>592 105 732.66</i>	<i>761 886 274.22</i>
<i>Appropriations carried over to the following year (c)</i>		<i>32 396 853.72</i>	<i>77 350 912.48</i>
TOTAL EXPENDITURE (d)=(b)+(c)		624 502 586.38	839 237 186.70
OUTTURN FOR THE FINANCIAL YEAR (a-d)		-70 254 034.67	-8 238 474.10
Cancellation of unused payment appropriations carried over from previous year	+	1 307 602.47	950 730.26
Adjustment for carry-over from the previous year of appropriations available at 31.12 arising from assigned revenue	+	70 439 373.81	8 468 314.19
Exchange differences for the year (gain +/-)	+/-	3 869.95	5 675.67
BALANCE OF THE OUTTURN ACCOUNT FOR THE FINANCIAL YEAR		1 496 811.56	1 186 246.02
Of which Administrative expenditure		1 328 726.25	957 742.88
Of which Operational expenditure		168 085.31	228 503.14
Administrative outturn:			
Exchange differences for the year		3 869.95	5 675.67
Cancelled appropriation on title 1 and 2 from current year		0.00	0.00
Cancelled appropriation on title 1 and 2 from previous year		1 307 602.47	950 730.26
Non budgeted revenue from liquidated damages and Court decisions		17 253.83	1 336.95
Operational outturn:			
Cancelled payment appropriations on title 3 from 2021		120 998.78	0.00
Uncashed membership contribution from the year		-230 700.00	-109 700.00
Uncashed budgeted amount of the Euratom Contribution			-0.15
Non budgeted revenue from liquidated damages and Court decisions		277 786.53	338 203.29

Fig. 34 Budget Outturn 2023

For the 2023 financial year, the balance of the budget outturn amounts to EUR 1 496 811.56.

8. Annexes

8.1. Commitment Appropriations for assigned revenue from IO opened in 2023

Forecast of Revenue - Description - Commitment appropriations opened in 2023	OBS	Amount (EUR)
DI-216795 PBS15 012023 - EUPA notification implementation relative to Vacuum Vessel sector 2 PS3 Manufacturing works instruction	IP.SB	74 159.28
DI-02.2 (BIPSDI-01) - PA 6.2.P2.EU.02 FFRS - Tokamak complex, embedments to B11, NB CELL (L2 Level) VVPSS Relief line	IP.SB	22 784.25
DI-06 - PA 6.2.P2.EU.02 FFRS - Tokamak complex, MASS provision in B11-L5-01 for PBS 24 equipment	IP.SB	20 240.00
DI-08 - PA6.2.P2.EU.02 FFRS - Tokamak complex - PIM-432 (NBCELL VV Ports Seismic dampers, implementation of couplers AT B11, L1 Level	IP.SB	47 869.63
DI-22 Site work instruction for PBS 61 Works by TB16 - Preparation of the B51 heavy crane platform	IP.SB	56 944.23
DI-23 - PA 6.2.P2.EU.02 FFRS - Site work instruction for PBS 63.51 Works by TB03 - Instruction for lifting and handling in B51 building	IP.SB	8 000.00
DI-25 - PA 6.2.P2.EU.02 FFRS - Working instructions for storage and preservation on construction site of WDS tanks	IP.SB	15 481.40
DI-32 - PA 6.2.P2.EU.02 FFRS - Assembly hall building - IO deviation request - Embedding additional plates for SSATS (T2CK5F)	IP.SB	150 213.14
DI-34 Works by TB16 - Modifications to laydown Area between B56 & B17 (LB 17) to enable laydown and storage of Cryostat cyclinder	IP.SB	176 545.02
DI-37 Fire engineering study of Building 13 with present fire loads + regul	IP.SB	109 611.35
DI-39 - Instruction for early installation of Cryostat Drain line 26DR00-PI-1130 within Bioshield penetration at B2 Level	IP.SB	13 000.00
DI-41 - Site works instructions - PA 6.2.P2.EU.05 - clarification on preservation plan requirements for PBS 24 and PBS 26	IP.SB	47 587.63
DI-42 - PA 6.2.P2.EU.02 FFRS - Tokamak complex - Design of lintels to port cell doors	IP.SB	15 286.68
DI-47 Preparation of the IO platform for the KO-DA transformers delivery OS146	IP.SB	26 900.00
DI-52 TB16 Additional shoring in zone 10 due to late delivery of PBS 26 pipes on site (Supplement to PCRS 440 and 560)	IP.SB	78 749.03
DI-58 Works TB16 -Installation of additional Caps, Welds and supports for PBS26 in building 33 TB16 OS152	IP.SB	13 512.50
DI-62 - Construction design of plinth in building 68A.	IP.SB	16 094.64
DI-64 - PA 6.2.P2.EU.05 - Site works instruction for concrete crown closure after installation of PF4 CFT feeder	IP.SB	360 000.00
DI-75 - Modification of PBS65 compressed air pipes routing and supports in B51/52 due to PBS65.CA-PBS34 Construction interfaces issues	IP.SB	100 000.00
DI-83 Instruction to repairs works damaged by others in Area 39/ Zone 11	IP.SB	39 500.00
DI-84 - PA 6.2.P2.EU.02 - Tokamak complex, support by architect engineer - remedial actions of the NCR-TA0-057	IP.SB	240 000.00
DI-87.1 - PA 6.2.P2.EU.02 FFRS - Tokamak complex - new fire protection implementation strategy in B11 and implications on CMF instructions	IP.SB	35 414.00
DI-91 - Site works instruction - Design and cost estimate to perform an impact study on seismic pit and adjacent tunnel	IP.SB	15 000.00
DI-93 - PA 6.2.P2.EU.02 for implementatio via PA 6.2.P2.EU.05 - Instrucion to execute load assessment of existing PBS 62.14,	IP.SB	22 365.00
DI-97 Instruction for Design and cost estimate to implement urgent modifications to B34 NB HV Transformer Building and area A30	IP.SB	50 000.00
DI-100 - PA 6.2.P2.EU.02 FFRS form implementation via PA 6.2.P2.EU.05 - PBS 62.14 Tritium building	IP.SB	6 000.00
DI-102 - PA 6.2.P2.EU.02 for implementatin via PA6.2.P2.EU.05 - electrical desing impacts studies relating to EU-DA TB12 and TB13 contracts	IP.SB	25 000.00
DI-104 - PA 6.2.P2.EU.02 FFRS - Design cost estimate to implement additional urgent modifications to B34 NB HV Transformer B	IP.SB	45 000.00
DI-105 - PA 6.2.P2.EU.05 FFRS - Input for modifications to existing fire detection PBS 63.15 RF Heating building	IP.SB	9 594.00
DI-106 Design and implementation of additional urgent local modifications to Cryoline Bridge.	IP.SB	65 000.00
DI-108 ITER - Site modification PA 6.2.P2.EU.05 - Cryoline bridge cladding dismantling for cryolines installation	IP.SB	60 000.00
DI-109 Design of clash resolution of T04_11_DT_SU_0098 with PBS24 flange in B11 DTR.	IP.SB	4 500.00
DI-110 - Impact items at Tokamak complex level B2 from the post-MRR changes and out of MRR FAP items impacting building services	IP.SB	16 000.00
DI-111 - Implementation of additional urgent fire partitions in PPEN tunnels	IP.SB	87 000.00
HIT CARDS in 2019 (agreed EPB amount)	IP.SB	887 094.00
I-NC-010: PBS15 INPA IWS Components quality (EU), Umbrella cost	IP.SB	180 000.00
ITA C62TD04FE Technical requirements for provisions integrated by TB12 in building 71N to facilitate upgrade of the kitchen facilities by IO	IP.SB	100 000.00

Forecast of Revenue - Description - Commitment appropriations opened in 2023	OBS	Amount (EUR)
PCR 634 Requirement for improved cooling chemistry for heating system components in Tokamak building port cells and galleries	IP.SB	288 566.55
PCR 689 Creation of CCWS-2E (Component cooling water system) Loop by modification of CCWS-2C Loop	IP.SB	359 710.56
PCR 712 Impact on buildings above L3 on TKM complex resulting from PCR-654 (CHWS-HI piping reconfiguration)	IP.SB	149 161.15
PCR 713 (VV regularisation)	IP.VV	33 500.00
PCR 715 (Regularisation)	OP	533 422.00
PCR 720 Definition of TB16 interfaces at west end of CCWS-1 Gallery (Plates) AE DNO114; TB16 OS187 & DNO013	IP.SB	411 267.84
PCR-642 PBS 26 interfaces with TB07 Buildings (64, 67, 68A, 68B, 69 and surrounding area)	IP.SB	163 667.90
PCR 747 Requirements regularization related to nuclear safety sensors in Tokamak complex	IP.SB	61 823.71
PCR 750 Additional coupons for welding test and forming tests - AAG	IP.VV	10 000.01
PCR-751 B15 Model update and revision of the B15 TB04 schedule	IP.SB	178 192.00
PCR 757 Improvements to nuclear shielding in the Tokamak building for critical electronic protection	IP.SB	1 420 208.00
PCR 758 Installation of VV pressure suppression system and vapour suppression system tanks (VVPSS/VST)	IP.SB	166 883.01
PCR 768 Modifications to embedded plates supporting NBS equipment resulting from impact analysis of updated floor response spectra	IP.SB	109 619.00
PCR 770 VVPSS new design - impacts on second phase concrete pouring of Tokamak building	IP.SB	635 122.38
PCR 805 RFE 1B Stage1 Modifications to reflect updates in the sequence of activities	IP.SB	271 680.05
PCR 822 Tokamak complex L3 level - replacement of P700 by distributed anchors and plates	IP.SB	414 704.98
PCR 823 Airplane crash design solution in B74 roof and outer walls above L1	IP.SB	3 906 527.50
PCR 827 Installation of an additional oil retention tank on the north side of building 32.	IP.SB	127 135.58
PCR 834 Re-configuration of the leak detection system and main Torus vacuum instrumentation	IP.SB	1 279 089.00
PCR 834 Re-configuration of the leak detection system and main Torus Vacuum instrumentation (link to PCR-748)	IP.SB	80 514.89
PCR 1006 - Design adaptation of TF Coil winding cooling pipe routing	IP.SB	28 950.65
PCR 1010 Temporary openings/recesses in Tokamak complex buildings	IP.SB	1 287 353.99
PCR 1013 Move of control system train and backup server room from B24 to B44	IP.SB	3 943 337.61
PCR 1038 Provision of additional Cryogenic clients on the front end Cryo distribution (FECD) to supply DMS	IP.SB	511 640.00
PCR 1086 Revision scope baseline to include procurement and construction of B11-B1 corner shielding walls	IP.SB	119 567.90
PCR 1099 Modification of interface load for the verification of the auxiliary buildings	IP.SB	472 829.74
PCR 1106 Modifications to cargo lift requirements	IP.SB	1 168 760.00
PCR 1161 Baseline seismic FRS of TCWS 11-L3 Mezzanine and DTR Mezzanine of tokamak building	IP.SB	5 896.79
PCR 1172 - new requirement of PBS 61 - special foundations for PBS 34 - support structure for Cryolines near B52 (INOX TOWER).	IP.SB	29 595.00
PCR 1178 IO Directed change of Torus and Cryostat Cryopumping system of technical specifications after FDR	IP.CF	593 394.58
PCR 1181 Change to route of high security fence and reservation of location of emergency response building	IP.SB	90 000.00
PCR 1207 Regularization of interfaces requirements between PBS 26.CH and PBS 65.	IP.SB	263 374.00
PCR 1209 Baseline of interfaces and requirements of 11-L5 SIC rooms Civil structures, related building services and supporting systems	IP.SB	87 215.72
PCR 1241	IP.IV	8 000 000.00
PCR 1261 Scope allocation of emergency response building (ERB) to IO PBS 63	IP.SB	85 754.99
PCR 1273 (Regularisation)	IP.DG	133 000.00
PCR 1291 Additional doors in B37 to ensure building cleanliness and installation sequence	IP.SB	564 558.00
PCR 1303 New construction design inputs for PBS65 and PBS 62 Staged approach implementation in Building 14 (Daughter of PCR-1245)	IP.SB	2 967 605.06
PCR 1439 - Update PBS31 Component technical specification	IP.CF	541 168.32
PCR 1440 - Update PBS31 component technical specification following manufacturing and qualification feedback	IP.CF	448 155.31
PCR 1452 Propagation B14 Baseline heat loads HVAC designer+definition technical solution to solve cooling deficits (daughter of PCR-01447)	IP.SB	104 462.00
PCR 1453 Propagation B74 baseline heat loads HVAC designer+definition technical solution to solve cooling deficits (daughter of PCR-01447)	IP.SB	18 993.00
PCR 1464 Update of PBS 53 (HNB PS) Interface requirements to PBS 61 Area 30, Building 34 and 37	IP.SB	483 817.00
PCR 1468	IP.RH	155 167.47
PCR 1471 Propagation of B11 Baseline heat loads to the HVAC designer and technical solution to solve the cooling deficits (daughter of PCR-01447)	IP.SB	113 959.00
PCR 1483 Changes Diagnostic IN-VESSEL and IN-DIVERTOR Electrical Services - Component designs and interfaces following prototype testing	IP.DG	600 000.00
PCR 1489	IP.IV	423 673.69
TB16 - Implementation of remedial actions to resolve NCRS 166 & 167 DNO#41	IP.SB	22 213.00
	Subtotal	37 105 684.71
Reduction of Forecasts of Revenue created in the past as part of regularisation		-8 721 770.77
Decommitments and technical adjustments		2 461 824.81
	Total	30 845 738.75

Fig. 35 Commitment Appropriations for Assigned Revenue from IO

8.2. Multi-Annual Payment Schedule for the Operational Budget

EUR

Year	Net Commitments	Paid until end of 2013	Paid in MFF 2014-2020	MFF 2021-2028			Outstanding amount
				Paid 2021	Paid 2022	Paid 2023	
<= 2007	115 445 438.21	113 121 009.41	2 324 428.80	-	-	-	-
2008	162 357 720.16	154 330 986.04	8 026 734.12	-	-	-	0.00
2009	295 658 870.68	234 711 366.38	60 244 459.12	494 543.46	-	-	208 501.72
2010	389 572 116.22	274 537 523.43	113 315 487.63	520 457.78	267 489.00	-	931 158.38
2011	370 662 303.25	224 611 776.68	138 573 486.04	227 422.68	65 267.85	-	7 184 350.00
2012	1 033 549 941.04	227 971 230.12	760 625 795.92	14 418 968.18	14 456 930.11	4 599 940.47	11 477 076.24
2013	731 253 363.26	67 053 699.98	611 806 609.36	18 485 338.22	15 653 339.40	1 701 968.12	16 552 408.18
2014	566 034 841.82	-	475 247 089.02	19 482 123.37	18 381 869.43	10 531 721.11	42 392 038.89
2015	336 471 793.19	-	323 703 676.59	3 947 737.56	2 866 937.05	593 039.16	5 360 402.83
2016	410 917 007.99	-	406 090 760.75	1 423 809.18	367 707.81	733 739.57	2 300 990.68
2017	478 593 733.70	-	433 038 187.24	19 067 695.60	9 512 936.62	5 842 281.59	11 132 632.65
2018	624 981 273.46	-	475 932 307.52	35 594 872.67	6 161 810.79	5 607 430.34	101 684 852.14
2019	652 400 329.53	-	438 734 899.59	72 880 000.06	72 301 641.32	27 636 673.09	40 847 115.47
2020	762 095 186.60	-	328 530 151.47	220 317 475.14	87 562 170.73	52 123 263.56	73 562 125.70
2021	915 763 551.22	-	-	278 124 868.81	242 964 503.48	99 341 228.12	295 332 950.81
2022	604 708 253.09	-	-	-	221 585 641.86	192 065 372.07	191 057 239.16
2023	505 533 977.67	-	-	-	-	123 864 499.06	381 669 478.61
Total	8 955 999 701.09	1 296 337 592.04	4 576 194 073.17	684 985 312.71	692 148 245.45	524 641 156.26	1 181 693 321.46

Fig. 36 Multiannual payment schedule (Operational)

- Notes :
- The actions accounted to F4E projects and implemented by the Commission and the CEA before F4E financial autonomy in 2008 are included.
 - For information, 1 448 commitment positions are open in ABAC on the 31/12/23, representing 2% less compared to the end of 2022.
 - Global commitment of EUR 7.5 million approved at the end of 2023 is not included in the table above.
 - Indicatively, the cumulative operational expenses at 31/12/23 are estimated to EUR 7 757.54 million in current value.

8.3. Reconciliation Between Budgetary and Accrual Based Accounts

	sign +/-	Amount (EUR)
Economic result (+ for surplus and - for deficit)	+/-	-172 706 188.78
<i>Adjustment for accrual items (items not in the budgetary result but included in the economic result)</i>		
Adjustments for Accrual Cut-off (reversal 31.12.N-1)	+/-	61 792 565.79
Adjustments for Accrual Cut-off (cut- off 31.12.N)	+/-	-5 146 590.25
Unpaid invoices at year end but booked in charges (class 6)	+	124 790 507.11
Depreciation of intangible and tangible assets	+	325 327.73
Provisions (impact of the year)	+/-	21 267 177.10
Recovery Orders issued in 2023 in class 7 and not yet cashed	-	-1 028 248.15
Prefinancing given in previous year and cleared in the year	+	47 753 404.51
Prefinancing received in previous year and cleared in the year	-	0.00
Payments made from carry over of payment appropriations	+	5 603 936.20
Other : 2023 corrections/credit notes on transactions booked in charges in previous years	+/-	-462 530.45
<i>Adjustment for budgetary items (item included in the budgetary result but not in the economic result)</i>		
Asset acquisitions (less unpaid amounts)	-	-285 239.73
New pre-financing paid in the year 2023 and remaining open as at 31.12.2023	-	-44 612 464.67
New pre-financing received in the year 2023 and remaining open as at 31.12.2023	+	1 496 811.56
Budgetary recovery orders issued before 2023 and cashed in the year	+	1 404 670.93
Budgetary recovery orders issued in 2023 on balance sheet accounts (not 7 or 6 accounts) and cashed	+	202 873.95
Payment appropriations carried over to 2024	-	-32 396 853.72
Cancellation of unused carried over payment appropriations from previous year	+	1 307 602.47
Adjustment for carry-over from the previous year of appropriations available at 31.12 arising from assigned revenue	+	70 439 373.81
Other : Invoices paid in 2023 but booked in charges in previous years	+/-	-78 249 194.30
Total		1 496 941.11
Budgetary result (+ for surplus)	+/-	1 496 811.56
Including amount of exchange rate differences		3 869.95
Delta not explained		129.55

Fig. 37 Reconciliation between budgetary and accrual based accounts

8.4. 2023 Budget Implementation – Details by Fund Source

Fund Source: C1 - Credits of the year (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A10	SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	C1	42 382 696.64	42 382 696.64	100.00%	42 382 696.64	42 292 696.63	99.79%
A11	SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	C1	13 062 707.06	13 062 707.06	100.00%	13 062 707.06	12 905 703.67	98.80%
A12	EXPENDITURE RELATING TO STAFF RECRUITMENT	C1	721 897.50	721 897.50	100.00%	721 897.50	684 570.16	94.83%
A13	MISSION EXPENSES	C1	800 000.00	800 000.00	100.00%	800 000.00	722 494.39	90.31%
A14	SOCIO-MEDICAL INFRASTRUCTURE	C1	601 990.00	601 990.00	100.00%	601 990.00	440 202.17	73.12%
A15	TRAINING	C1	850 000.00	850 000.00	100.00%	850 000.00	244 059.68	28.71%
A16	EXTERNAL SERVICES	C1	630 000.00	630 000.00	100.00%	630 000.00	523 423.39	83.08%
A17	RECEPTIONS, EVENTS AND REPRESENTATION	C1	2 500.00	2 500.00	100.00%	2 500.00	1 151.54	46.06%
A18	SOCIAL WELFARE	C1	61 520.00	61 520.00	100.00%	61 520.00	50 855.90	82.67%
A19	OTHER STAFF RELATED EXPENDITURE	C1	3 523 931.99	3 523 931.99	100.00%	3 523 931.99	2 787 623.18	79.11%
Total Title 1			62 637 243.19	62 637 243.19	100.00%	62 637 243.19	60 652 780.71	96.83%

Fund Source: C1 - Credits of the year (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	C1	1 879 000.00	1 879 000.00	100.00%	1 879 000.00	1 322 125.70	70.36%
A22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	C1	5 238 281.66	5 238 281.66	100.00%	5 238 281.66	3 366 648.20	64.27%
A23	MOVABLE PROPERTY AND ASSOCIATED COSTS	C1	220 740.00	220 740.00	100.00%	220 740.00	76 845.76	34.81%
A24	CURRENT ADMINISTRATIVE EXPENDITURE	C1	1 783 911.55	1 783 911.55	100.00%	1 783 911.55	1 181 030.57	66.20%
A25	POSTAGE / TELECOMMUNICATIONS	C1	571 422.00	571 422.00	100.00%	571 422.00	380 078.88	66.51%
A26	MEETING EXPENSES	C1	589 120.00	589 120.00	100.00%	589 120.00	348 556.37	59.17%
A28	INFORMATION AND PUBLISHING	C1	13 000.00	13 000.00	100.00%	13 000.00	8 806.59	67.74%
A29	OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	C1	187 406.20	187 406.20	100.00%	187 406.20	114 331.62	61.01%
Total Title 2			10 482 881.41	10 482 881.41	100.00%	10 482 881.41	6 798 423.69	64.85%

Fund Source: C1 - Credits of the year (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C1	462 402 914.83	326 585 852.47	70.63%	339 225 427.73	339 225 427.73	100.00%
B32	TECHNOLOGY FOR ITER AND DEMO	C1	4 113 172.00	3 899 736.01	94.81%	3 379 134.48	3 379 134.38	100.00%
B33	TECHNOLOGY FOR BROADER APPROACH	C1	33 294 531.00	32 798 899.08	98.51%	23 799 269.57	23 799 269.57	100.00%
B34	TECHNOLOGY FOR DONES	C1	15 000.00			0.00		
B35	EXTERNAL SUPPORT ACTIVITIES	C1	21 176 598.20	20 268 043.23	95.71%	17 820 278.83	17 820 278.83	100.00%
B36	OTHER OPERATIONAL EXPENDITURE	C1	5 443 705.17	5 433 705.17	99.82%	5 250 000.00	5 129 001.32	97.70%
Total Title 3			526 445 921.20	388 986 235.96	73.89%	389 474 110.61	389 353 111.83	99.97%
Total C1			599 566 045.80	462 106 360.56	77.07%	462 594 235.21	456 804 316.23	98.75%

Fund Source: C4 - Internal assigned revenues (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A19	OTHER STAFF RELATED EXPENDITURE	C4	20 963.50	20 963.50	100.00%	20 963.50	13 372.00	63.79%
Total Title 1			20 963.50	20 963.50	100.00%	20 963.50	13 372.00	63.79%
A21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	C4	2 625.31	2 624.31	99.96%	2 625.31		0.00%
Total Title 2			2 625.31	2 624.31	99.96%	2 625.31	0.00	0.00%
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C4	218 004.43		0.00%	218 004.43	218 004.43	100.00%
B36	OTHER OPERATIONAL EXPENDITURE	C4	98 436.95	85 760.39	87.12%	98 436.95	85 760.39	87.12%
Total Title 3			316 441.38	85 760.39	27.10%	316 441.38	303 764.82	95.99%
Total C4			340 030.19	109 348.20	32.16%	340 030.19	317 136.82	93.27%

Fund Source: C5 - Carried-over internal assigned revenues (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
B31	OTHER OPERATIONAL EXPENDITURE	C5	693.93		0.00%	693.93	693.93	100.00%
B35	OTHER OPERATIONAL EXPENDITURE	C5	7 732.80	7 732.80	100.00%	20 833.08	20 833.08	100.00%
B36	OTHER OPERATIONAL EXPENDITURE	C5	0.00			51 070.41	51 070.41	100.00%
Total C5			8 426.73	7 732.80	-	72 597.42	72 597.42	100.00%

Fund Source: C8 - Carried over credits from previous years (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A10	SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	C8	1 700 000.00	1 559 616.78	91.74%	1 700 000.00	1 559 616.78	91.74%
A11	SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	C8	611 183.12	555 432.16	90.88%	611 183.12	555 432.16	90.88%
A12	EXPENDITURE RELATING TO STAFF RECRUITMENT	C8	66 163.63	20 487.05	30.96%	66 163.63	20 487.05	30.96%
A13	MISSION EXPENSES	C8	74 090.44	64 426.46	86.96%	74 090.44	64 426.46	86.96%
A14	SOCIO-MEDICAL INFRASTRUCTURE	C8	208 399.22	169 608.57	81.39%	208 399.22	169 608.57	81.39%
A15	TRAINING	C8	387 124.24	342 502.82	88.47%	387 124.24	342 502.82	88.47%
A16	EXTERNAL SERVICES	C8	269 786.06	153 412.49	56.86%	269 786.06	153 412.49	56.86%
A17	RECEPTIONS, EVENTS AND REPRESENTATION	C8	3 548.81	0.00	0.00%	3 548.81	0.00	0.00%
A18	SOCIAL WEALFARE	C8	27 151.98	9 996.43	36.82%	27 151.98	9 996.43	36.82%
A19	OTHER STAFF RELATED EXPENDITURE	C8	285 636.85	144 525.01	50.60%	285 636.85	144 525.01	50.60%
Total Title 1			3 633 084.35	3 020 007.77	83.13%	3 633 084.35	3 020 007.77	83.13%

Fund Source: C8 - Carried over credits from previous years (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	C8	596 969.24	472 119.88	79.09%	596 969.24	472 119.88	79.09%
A22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	C8	1 482 533.92	1 305 806.06	88.08%	1 482 533.92	1 290 260.63	87.03%
A23	MOVABLE PROPERTY AND ASSOCIATED COSTS	C8	73 016.31	51 007.74	69.86%	73 016.31	51 007.74	69.86%
A24	CURRENT ADMINISTRATIVE EXPENDITURE	C8	636 914.60	500 037.80	78.51%	636 914.60	500 037.80	78.51%
A25	POSTAGE / TELECOMMUNICATIONS	C8	240 434.89	90 937.25	37.82%	240 434.89	90 937.25	37.82%
A26	MEETING EXPENSES	C8	160 574.08	117 526.94	73.19%	160 574.08	117 526.94	73.19%
A28	INFORMATION AND PUBLISHING	C8	3 770.85	6.71	0.18%	3 770.85	6.71	0.18%
A29	OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	C8	84 240.43	62 031.48	73.64%	84 240.43	62 031.48	73.64%
Total Title 2			3 278 454.32	2 599 473.86	79.29%	3 278 454.32	2 583 928.43	78.82%
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C8	909 165 487.43	850 034 062.54	93.50%	Payment appropriations under C1 Fund source		
B32	TECHNOLOGY FOR ITER AND DEMO	C8	6 371 868.09	6 362 278.09	99.85%			
B33	TECHNOLOGY FOR BROADER APPROACH	C8	23 276 155.17	22 822 136.38	98.05%			
B35	EXTERNAL SUPPORT ACTIVITIES	C8	34 648 662.44	28 524 750.00	82.33%			
B36	OTHER OPERATIONAL EXPENDITURE	C8	3 087 927.93	2 906 208.60	94.12%			
Total Title 3			976 550 101.06	910 649 435.61	93.25%			
Total C8			983 461 639.73	916 268 917.24	93.17%	6 911 538.67	5 603 936.20	81.08%

Fund Source: R0 - Assigned revenues (EUR)

Official Budget Item	Budget Line Description	Fund Source	Commitment			Payment		
			Credit Com Amount (1)	Commitment Accepted Amount (2)	% Committed (2)/(1)	Credit Pay Amount (4)	Payment Accepted Amount (5)	% Paid (5)/(4)
A27	RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES	R0	14 530.88	0.00	0.00%	14 530.88		0.00%
Total Title 2			14 530.88	0.00	0.00%	14 530.88	0.00	0.00%
B41	ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	R0	423 407 026.56	375 757 398.97	88.75%	116 779 262.94	115 279 262.94	98.72%
B42	ACTIVITIES LINKED TO ITER ORGANIZATION	R0	73 054 952.77	37 611 386.09	51.48%	44 086 400.62	19 284 882.82	43.74%
B43	OTHER EARMARKED EXPENDITURE	R0	736 527.90	736 527.90	100.00%	736 527.90	347 536.43	47.19%
Total Title 4			497 198 507.23	414 105 312.96	83.29%	161 602 191.46	134 911 682.19	83.48%
Total R0			497 213 038.11	414 105 312.96	83.29%	161 616 722.34	134 911 682.19	83.48%

Fig. 38 Budget Implementation – Details by Fund Source

8.5. 2023 Establishment Plan

Function group and grade	2023 Budget			
	Authorised under the EU Budget		Filled as 31/12/2023	
	Permanent posts	Temporary Posts	Permanent posts	Temporary Posts
AD 16				
AD 15		1		
AD 14	4	3	2	1
AD 13	7	9	4	2
AD 12	11	24	11	24
AD 11	3	24	1	19
AD 10	3	49	8	52
AD 9	4	50	2	41
AD 8		24		23
AD 7	1	20	1	15
AD 6		19		24
AD 5				
AD total	33	223	29	201
AST 11	2		1	
AST 10	2		1	
AST 9	2	1	4	
AST 8	1	3		1
AST 7	1	7		4
AST 6		9	2	8
AST 5	3	11	3	6
AST 4	1		1	4
AST 3		6		7
AST 2				-
AST 1				-
AST total	12	37	12	30
AST/SC total	0	0	0	0
TOTAL	45	260	41	231
GRAND TOTAL	305		272	

Fig. 39 Budget 2023 Establishment Plan

9. Glossary and Abbreviations

ABAC	Accrual Based Accounting (accounting system used by F4E and managed by the EC).
Accounts payable	Organisation's current payables due within one year. Accounts payable are current liabilities.
Accounts receivable	Organisation's current receivables due within one year. Accounts receivable are current assets
Accrual accounting	Accounting methodology that recognises income when it is earned and expenses when they occur, rather than when they are actually received or paid, as opposed to cash accounting.
Actual = Actual amounts	Budget outturn = Budget execution = Budget implementation
Assets	Assets are items owned by an individual or an organisation, which have commercial or exchange value. Assets may consist of specific property or claims against others.
BA	Broader Approach
Cash accounting	Accounting methodology based on cash flows, i.e. transactions are recognised when cash is received or paid, as opposed to accrual accounting.
Current asset	The group of assets considered to be liquid in that they can be turned into cash within one year.
Current liability	Liabilities to be paid/settled within one year of the balance sheet date. (e.g. vendor's payables, etc.).
DI	Direct implementation for tasks requested by IO
EaC	Estimate at Completion
EC	European Commission
EPB	Executive Project Board
EU	European Union
External assigned revenues	Dedicated revenue received to finance specific items of expenditure
FR	Financial regulation
Financial statements	Written reports which quantitatively describe the financial health of an organisation. They comprise the Statement of Financial Performance, the Balance Sheet, the Cash Flow Statement, the Statement of Changes in Net Assets (capital) and the explanatory notes.
GB	Governing Board
Imprest account	Bank accounts and/or cash at hand used for the payment of low value expenses.
Internal assigned revenues	Funds received for specific assigned operations and activities from amounts recovered.
IO	ITER Organisation
Liability	A financial obligation, debt, claim, payable or potential loss.
NCR	Non conformity Report is a document issued by the supplier, F4E or the Customer detailing a condition that does not comply with a specified requirement.
PA	Procurement Arrangement: the PA between F4E and IO define the F4E deliverables to IO as well as the credit allocation scheme for each deliverable under the ITER unit of account.
PCR	Project Change Request
RAL	Commitments resulting in payment appropriations remaining to be paid.
TB	Tender Batches
WP	Annual Work Programme