FUSION FOR ENERGY

Consolidated Annual Activity Report (CAAR) for 2024

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

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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
Body PS & MHVPS	Body Power Supply and Main High Voltage Power Supply
BPM	Business Process Management
BSM	Blanket Shield Module
BSM	Buildings and Site Management
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
CDLDS:	Cryostat Direct Leak Detection System
CPRHS	Cash and Plug Remote Handling System
CS	Central Solenoid
CSC	Computational Simulation Centre
CTM	Cassette Toroidal Mover
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
DTU	Digital Transformation Unit
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
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
FUTED	Fusion Technologies & Engineering Department
FW	First Wall
FWC	Framework Contract
GB	Governing Board
GDoIs	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
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
IRS	Integrated Reporting System
ISC	Improvement Steering Committee
ISEPS	Ion Source and Extraction Power Supplies
ISS	Isotope Separation System
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
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
MTA	Milestone Trend Analysis
MV DC	Mega Volt Direct Current
NB	Neutral Beam
NBI	Neutral Beam Injector
NBDLDS	Neutral Beam Direct Leak Detection System

NBRHS	Neutral Beam Remote Handling System
NBTF	Neutral Beam Test Facility
NbTi	Niobium Titanium
NCR	Non-Conformity Report
NDT	Non-Destructive Testing
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
PCSCF	Project Control
PF	Poloidal Field (coils)
PFU	Plasma Facing Units
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
P&C	People and Culture
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
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
TBS	Test Blanket System
TF	Toroidal Field (coils)
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 progress and achievements of F4E in delivering its contributions to the ITER and Broader Approach projects in 2024, especially the manufacture and delivery of the first European ITER Vacuum Vessel Sector, the delivery of the final Poloidal Field Coil to ITER, the handover of key ITER buildings, the progress towards continuous wave operation at the LIPAc accelerator, crucial upgrades in JT-60SA, and the commencement of construction for the DONES facility.

2. Commends F4E for the increased maturity of its project management and schedule monitoring capabilities, especially as evidenced by improved Schedule Performance Index (SPI) and milestone achievements compared to previous years.

3. Acknowledges the progress made across In-Vessel components, Remote Handling, Diagnostics, External Heating, and Fuel Cycle Systems, as well as F4E's close collaboration with European industry, SMEs, and research organisation.

4. Commends F4E for its strategic efforts and operational improvements throughout 2024, including the continued focus on deeper integration with the ITER Organization, particularly in civil engineering and buildings.

5. Appreciates F4E's growing role in fostering a competitive European fusion ecosystem, notably through the launch of the Technology Development Programme (TDP), strengthened engagement with the EUROfusion consortium, and new outreach initiatives such as the SME Day and the 2024 F4E Roundtable.

6. Recognises the uncertainties associated with the ITER project re-baselining and urges F4E to continue working closely with the ITER Organization and other Domestic Agencies to define and align on a realistic baseline within budgetary and schedule constraints.

7. Notes that risks persist in areas such as in-kind contributions, design stability for first-of-a-kind components, and the Hot Cell Facility and encourages F4E to continue its proactive efforts in addressing these risks through reinforced monitoring of the industrial supply chain and closer integration with the ITER Organization.

8. Commends F4E for the successful implementation of its new organizational structure in 2024, aimed at improving performance, reinforcing matrix management, and enhancing staff wellbeing.

9. Notes the measures undertaken to strengthen internal controls and governance, including enhanced risk management practices and the follow-up to internal and external audit recommendations.

10. Welcomes the improvements in budget execution in 2024, with higher implementation rates for both commitments and payments compared to the previous year, and encourages continued improvements in procurement efficiency and financial planning.

11. Expresses satisfaction with the quality and comprehensiveness of the Consolidated Annual Activity Report 2024 prepared by F4E and notes the Declaration of Assurance issued by the Director.

12. Adopts the present analysis and assessment of the Consolidated Annual Activity Report 2024 and requests F4E to annex it to the report.

Barcelona, 10 July 2025
Carlos Alejaldre
Chair of the Governing Board

[Electronically signed in IDM]

Executive Summary/The Year in Brief

Dear stakeholders, colleagues, readers,

Fusion energy is gaining unprecedented political, technical and industrial momentum.

Technological breakthroughs, increasing private investment and governmental commitment are speeding up the race to harnessing fusion as an environmentally friendly energy source.

Europe must be at the forefront, leveraging its world-class research and industry to stay ahead. The stakes for Europe are high: competitiveness, autonomy, and sustainability are at the centre and Fusion for Energy (F4E) plays a pivotal role in strengthening our continent's leadership.

In this context, 2024 has been a strategic year of progress for F4E. We have continued to deliver on ITER and the Broader Approach (BA) activities, drawing lessons from these key projects while contributing to other experiments as part of the fusion roadmap.

Together with our partners, we have achieved many milestones, such as:

- First European ITER Vacuum Vessel Sector manufactured, a massive industrial achievement.
- Final Poloidal Field Coil delivered to ITER, one of the largest superconducting magnets ever.
- Handover of key ITER buildings, ready for upcoming assembly and integration activities.
- Progress towards continuous wave at the LIPAc accelerator.
- Upgrades in JT-60SA, the world's largest tokamak, built by Europe and Japan.
- Start of construction for the DONES facility to develop fusion materials.

We have also made commendable progress in other areas such as In-Vessel components, Remote Handling, Diagnostics, External Heating and Fuel Cycle Systems. To achieve this, we worked closely with European industry, SMEs and research organisations. Since 2007, we have signed 1.350 contracts with a cumulative value exceeding 7 billion EUR. These successes were matched by excellent project and financial execution, improving from previous years. The positive performance is reflected in the impressive completion rate of planned activities for the ITER project, reaching 84%.

Additionally, the ITER Organization, has presented a new baseline plan of the next stages of the project, reinforcing our commitment to its joint success. We also pursued further integration between F4E and the ITER Organization, especially in civil engineering and buildings, capitalising on resources and delivering efficiencies.

Beyond technical and project achievements, this was also a year of transformation for F4E. We implemented a new organisational structure, which strengthens matrix management, improves collaboration, and capitalises on our expertise—all while ensuring business continuity. At the heart of our success is our people and a new leadership team.

We strengthened our collaboration with the EUROfusion consortium, to better connect research and industry. We also launched the Technology Development Programme to map and advance key technologies for the future of fusion. In parallel, we kept expanding our engagement with the industrial supply chain to ensure Europe's involvement in an ever-evolving fusion landscape. We also started exploring partnerships with private fusion initiatives, paving the transition from experimental to commercial fusion.

Other important initiatives in 2024 that can be highlighted include F4E's first SME Day that involved 50 companies exploring ways to reinforce their engagement and participation in work for ITER and other fusion projects. Another important event was the 2024 F4E Roundtable that brought together top experts to discuss the legal and contractual dimensions of fusion, to enable future partnerships and address upcoming challenge. Finally, to emphasize our dedication to sustainability, it is important to note that F4E launched over 50% of its 2024 procurements with sustainable criteria

I would like to extend my sincere gratitude to the entire F4E team, our partners, and stakeholders for their dedication and expertise. Our achievements this year are a testament to our collaboration and shared vision to delivering this safe, limitless, and sustainable power.

Marc Lachaise
Director, Fusion for Energy

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** though:
    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

Fusion for Energy (F4E) is delivering on key fusion projects with its unique set of competencies and plays a pivotal role in strengthening Europe's leadership. Starting with ITER, the biggest international fusion experiment, under construction in Cadarache in the south of France. Europe, as the Host Party, plays an important role for the success of this project. The EU bears 45.46 % of the cost of the project for its share of components and all buildings. It will provide 34% of the cost of operation, deactivation and decommissioning of ITER[1].

Until the end of 2020, Europe budgeted 6.6 billion EUR and an additional 5.6 billion EUR 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.

In this context, 2024 has been a strategic year of progress for the European contribution to ITER. Some of our main achievements include:

- First European ITER Vacuum Vessel sector manufactured, a massive industrial achievement.
- Final Poloidal Field Coil delivered to ITER, one of the largest superconducting magnets ever.
- Handover of key ITER buildings, ready for upcoming assembly and integration activities.

We have also made commendable progress in other areas such as In-Vessel components, Remote Handling, Diagnostics, External Heating and Fuel Cycle Systems. To achieve this, we keep working closely with European industry, SMEs and research organisations. Since 2007, we have signed 1350 contracts with a cumulative value close to EUR 7 billion. These successes were matched by improved project and financial execution. The positive performance is reflected in a good completion rate of planned activities for the ITER project, reaching 84% and 100% on the critical path. The report presents in more detail our main achievements.

Additionally, the ITER Organization (IO), presented a new baseline plan of the next stages of the project, reinforcing the commitment of all parties. F4E and IO pursued further integration, especially in civil engineering and buildings, capitalising on resources and delivering efficiencies.

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

1.1.2 Major Achievements in EU Start of Research Operation 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 m^3 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 Works and Painting activities in the Tokamak Complex including Tritium Building (B14) enabling IO equipment installation in the full facility. The Cargo Lift installation in the Machinery Room started and the manufacturing and delivery of first package of Doors for Tritium Building (B14) was completed as well as the delivery of the first Fire Isolation Dampers under the new Building Services Procurement.

Hot Cell Complex functional and safety requirements were frozen in the Design Integration Review. In this basis the procurement is now planned for the main facility.

Architect Engineer Contract II (long term collaboration ~9 years) signed with b.NEXT consortium (Assystem, Egis and Empresarios Agrupados) for the Construction consultancy services and Mechanical & Electrical Design Activities for the Tokamak Complex.

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), the Area 30 and the Busbar bridge M2 (Figure 5).

The construction works for the Neutral beam Power Supplies Buildings (B37), the NB Power Supply Building (34), progressed up to a state where IO contractors were able to start working (Ready for Equipment). Heating Building (B15), Cryoline Bridge and Cryoplant Buildings (B50s) were Taken Over to IO and the PF Coil Building (B55) was transferred from F4E to IO.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU62.05.460	IPL > Construction of Cryoplant Coldbox Building (52) Completed	Q4 2024	GB21	MAIN MILESTONES	Achieved
EU62.05.620	IPL > Construction of Fast Discharge & Switching Network Resistor Building (75) Completed	Q4 2024	WP24 objective	MAIN MILESTONES	Not achieved
EU62.604260	Construction of 2 Bus-Bar Bridges (between B32 &74 and B33 &74) Completed	Q3 2024	GB58	AUX BUILDINGS D&B TB12	Achieved
EU62.886781	Civil works completed for MV Distribution Bldg LC/2B (47) - Level 4	Q3 2024	WP24 objective	AUX BUILDINGS D&B TB13	Achieved

Table 1: Site and Buildings and Power Supplies – Annual Objectives presented in the F4E Work Programme 2024.

Figure 1: Aerial view of the ITER construction site. Photo: © ITER Organization (October 2024)

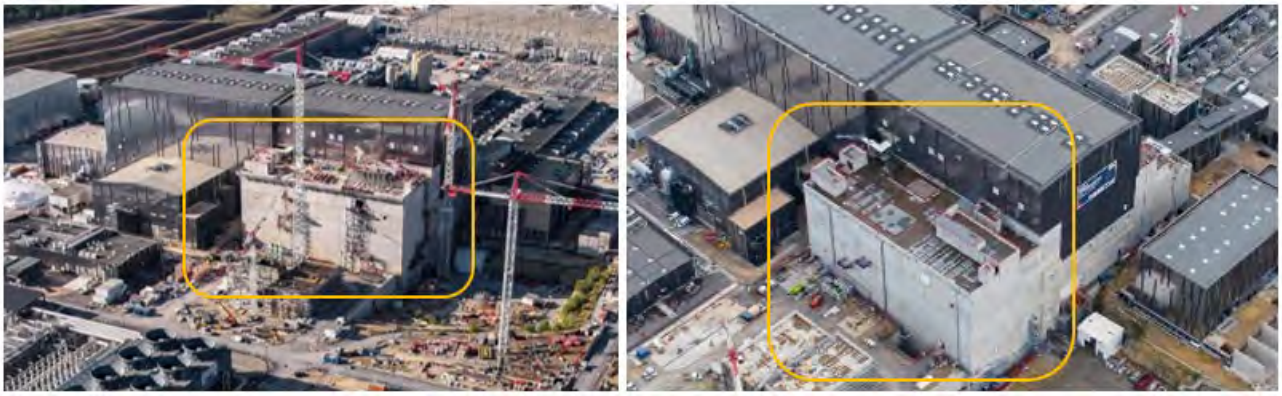


Figure 2: TB18 (Vinci-Ferrovial-Razel,VFR) B14 Tritium Building work status in September 2023 (left) versus October 2024 (right) Photos: © ITER Organization

Figure 3: TB13 (Ansaldo - Monsud) B44, B45, B46 and B47 Power Supply and Distribution Buildings work status in December 2023 (left) versus December 2024 (right) Photos: ©F4E

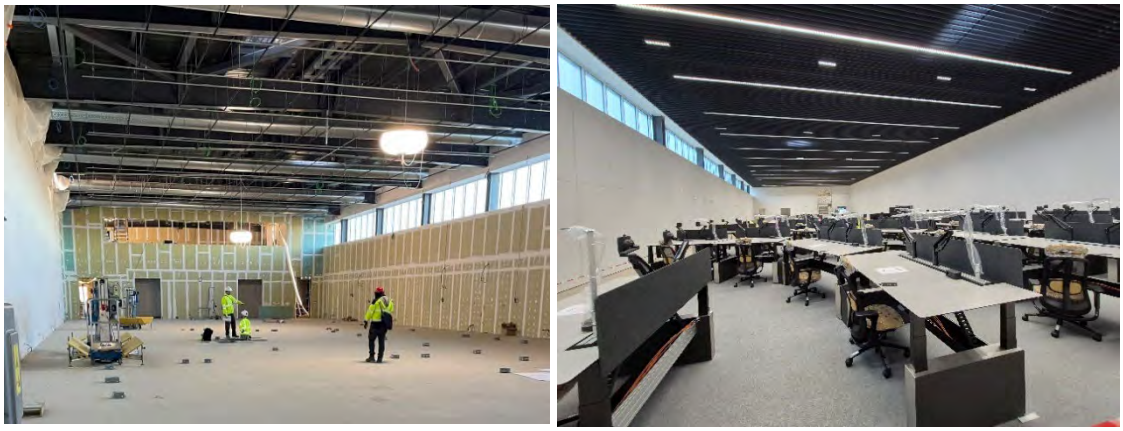


Figure 4: TB12 (Demathieu Bard) B71 Control Building North work status in December 2023 (left)versus December 2024 (right) Photos: ©F4E

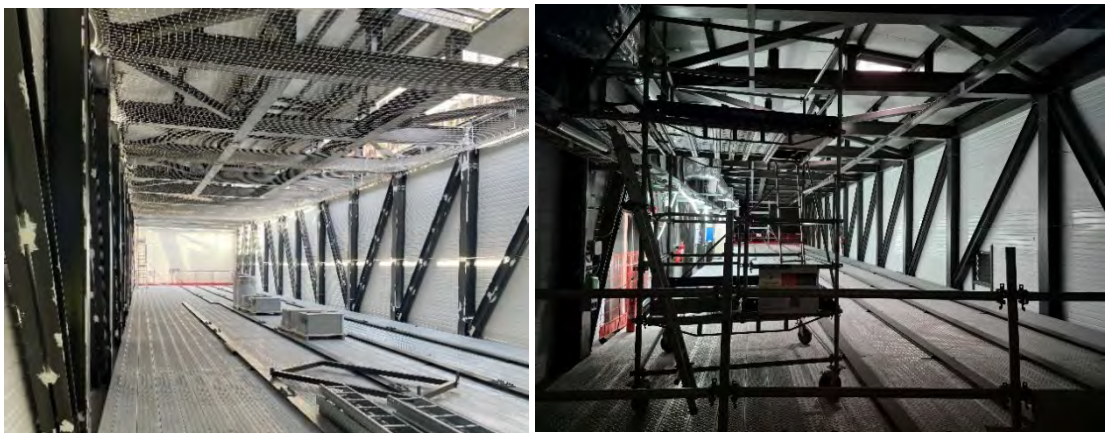


Figure 5: TB12 (Demathieu Bard) (up) and Busbar bridge M2 (connecting Magnet Power Conversion Building 2 (B33) and Diagnostics Building (B74)) in December 2023 versus December 2024. Photos: ©F4E

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 2024, AMW (the industrial consortium responsible for the manufacturing of all 5 sectors) has achieved several important milestones:

- Sector 5 has been successfully delivered to Cadarache on Oct 25th, fully in-line with the ITER baseline schedule
- Sector 4 is fully welded and all welds have been declared conform
- Also the final Field Joint machining of Sector 4 has been completed and the sector is on track to be delivered to Cadarache by May 2025
- All 3 remaining sectors in final assembly stage, with the welding activities of the final "D-shape" progressing in several stages of advancement, all in-line with the schedule

Figure 6: Sector 5 at Mangiarotti, under preparation for final transportation to Cadarache

Figure 7: Sector 4 under final machining of Field Joints at WTO

Figure 8: Sector 9 under final assembly at Mangiarotti

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU15.1A.08500	IPL > Delivery of Sector 5 by EU-DA to ITER Site	Q4 2024	GB16	GB16	Achieved
EU15.1A.3081300	S5 - Start of FAT	Q1 2024	Predecessor of GB16	Predecessor of GB16	Achieved
EU15.1A.3119198	S9 - Start of Outer Shell fit-up	Q4 2024	Predecessor of GB25	Predecessor of GB25	Achieved
EU15.1A.80540	S9 - Inner Shell welding completed	Q2 2024	Predecessor of GB25	Predecessor of GB25	Achieved

Table 2: Vacuum Vessel – Annual Objectives presented in the F4E Work Programme 2024

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 has provided 10 of 18 Toroidal Field (TF) coils installed in the tokamak, 20% of the Nb_3Sn 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.

In 2024, the 10th TF Coil High Voltage wire was repaired on site and the project is considered completed.

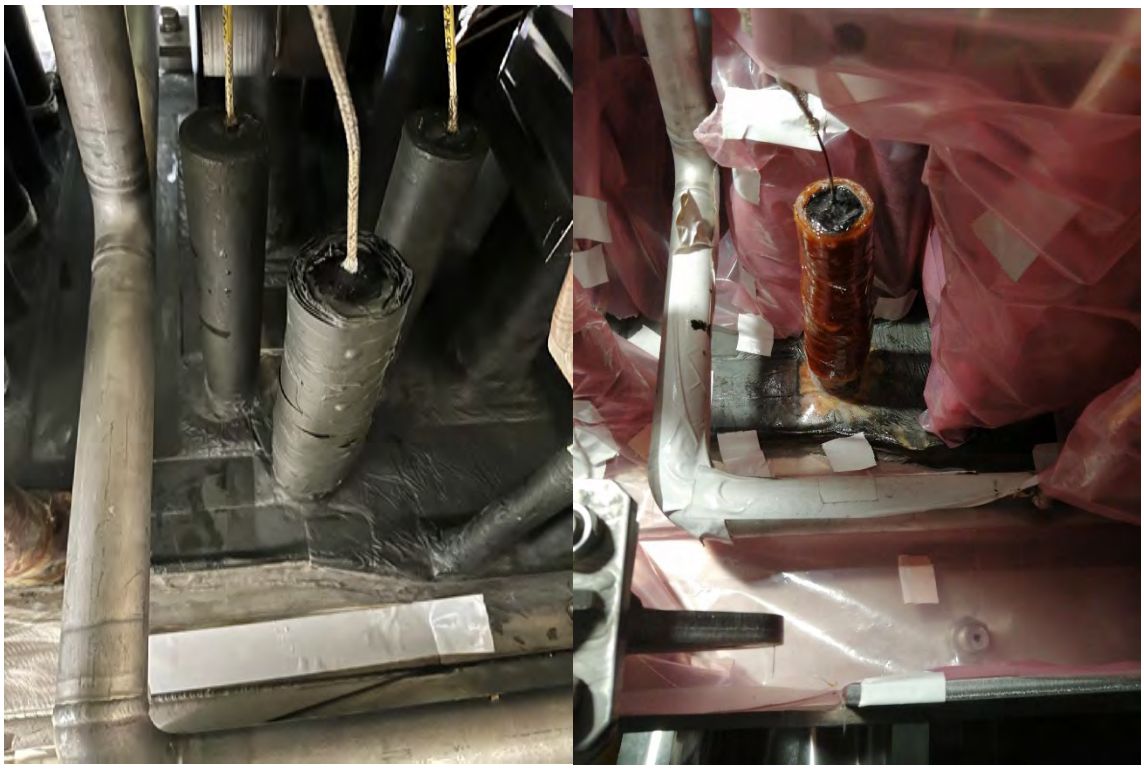


Figure 9: 10th TF Coil repairs

1.1.2.3.2 Poloidal Field Magnets

F4E has delivered to ITER IO 5 ITER Poloidal Field (PF) coils (#6, #5, #4, #3, #2).

European industries have fabricated 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.

In 2024 F4E successfully completed the cold test and the delivery of the last Coil, PF Coil #3.

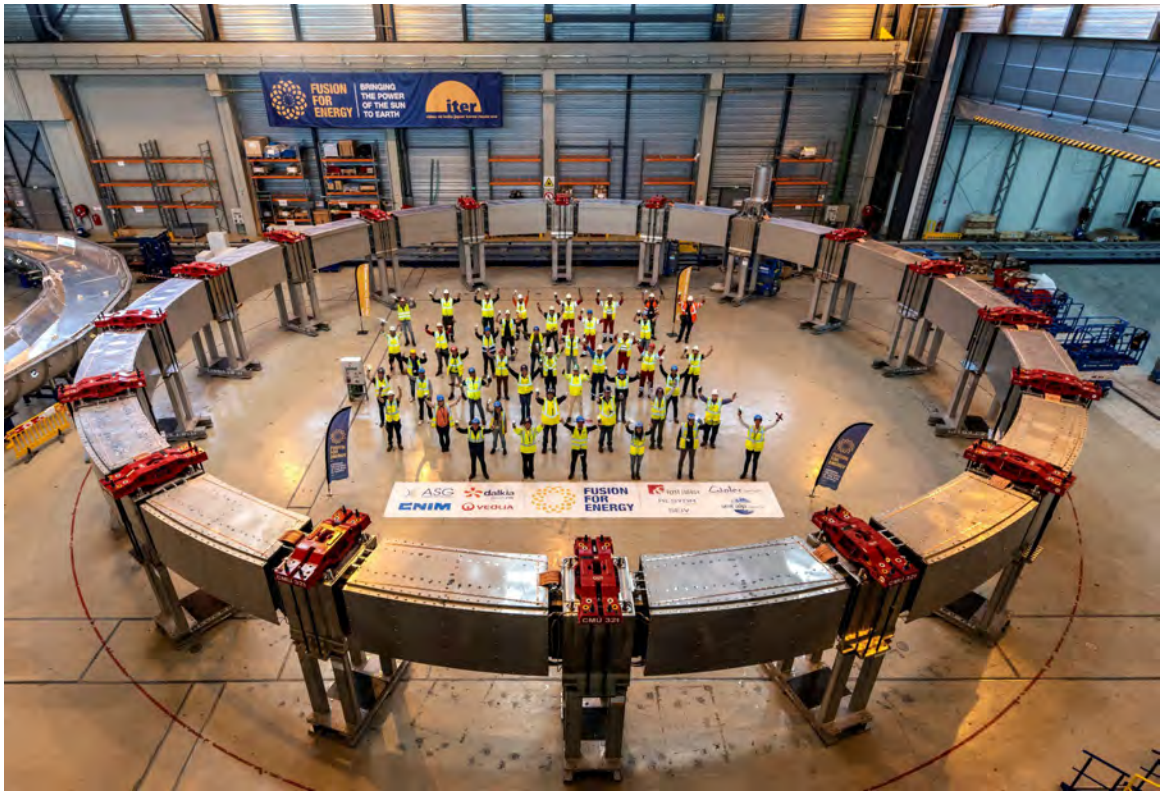


Figure 10: PF Coil #3 completed

1.1.2.3.3 Pre-Compression Rings

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.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	**PA / ITA**	End 2024 Status
EU11.1A.11820	IPL > Delivery of TF18 (EU 10) by EU-DA to ITER Site	Q2 2024	WP24 objective	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	Achieved
EU11.1A.28115	HPC- Approval by IO for Document CFAD (HP 9.1.6) / TF-EU10 (IC64 /GB54)	Q2 2024	GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	Achieved
EU11.3B.01160	IPL > Delivery of PF3 Coil by EU-DA to IO	Q2 2024	WP24 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	Achieved

Table 3: Magnets – Annual Objectives presented in the F4E Work Programme 2024.

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 Tokomak 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).

During 2024 the new schedule baseline was agreed with IO and, according to the new assembly sequence, the Blanket Cooling Manifolds and Divertor components will be requested for the Start of Research Operations (SRO) and the Blanket First Wall panels will be required for installation for the DT1 phase. The change in the assembly sequence and in the assembly need dates led to a full review of the schedules for all the F4E In Vessel components and required risk mitigation actions to be activated to support the new ITER baseline, mainly for SRO components. The change in the armour material from Beryllium (Be) to Tungsten (W) required a review of the Blanket First Wall contractual arrangements.

The main achievement in 2024 for the Blanket First Wall, 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 and last Manufacturing Readiness Review (MRR) for Series panels of row FW13A and the start of the series production for the panels structures at both manufacturing sites: ALSYMEX (France) and FUSION BUSINESS LEADERSHIP (FBL, Spain). The manufacturing of the pre-series panels is ongoing and in one case all the main manufacturing operations have been completed. Another MRR has been completed for the start of manufacturing of the standard fixtures needed to connect the First Wall to the Shield Blocks. Due to the decision by the ITER Organization to change the armour material of the FW panels from Beryllium to Tungsten the Be main relevant tasks have been closed and the focus during 2024 was on the panel structures only. The High Heat flux testing facility (HEZCLA) was decontaminated and made available for testing other components. The

qualification programme for the armour based on tungsten has been agreed and an ITER Task Agreement was signed in December 2024 for its implementation.

For the Blanket Cooling Manifolds, during 2024 took place the Qualification Readiness Review (QRR) for the bundle prototype tasks (Task 1) and the Manufacturing Readiness Review (MRR) for the materials for the main manifolds scope (Task 8). The reopening of competition for the Chimney Pipes (Task 3) was launched and specific contract signed in 2024. Progress was made also on the parallel activities for the development of an alternative support design.

The manufacturing of the Divertor Cassette Bodies (58 CBs) continued in 2024 for both contractors CNIM-SIMIC (CSI) and WALTER TOSTO for the Stage 1 with the start of the final acceptance tests of the first CB at CSI and delivery of the Remote Handling flanges at ITER site 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). A risk mitigation contract has been launched and signed in 2024 to increase the manufacturing capacity.

2024 was also an important year for the Inner Vertical Target (IVT) project with the qualification of the second contractor (Alsymex) and subsequent signature of the second specific contract in August 2024. During 2024 the MRR was approved for the PFUs with RESEARCH INSTRUMENTS for the IVT series allowing the start of the manufacturing activities. To mitigate the risks of delays for the PFUs high heat flux testing due to the international situation, F4E proceeded with the qualification of the HELZCA facility for the use of the IVT project.

Blanket First Wall

Figure 11: Pre-Series (upper) and Series (lower) First Wall panels under manufacturing at FBL (Spain) and Alsymex (France) workshops.

Divertor Inner Vertical Target

Figure 12: IVT Prototypes (Research Instruments and Alsymex)

Figure 13: HEZCLA (CVRez) facility being upgraded for IVT testing

Divertor Cassette Body

Figure 14: FOAK Divertor Cassettes at CSI_SIMIC and Walter Tosto premises and ancillary parts at Walter Tosto

In Vessel – Blanket

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	**PA / ITA**	End 2024 Status
EU15.2A.10200	Task Order Signed for Task 3 - Chimney Pipes	Q4 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds	Achieved
EU15.2A.12115	Manufacturing and Inspection Plan of the prototype Bundle for Task 1.A (Contractor #02) approved	Q3 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds	Achieved
EU.16.01.101790	Request for Final Tenders for Release of TASK 3.XX - Reopening of competition #1 OMF-900	Q4 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall	Achieved
EU.16.01.12406760	MS#03 Manufacturing Readiness Review approved for Task 1 and Task 2 of Standard parts	Q4 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall	Achieved

Table 4: In Vessel-Blanket – Annual Objectives presented in the F4E Work Programme 2024.

(*) During 2024 the Blanket First Wall project has been subject to a change in the priorities following the new ITER rebaseline.

In Vessel – Divertor

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU17.01.1175580	HP - Reception of the Load Test Report the SF1 (CB#16)	Q4 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body	Achieved
EU17.01.1367140	Manufacturing approved for Pins, Sleevs & PFC Links Series by MRR Panel (M_PISLLI_04)	Q4 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body	Achieved
EU17.2B.140310	OMF-1139-02-01 Signed for IVT Series - OMF-1139-02-01	Q4 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target	Achieved
EU17.2B.982280	M_CAD-8_ Approval of the SSS manufacturing drawings- OMF-1139-01-01	Q4 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target	Achieved

Table 5: In Vessel-Divertor – Annual Objectives presented in the F4E Work Programme 2024.

1.1.3.2 Breeding Blanket Modules

The Test Blanket Module (TBM) systems are not part of the ITER basic machine, instead they are test sections hosted in ITER. F4E will test two TBM systems (TBS), one water-cooled (WCLL TBS) and one helium-cooled (HCCP TBS), the latter developed jointly with ITER Korea. The testing is intended to provide evidence of functional capability (primarily tritium generation, then also neutron shielding and heat removal), and a 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 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 and complete BB-relevant system integrated in a tokamak environment. The TBSs are not part of the EU in-kind contribution to ITER.

In 2024, significant progress was achieved in the Helium-Cooled Ceramic-Pebbles (HCCP) TBS joint project between ITER Korea and F4E. A joint quality plan was developed and approved to support these technical activities, strengthening the collaboration between ITER Korea and F4E. The project demonstrated very good schedule performance. Overall, the efforts are on track to meet critical milestones for the Preliminary Design Readiness Workshop (PDRW) in 2025, reflecting a successful year for the Korea-EU partnership. Key technical activities included notable advancements in TBM set design, with both ITER Korea and F4E contributing to material, fabrication technologies, and TBM box design improvements. Ancillary systems design also saw major updates, while safety modelling activities progressed significantly with two codes, Melcor and Gamma-FR. The tritium transport modelling activities progressed significantly, and F4E performed calibrating Theta-FR with the EcosimPro based code.

The F4E contribution on the HCCP TBM-Set development activities mainly focused on the structural analysis and fluid dynamics studies of TBM box. A new structural integrity assessment was performed on the TBM box in *configuration "1*", where the most relevant TBM box design modifications (e.g. the vertical stiffening plate) were implemented. Similar analysis was also carried out for the process pipes.

Fluid dynamic analyses for He coolant and purge gas were also performed to confirm the homogeneous flow distribution through the TBM box manifolds and through the CP cooling channels.

A preliminary version of the Testing and Commissioning Plan and of the Maintenance and Inspection Plan were also produced. They will be used, among other technical documents, as relevant inputs for the PDRW.

For the HCCP Tritium Extraction System (TES) and Tritium Accountancy System (TAS), a relevant step was completed towards the Preliminary Design Review of HCCP-TBS. As a result, the impact analysis of two important design changes were finalized, the relocation of several TES components from the PC#16 to the Glovebox of the Tritium Process Room, already started in 2023, and an updated definition of the TES nominal operating conditions. The new TES nominal operating conditions consist of a lower He purge flowrate and a reduced H2 molar fraction in the purge gas. This reduces by a factor of 10 the quantity of Q2 to be processed by the TES and TAS getter beds as well as to limit the dump of hydrogen to TEP, thereby reducing the heat generated in the TES/TAS getter beds during adsorption. The analysis gave positive results, and the new changes have been now included in the reference technical baseline.

Activities related to the design improvements of the Water-Cooled Lithium-Lead (WCLL) TBM Set and preparation of documentation for PDRW that started in Q4-2023 are progressing satisfactory and will be finalized in November 2025. The design improvements have been implemented in the 3D model and the manufacturability and inspectability are being assessed both internally within F4E and externally.

Among the most relevant activities carried out in 2024 on the WCLL-TBS ancillary systems (AS) there is a consolidated RAMI analysis. Updated structural and thermo-hydraulic studies were carried out for the AS systems and the components in the relevant Tokamak areas (PC#16, TCWS Vault, process Room). They provided input for design modifications on piping routing and support locations. The activities on the I&C have progressed at the expected pace and, in this context, an accurate assessment of the number and type of signals for the three tiers of safety, investment protection and conventional control was completed. Updated CAD models were also generated. Finally, the first elements of the Operational Plan and the updated AS System Design Description were made available.

The technical activities under a specific contract with JACOBS on an EU-WCLL severe accident analysis have been successfully completed. This work involved providing input data and engaging in technical discussions on three key accidental scenarios: "WCS Ex-vessel LOCA on TBM side of IVs," "TES Tritium Leak in Tritium Process Room & AEU," and "Ex-vessel PbLi Leak." The main focus during this period was to clarify technical inputs, revise the Analysis Plan and Accident Analysis Specifications, and define the scope of sensitivity studies. In parallel, the contract with NIER for studying EU-WCLL severe accidents continued and by September, the first two technical deliverables had been finalized, followed by the successful submission of the "TAS Tritium Leak in Glove Box – Safety Study" report to F4E, which is currently under review by the safety team. This report presents a detailed accident analysis, including sensitivity and qualification studies, focusing on the worst-case scenario: a gas mixture loss due to a rupture in the Tritium Accountancy System

(TAS) pipe. Additionally, a new specific contract was initiated for multiple subtasks, including WCS ex-vessel and in-vessel LOCA analyses, TBM in-vessel LOCA updates, and plasma operation analysis without LiPb in the TBM box.

Significant progress was also made in collaboration with EUROfusion on the Failure Modes and Effects Analysis (FMEA) of WCLL. This included studies on activated corrosion products and PbLi-water interactions through an experimental campaign. Further, in partnership with EUROfusion-ENEA, an experimental campaign on PbLi-water interaction was conducted at Brasimone, Italy.

For the implementation of the PED and ESPN regulations, a full review of the input data to the future PED/ESPN manufacturer, which are under responsibility of the operator, has been completed for the WCLL-TBS in collaboration with the ITER operator and an Agreed Notified Body. The outcome of this review is an issue log transmitted to system designers for consolidation of systems architecture and safety systems for the Preliminary Design Review. Also, the delimitation of nuclear assemblies has been defined, and was discussed with the operator and presented to the TBM-PT.

The EUROfusion-F4E joint execution of the R&D activities successfully continued in 2024. More than 50 deliverables, with main achievements in the following areas

- Neutron irradiation campaigns in material test reactors have begun for in-situ tritium measurements and post-irradiation examinations of functional materials, i.e. the European Li-ceramic and advanced neutron multipliers.
- Instrumentation for pressure, level, and tritium measurements is being tested and characterized in key facilities within the EUROfusion Laboratories
- The experimental campaign to analyse the performance of ZrCo getter beds for tritium extraction and removal systems is progressing successfully
- Advanced tritium transport modelling tools relevant for both the WCLL and HCPB TBS are being successfully developed and validated
- The safety assessment of the WCLL-TBS has been updated to account for ACPs production in the water-cooling and purification systems, reflecting ITER's revised irradiation scenario post-re-baseline.
- Export control, and dual-use considerations for sharing sensitive tritium production documentation

EUROfusion, acting as F4E Partner, has progressed in the characterization program of EUROFER97 steel. Low cycle fatigue characterisation activities were completed and a number of additional activities continue, including cycling softening, creep and creep-fatigue, ratchetting, fracture toughness and irradiation with target at 2 dpa.

Within F4E, the framework contract for the EUROFER97 codification in RCC-MRx has been signed. It encompasses services for the technical management, codification and justification of the integration of EUROFER alloy steel in the RCC-MRx for ITER TBMs application. It addresses EUROFER97 as base metal and welded joints, irradiated or non-irradiated. The first specific contract will be signed in 2025 for the first analysis of EUROFER test data coming from both EUROfusion and the manufacturer of EUROFER Batches 3 and 4.

Within the CEA/FRAMATOME consortium, the implementation of the first Specific Contract (SC#1) focused on “Consolidation of welding processes and related technologies for manufacturing of EUROFER97 structures and components” is on-going. Activities have been completed on the weldability of EUROFER97 and lamellar tearing and cold cracking susceptibility testing has been completed. This was completed on a number of different welding technologies including Laser Beam Welding (LBW), TIG welding ad Hot Isostatic Pressing (HIP). Additional activities continue,

including the use of different filler material thicknesses, the completion of long duration creep testing, the effect of Post Weld Heat Treatment (PWHT), amongst others. The activities were carried out with the help of APAVE EXPLOITATION, France, in a consultancy capacity and are scheduled to continue until May 2025.

The third Specific Contract (SC#3) with the consortium CEA/FRAMATOME, focused on "Fabrication developments for the HCCP and WCLL TBM-sets", was signed and its implementation has just started. The technical activities and services are focused on the development of pWPS for the selected weld of the HCCP & WCLL TBM concepts, developments addressing the TBMs' instrumentation aspects, the definition of the WCLL TBM shield manufacturing sequence and respective weld matrix, elaboration of the TBMs manufacturing sequence and Failure Mode Effects and criticality Analysis (FMEA) of the HIP process.

The next procurement of EUROFER97 material, batch #5 (EUROFER97-5), is in the stage of evaluation of the Tender Offers and negotiation with potential suppliers. The Technical Specification was prepared considering the lessons learned and non-conformities observed during the last procurement, with a goal of qualifying the EUROFER97 manufacturing process following the requirements of the RCC-MRx code. In total ~40 tons of EUROFER97 plates and bars will be procured for F4E, EUROfusion and ITER Korea activities.

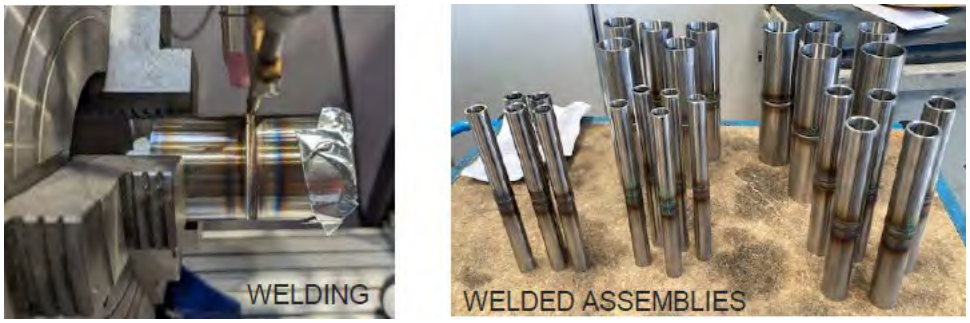


Figure 15: Qualification of dissimilar weld joints between EUROFER97 and stainless steel SS316L(N)-IG, pipe GTAW welding (CEA credit).

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	**PA / ITA**	End 2024 Status
EU56.01.1242855	F4E-OFC-1497-01 TO-01 Signed for EUROFER design limits codification in RCC-MRx	Q4 2024	WP24 objective	NA	Not achieved
EU56.01.1259955	F4E-OFC-1350-01 Task Order 02 Signed for Set of Additional Accident Analyses for WCLL TBS	Q4 2024	WP24 objective	NA	Achieved
EU56.02.1240200	F4E-OFC-1063-01 TO4 Signed for Handling, Cutting Storage Services for Steel Products related to the EU TBMs	Q1 2024	WP24 objective	NA	Achieved
EU56.06.1242780	Technical Specification Approved for TO-01 OFC-1497 for EUROFER design limits codification in RCC-MRx	Q4 2024	WP24 objective	NA	Achieved

Table 6: TBM – Annual Objectives presented in the F4E Work Programme 2024.

1.1.3.3 Remote Handling

Remote Handling (RH) systems will be critical for ITER assembly and operations. As fusion reactions produce substantial radiation and activation of ITER components, remotely operated robotic devices will be essential for their inspection and replacement in proximity to or within the ITER machine. These tasks involve are large set of challenging operations ranging from handling and positioning with millimetric accuracy large and heavy items weighing up to 50 tonnes, to finely cutting and welding pipes in narrow spaces. Fusion for Energy (F4E) will supply several elements of ITER's RH systems, including the Divertor Remote Handling System (DRHS), the Cask and Plug Remote Handling System (CPRHS) for transporting components from the Tokamak to the Hot Cell Building, the Neutral Beam Remote Handling System (NBRHS), and the In-Vessel Viewing System (IVVS). During the ITER assembly, F4E will deliver non-nuclear and simplified functional versions of the DRHS and CPRHS for installing large-size and heavy in-vessel ITER components, together with the final nuclear grade IVVS and NBRHS Crane System & Top Lid Opening Mechanism.

For the DRHS, in 2024, a significant effort has been devoted to the final design of two main subsystems: the Cassette Toroidal Mover (CTM) has implemented a major design change, while the Cassette Multifunctional Mover (CMM) has reached the Final Design review maturity (Figure 19). Prototyping and testing activities related to DRHS water-hydraulic digital valves and control system technologies concluded with a demonstration in January 2024 at the VTT Divertor Test Platform (DTP-2) in Tampere (Finland). The re-baselining of ITER has led the IO to prioritize the Divertor Assembly Transporters (DAT) development over final DRHS systems, with a focus on schedule efficiency. The DAT consists of non-nuclear grade and functionally simplified movers, capable to transport divertor cassettes to their final position inside the vessel during the pre-SRO assembly phase.

The focus of the CPRHS development during 2024 has been the completion of the Final Design activities for the sub-systems to be used for initial installation of the Equatorial and Upper Port Plugs in preparation for their manufacturing phase in 2025. These sub-systems are of a reduced functionality, in comparison to the full nuclear-grade CPRHS, and will provide critical lessons learned related to the transportation and handling of Port Plugs during the later nuclear phase of ITER. In addition, the Preliminary Design Review for the nuclear-grade variants of the CPRHS for the Equatorial and Upper Port Plug handling (Figure 21) was successfully completed. This review provides a strong design basis for the CPRHS going forward in standardisation of critical areas such as nuclear confinement and handling of Port Plugs for the outstanding variants of the CPRHS. Included in the scope of the Preliminary Design Review was also the Cask Docking System which is resident in the Tokamak Building Lift (CDS Lift) to facilitate the transportation of the Cask Envelope Systems and Port Cell Equipment when transported between different floors of the Tokamak Building.

On the NBRHS, the contract for the final design of the Monorail Crane System (MCS) has been kicked off in February 2024 and the conceptual design review of the Crane Deployment Hoist (CDH) has been successfully achieved. Regarding the other NBRHS sub-systems, the structural design of the Beam Line Transporter (BLT) and Top Lid Open Mechanism (TLOM) have been finalized with a release of all the associated deliverables. Efforts have also been focused on defining the detailed manufacturing and installation plan for the MCS, which is the first system to be assembled in the ITER Neutral Beam Cell. This has been discussed within the overall Neutral Beam Cell assembly strategy to anticipate interface issues and adhere to the ITER Project baseline schedule.

The IVVS project has been focused in 2024 on developing the Final Designs of three key subsystems: the Measurement System (MS), the Deployment System (DS), and the Confinement

System (CONF), in preparation for their respective Final Design Reviews scheduled for 2025–2026. The MS design team has been advancing the production of a second-generation Pan & Tilt prototype, ready to be qualified for temperature and vacuum conditions, and featuring enhanced scan algorithms for high-resolution control of the scanned area (Figure 17). Additionally, the MS Probe underwent a complete optical redesign based on insights from the 2022–2023 prototype tests. The feasibility of the probe remote connection/disconnection was successfully demonstrated on a full-scale prototype, witnessed by both F4E and IO Remote Handling experts, confirming the system's remote maintainability. In parallel, the DS design has significantly matured. The Resident Guide Tube was reengineered for improved manufacturability and assembly. The Push-Chain System (PCS) and Cable Management System (CMS) were evaluated through full-scale prototype testing (Figure 17). These developments were further supported by component outgassing and performance testing following gamma irradiation, including tests with long cables where applicable. Notably, the adaptation of a space-proven Hold-Down and Release Mechanism (HDRM) to ITER's environmental conditions has commenced, targeting qualification in 2025. Meanwhile, efforts were made in collaboration with IO to refine the IVVS and IVV Port Extension assembly procedures, ensuring compatibility with the first as-built Vacuum Vessel sectors.

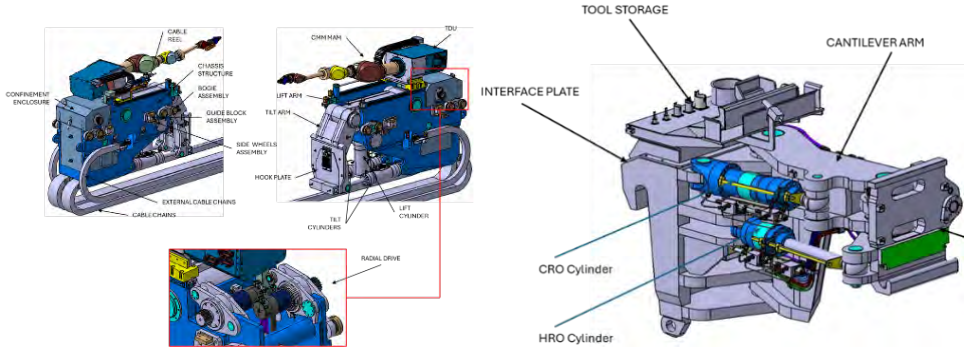


Figure 16: Final Design of the Cassette Multi-Functional Mover (CMM) and Second Cassette End-Effector (SCEE).

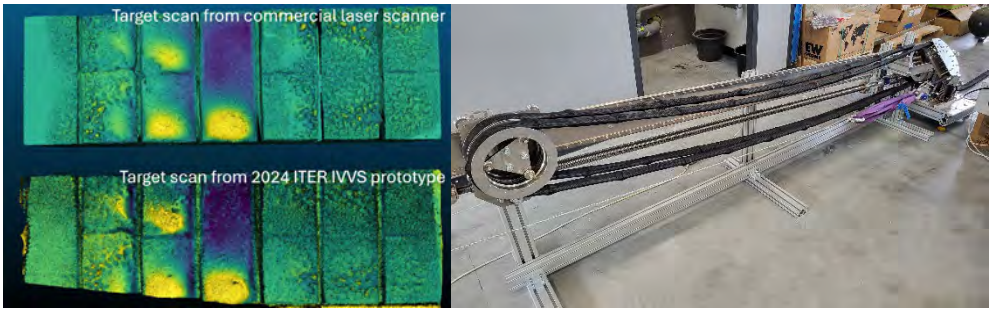


Figure 17: IVVS high-density 3D point cloud with resolution comparable to commercial laser scanners (left), CMS full-scale prototype (right).

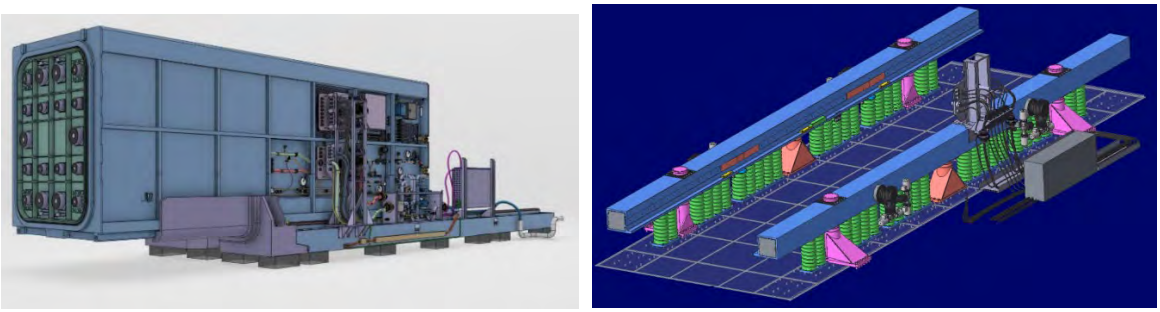


Figure 18: Preliminary Design of the Equatorial Port variant of the CPRHS (left), Preliminary Design of the Cask Docking System resident in the Tokamak Building Lift (right).

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU23.03.14069040	CPRHS TO-577-02-02 Subtask 9 CDS Lift completed	Q3 2024	Predecessor of GB41	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	Achieved
EU23.03.14074440	CPRHS OMF-1034-01-06 DDL-047 D2.5.02 Assembly Drawing CTS approved	Q4 2024	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	Achieved
EU23.05.14054460	M6 - CDH Concept Design Review [OPE-1252]	Q4 2024	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	Achieved
EU57.01.14062860	[M12] CMS Prototype tested successfully	Q4 2024	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System	Achieved

Table 7: Remote Handling – Annual Objectives presented in the F4E Work Programme 2024.

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 2024, the commissioning of the Cryoplant progressed with the startup of equipment like Liquid Nitrogen plant compressors. The quench line header, the final piece supplied by Europe for the cryoplant, was also installed and tested.

The front-end cryodistribution system, which manages the cryogens needed for the operation of the cryopumps, achieved several milestones in 2024. All the Torus Cold Valve Boxes passed their Site Acceptance Tests at ITER. The manufacturing and mechanical assembly of the Neutral Beam cryopumps were completed, and the first factory acceptance test commenced. The final design of the Neutral Beam cryolines and cryojumpers was completed, along with the procurement of parts and preparation for manufacturing. Additionally, the final design of the Neutral Beam instrumentation and control system was finished, and the control software was developed, tested, and delivered to ITER.

The Torus and Cryostat Cryopumping System will pump the vacuum vessel and cryostat volumes. The final assembly of the eight pumps progressed smoothly, successfully completing the factory acceptance tests for five cryopumps and their delivery to the ITER site. The series production of the associated instrumentation and control system was completed, and the control cabinets, along with the control software, were delivered to the ITER site.

Leak detection systems are required to identify potential leaks from the vacuum vessel, cryostat, and neutral beam equipment. The first stage of the leak detection system's final design was completed. Nuclear Qualification for critical components for the leak detection system have been performed along 2 years under accidental load conditions like seismic, fire, overpressure and residual static magnetic fields). For Leak Localization Systems two systems were designed, manufactured and delivered to the ITER site: the Cryostat Vacuum Gauging System and the In-Pipe Inspection Tool, which is designed to help locate leaks in the thermal shield manifolds, in OD 50 and 65.

The Radiological and Environmental Measurement system (REMS) has gone thorough design optimization activity with the objective of optimizing deployment of instrumentation inside the Tokamak Complex and outside for environmental monitoring. Significant reduction in the quantity of monitors has been achieved which are linked to reduction of both procurement and operation cost. A sensitivity tests were carried out for tritium monitors in magnetic field. Several EU manufacturers applied to participate. As an example, tests were performed showing the static magnetic field limits for operation of ionization chambers. This information is key to efficiently distribute instrumentation inside the rooms (Fig x, shows the SMF facility with an arrangement of units undergoing tests.

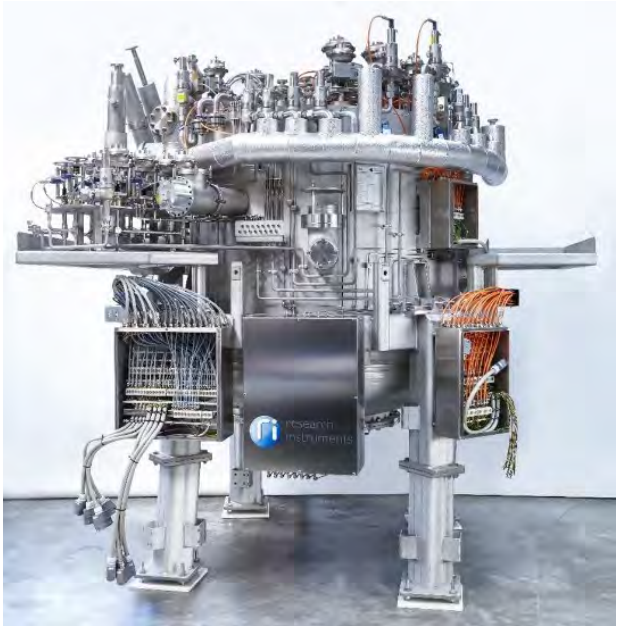


Figure 19: Completed ITER Cold Valve Box.

Figure 20. 4 T&C CVBs stored at ITER site, one of them undergoing SAT.

Figure 21: MITICA cryopumps ready to be delivered.

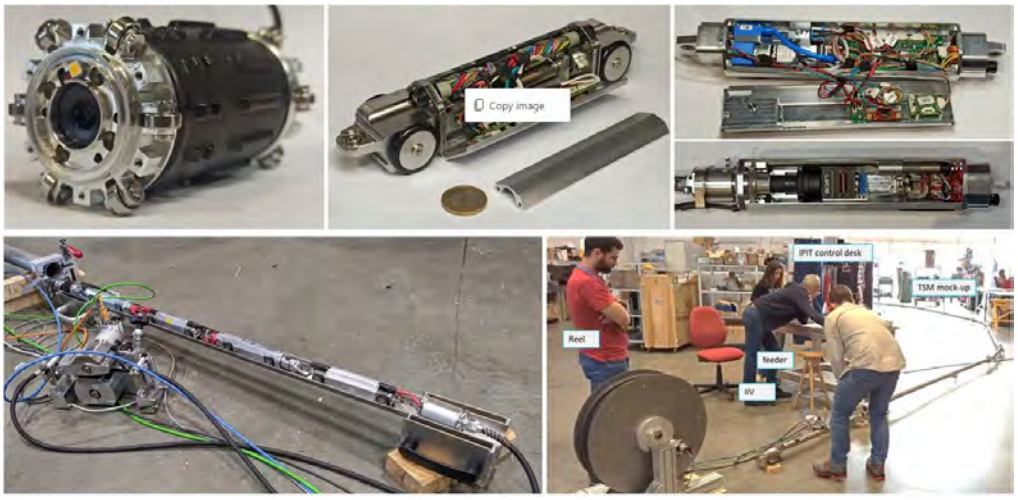


Figure 22: In-pipe inspection tool prototype.

Figure 23: Installed quench line header (last cryoplant component).

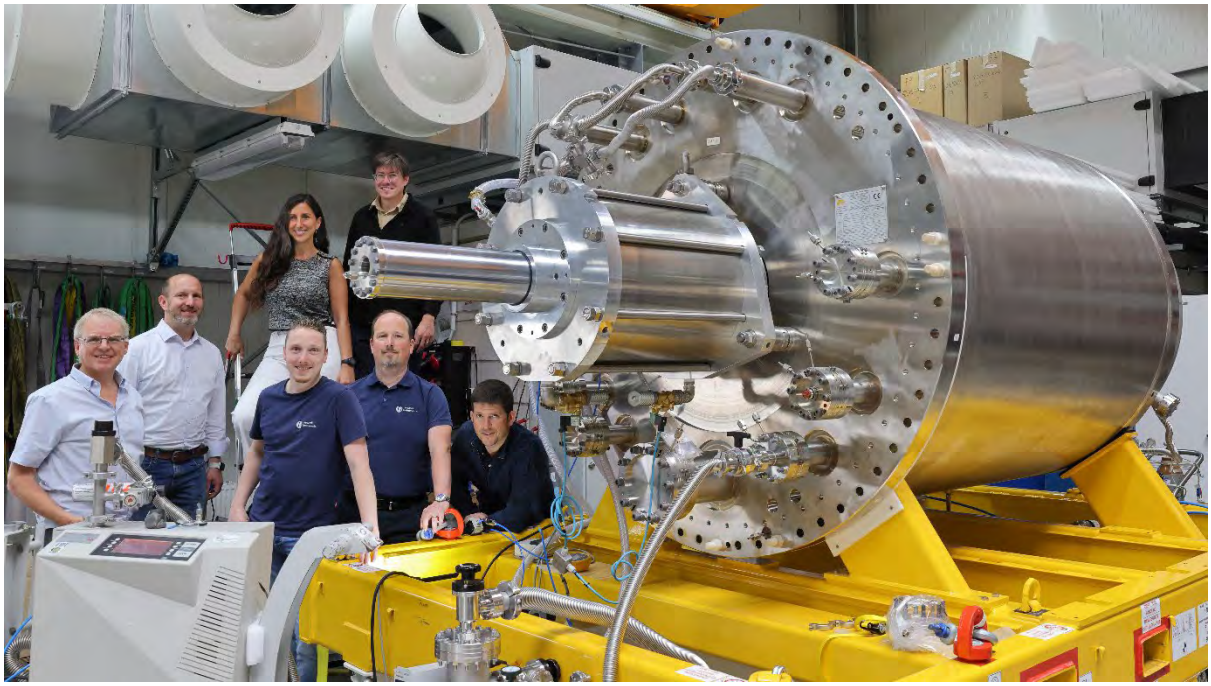


Figure 24: First Torus and Cryostat Cryopump Factory Acceptance Tests.

Figure 25: First Torus and Cryostat Cryopump delivered in May 2024

Figure 26: 5 Torus cryopumps delivered to ITER.

Figure 27: Static magnetic field test facility and instrument arrangement on test rig.

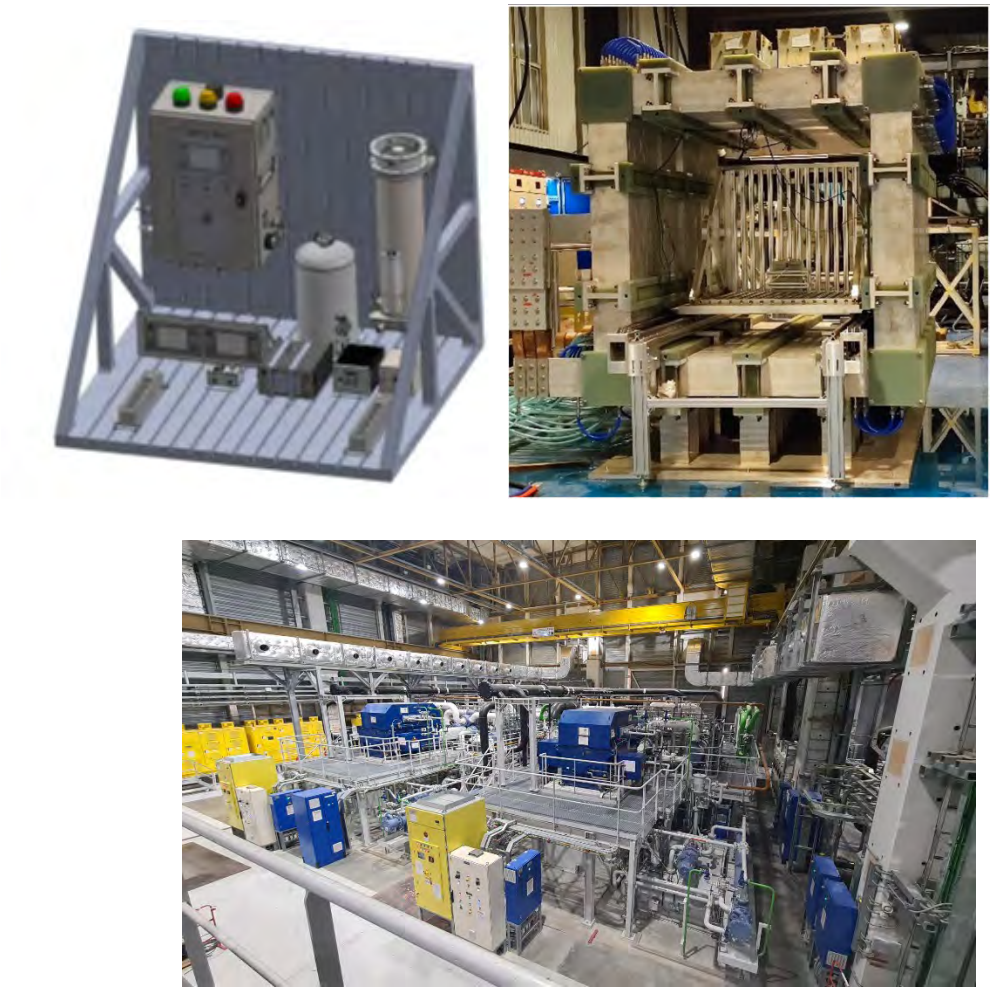


Figure 28: LN2 Plant compressors operational on site.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	**PA / ITA**	End 2024 Status
EU31.01.10261	IPL > Delivery of First Torus & Cryostat Cryopumps by EU-DA to ITER Site	Q2 2024	GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	Achieved
EU31.01.12290	Strategy proposal of PA Amendment 3.1.P1.EU.04	Q2 2024	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps	Achieved
EU31.03.25790	Pre-FDR completed for CDLDS and NBDLDS	Q4 2024	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	Achieved
EU31.03.40260	Cryostat Direct Leak Detection System qualification completed	Q4 2024	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	Achieved

Table 8: Cryoplant and Fuel Cycle – Annual Objectives presented in the F4E Work Programme 2024

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 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 2024, F4E completed complex brazing operations on the seven diamagnetic compensation coils, sensors that form part of the ITER magnetics diagnostic suite and are designed to measure the plasma pressure. The magnetics diagnostic suite will produce 1,700 signals in all. During 2024, F4E delivered successfully to ITER ten cubicles packed full of electronics to condition and digitise these signals. The magnetics diagnostic suite (sensors and electronics) must be fully operational to support the start of research operations on ITER.

Many diagnostics inside ITER produce, or must be supplied with, electrical signals. F4E is responsible for the in-vessel electrical system that fulfils this function. During 2024, F4E delivered successfully to ITER two batches of ultra-high vacuum terminated, mineral insulated cables and one batch of in-vessel cable supports and junction boxes (10,000s of bespoke manufactured parts), together with full-scale prototypes of specialist tooling required to insert the vacuum vessel electrical feedthroughs, which allow the signals to cross the ITER vacuum barrier. Signals must also cross from diagnostics mounted on ITER's divertor cassettes to the vacuum vessel, this is the function of the in-divertor electrical connector. During 2024, F4E developed fully operational prototypes for key parts of the connector and completed a final design review.

The Bolometer diagnostic measures total power radiated by the ITER plasma and comprises around 470 collimated sensors housed in 68 'cameras', each capable of detecting subtle temperature rises despite the fierce environment inside the ITER vacuum vessel. During 2024, F4E completed testing of the bolometer cameras and sensors, including n-irradiation testing of the sensors in a fission reactor, and developed a prototype of the complex electronics for the cameras. The preliminary design review for cameras mounted on the vacuum vessel was closed during 2024. Most of the bolometer cameras must be operational to support the start of research operations on ITER.

During 2024, F4E closed the preliminary design review of the Core Plasma Thomson Scattering System (CPTS) as well as completing qualification testing of key protection important components (valves and widows at tritium boundaries) and tests of the "radio frequency cleaning system", designed to maintain the reflectivity of mirrors exposed to the ITER plasma. The CPTS is an optical diagnostic 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 fully operational to support the start of research operations on ITER.

Significant progress was made during 2024 on another optical diagnostic, the Equatorial Wide-Angle Viewing System (WAVS), with closure of two final design reviews, for sub-systems in equatorial port 12, and the launch of a call for manufacture of components inside the port plug. 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. Most of the WAVS must be operational to support the start of research operations on ITER.

The diagnostics on ITER must also provide data on the all-important fusion reactions taking place in the plasma. Two such diagnostics under F4E responsibility the Radial Neutron Camera (RNC) and the Collective Thomson Scattering system (CTS), both of which are housed in ITER equatorial ports. The RNC provides a profile of fusion neutron sources across the ITER plasma, using arrays of in-vessel and ex-vessel neutron collimators coupled to several types of neutron detector specially developed for the environment. The CTS measures the density and temperature of fusion alpha particles in the plasma using Thomson scattering, somewhat like the CPTS described above but using microwaves instead of lasers. F4E has progressed significantly during 2024 with the RNC, closing a preliminary design review for ex-vessel sub-systems and developing a fully functional prototype of a neutron detector using high-pressure He4 as a scintillator. Tendering for manufacture of the in-vessel sub-system manufacture continued through 2024 and F4E expect to sign the contact in early 2025. For the CTS, a contract was signed during 2024 to begin manufacture of several components and complete manufacturing design for the rest. The CTS is a so-called ‘captive system’ and the components are needed for installation before the start of research operations on ITER.

Many of ITER’s diagnostics are mounted in its lower, equatorial and upper ports. F4E is responsible for six such ports, housing diagnostic sub-systems provided by Europe, Japan, United States and IO. The new ITER baseline required major new components, the GDC electrodes, to be integrated into three of these ports, including equatorial port 10 which must be fully operational to support the start of research operations on ITER. To avoid delays, F4E urgently launched and signed a major design contract during 2024 to update the design of equatorial port 10.

Figure 29: Facility at University of Basel used to demonstrate the use of radio-frequency plasmas for in-situ cleaning of the large, CPTS plasma-facing mirror.

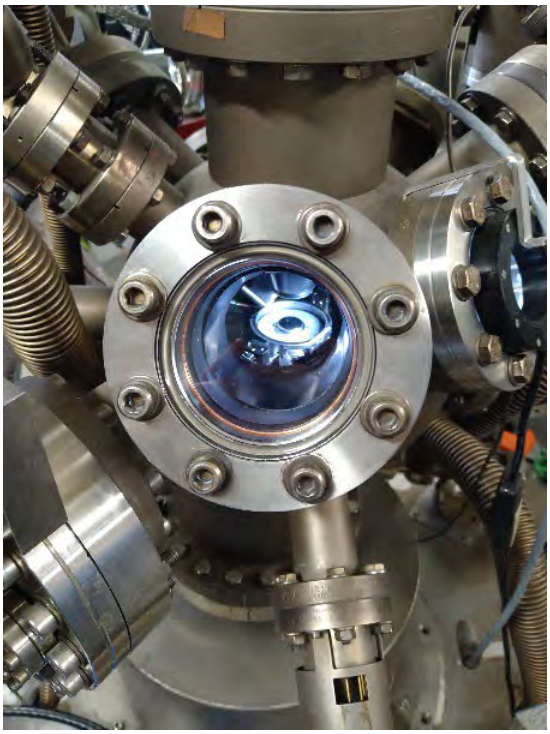


Figure 30: Interior view of the radio-frequency mirror cleaning facility at University of Basel used to test in-situ cleaning of the large, CPTS plasma-facing mirror.

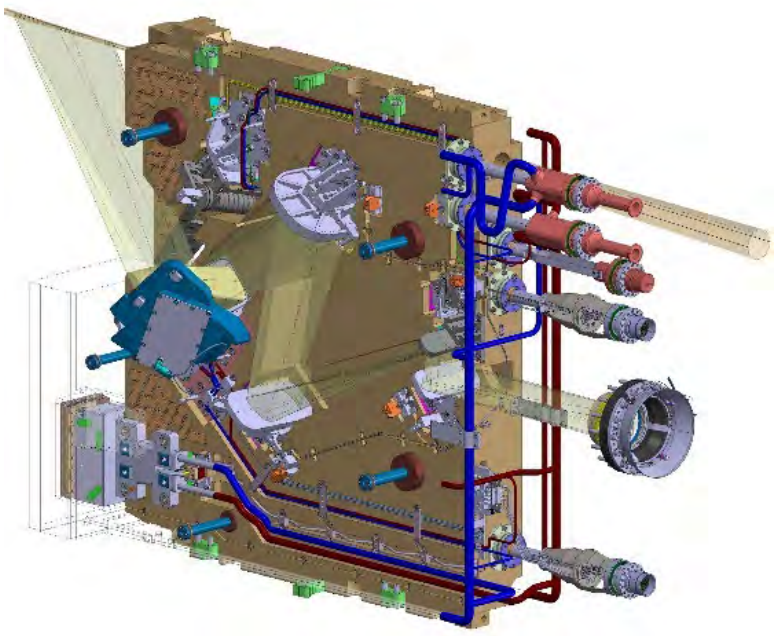


Figure 31: CAD image showing the successful integration of a new Glow Discharge Electrode (bottom left) into the radiation shielding module of Equatorial Port 10, which is required for the new ITER baseline to support boronisation of the first wall.

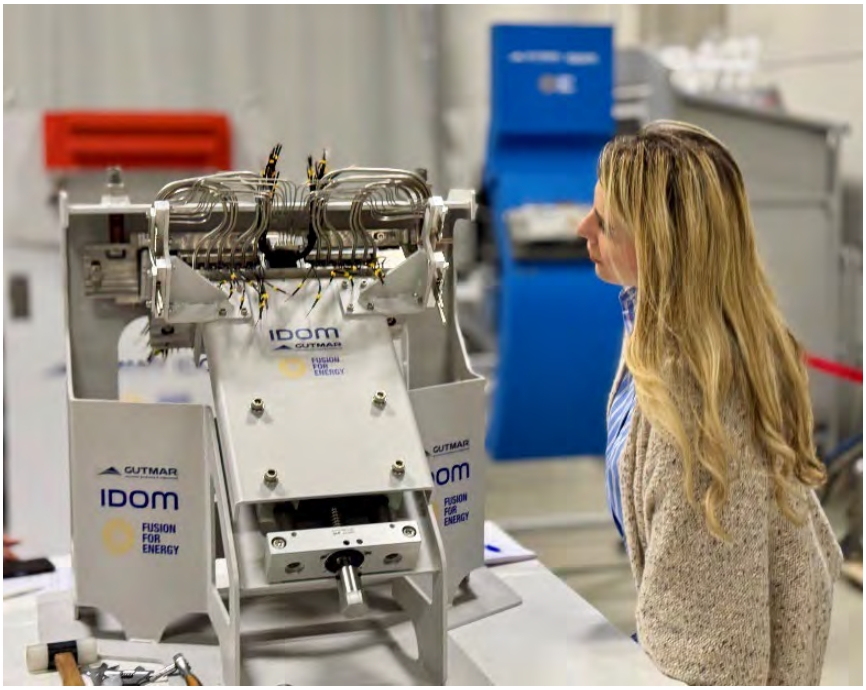


Figure 32: Prototype of the in-divertor electrical connector, developed by IDOM and GUTMAR to simulate and verify the challenging engagement and disengagement operations each time the divertor cassette is replaced.

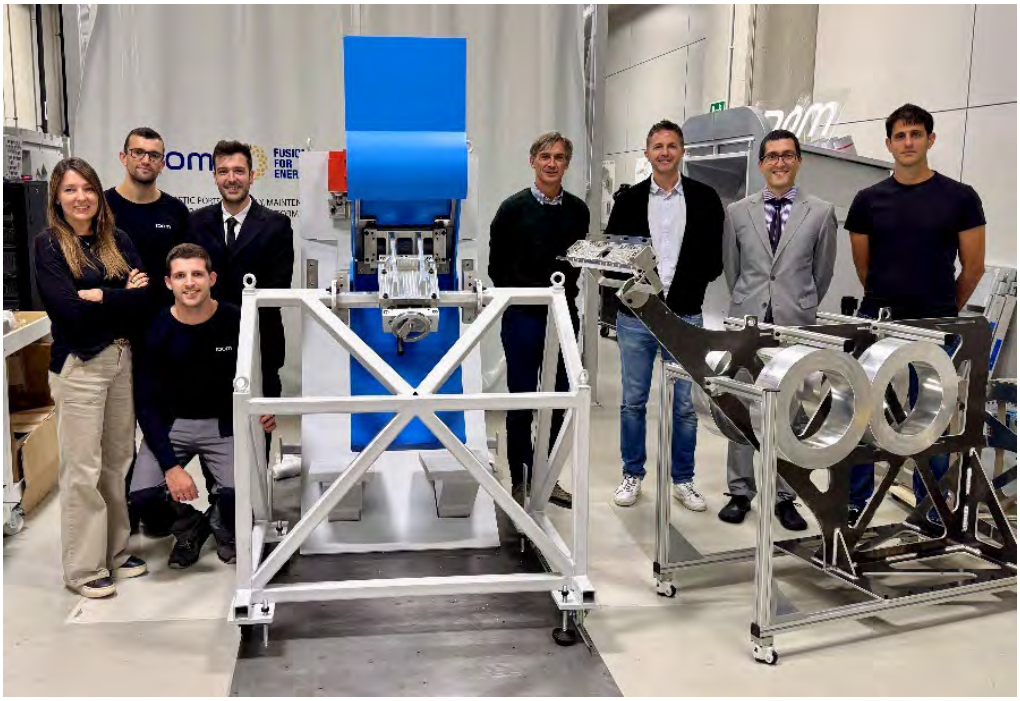


Figure 33: Supplier (GUTMAR, IDOM) and F4E teams in charge of the development of the in-divertor electrical connector, with prototypes of the in-divertor electrical connector developed to simulate ITER remote handling operations on the divertor cassette.

Figure 34: Prototype, produced by ARKTIS for ENEA, of the RNC ex-vessel neutron detector which uses high-pressure He4 as a scintillator.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	**PA / ITA**	End 2024 Status
EU55.02.226450	PDR Panel Approval of Chit Resolution Plan for VV & DIV Cameras	Q4 2024	WP24 objective	PA 5.5.P1.EU.03 Diagnostics - Bolometers	Achieved
EU55.06.697220	IPL > Delivery of in-vessel cables for VV Sector 3 (Batch 7) by EU-DA to IO ITER site	Q4 2024	WP24 objective	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	Achieved
EU55.06.707200	PQMP Vactron Approved	Q4 2024	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	Achieved
EU55.11.205760	Approval of chit close-out action plan for resolution of CAT-1 chits raised at PDR for ExV Components	Q3 2024	WP24 objective	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	Achieved

Table 9: Plasma Diagnostic Systems – Annual Objectives presented in the F4E Work Programme 2024

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.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU52.01.3000010	Option 1 Signed for TO1 for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q2 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	Achieved
EU52.01.4001240	EC Upper Launcher - Design Description Document for UL system - Completed	Q3 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	Achieved
EU52.03.17200	Task Order Signed for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets	Q4 2024	WP24 objective	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	Achieved
EU53.TF.4446460	Delivery On-Site Completed (M89) - MITICA Neutralizer	Q3 2024	WP24 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	Achieved

Table 10: Neutral Beam and Electron Cyclotron Annual Objectives presented in the F4E Work Programme 2024 (TO: Task Order, UL: Upper Launcher, EC: Electron Cyclotron).

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.

As of the end of 2024:

- SPIDER (Source for Production of Ions of Deuterium Extracted from Radio Frequency plasma):
  - All contributions of F4E are completed, and all components and systems transferred to IO
- MITICA (Megavolt ITER Injector & Concept Advancement):
  - 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 – Neutralizer and Electrostatic Residual Ion Dump were delivered end of 2024. The Calorimeter is under manufacturing and assembly.
    - Some of the diagnostics and the assembly activities for these components

The following annual objectives were set in 2024 for the HNB systems (Table 2):

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU53.TF.4446460	Delivery On-Site Completed (M89) - MITICA Neutralizer	Q3 2024	WP24 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	Achieved

Table 11: Neutral Beam - Annual Objectives presented in the F4E Work Programme 2024.

MITICA Beam Source (BS)

The assembly of the MITICA BS is presently under execution, with delivery to NBTF site planned for Q4 2025. The final stage of the framework contract- dedicated to the manufacturing of the ITER HNB units- was cancelled. This is because the related PA 53.02 signature has been postponed due to the on-going ITER re-baseline exercise. It is now tentatively planned for 2030.

The MITICA BS accelerator was completed at the end of 2023 and in 2024, the electron dump panels were installed downstream of the grounded grid. The ion source assembly is still on-going. Its completion, together with the integration between ion source and accelerator, the execution of the factory acceptance test and the delivery of the MITICA Beam Source, have been postponed to Q4 2025. The delay was caused by technical issues which occurred during the pressure testing of the ion source hydraulic circuits, where some damaged parts were replaced. Two different consecutive issues hampered the continuation of the activities (last issue occurred in February 24), both due to the pressure tests on the cooling circuit of the Plasma Driver Plates (PDP). As of December 24, both issues have been sorted out and the pressure test was successfully performed in December 2024 confirming the repair of the PDP cooling circuit. The supplier has now resumed the assembly activities for the Ion Source, although with some minor difficulties due to the complexity of the assembly operations.

Figure 35: Detailed view of the upper Electron Dump (ED) panel recently installed.

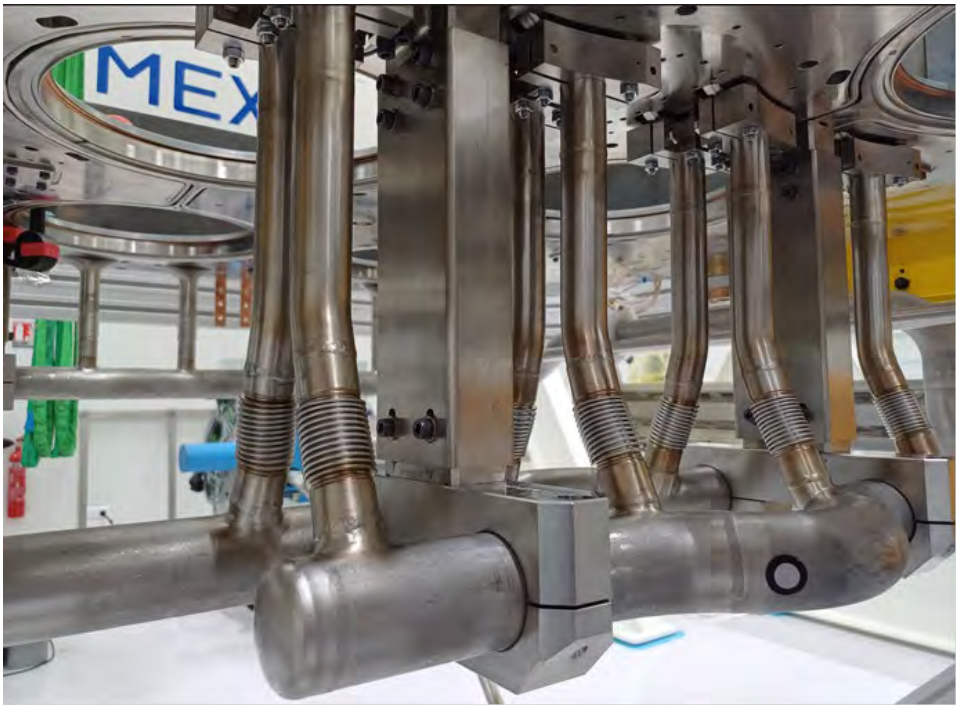


Figure 36: PDP central pipes group welded with replaced bellows.

MITICA Beam Line Components (BLCs)

The Beam Line Components (BLCs) of each NB injector consist in a Neutralizer and Electron Dump (NED), and Electrostatic Residual ion Dump (ERID), and a Calorimeter (CAL), located downstream from the Beam Source, inside the NB Vessel.

The specific contract for the MITICA Beam Line Components manufacturing (procured via the NBTF PA) is under execution- the signature of the PA for the HNB units is tentatively planned for 2029 as a consequence of the ITER's 2024 re-baseline exercise.

The acceptance data package of the first two BLCs, the Neutralizer and Electron Dump (NED) and the Electrostatic Residual Ion Dump (ERID) is to be completed in Q1 2025, following a successful SAT in September 2024. Both components are stored at the MITICA facility and underwent successful dimensional and leak test, as well as successful electrical testing for the sensors of ERID.

At the beginning of April 2024, the load test on the lifting frame which is part of the common equipment for the three Beam Line Components (BLCs) was successfully performed.

Assembly of the Calorimeter: significant progress was made with the welding of cooling circuits together with the bellows. The Calorimeter (CAL) panels also successfully passed the pressure and leak tests, an intermediate test after the completion of the welding of the panels composed by CuCrZr tubes. The manufacturing and testing of the actuator of the CAL, to open and close the panels and whose vacuum barrier includes a monitored interspace, was performed in November 2024. The delivery of the Calorimeter to the NBTF is expected in the third quarter of 2025.

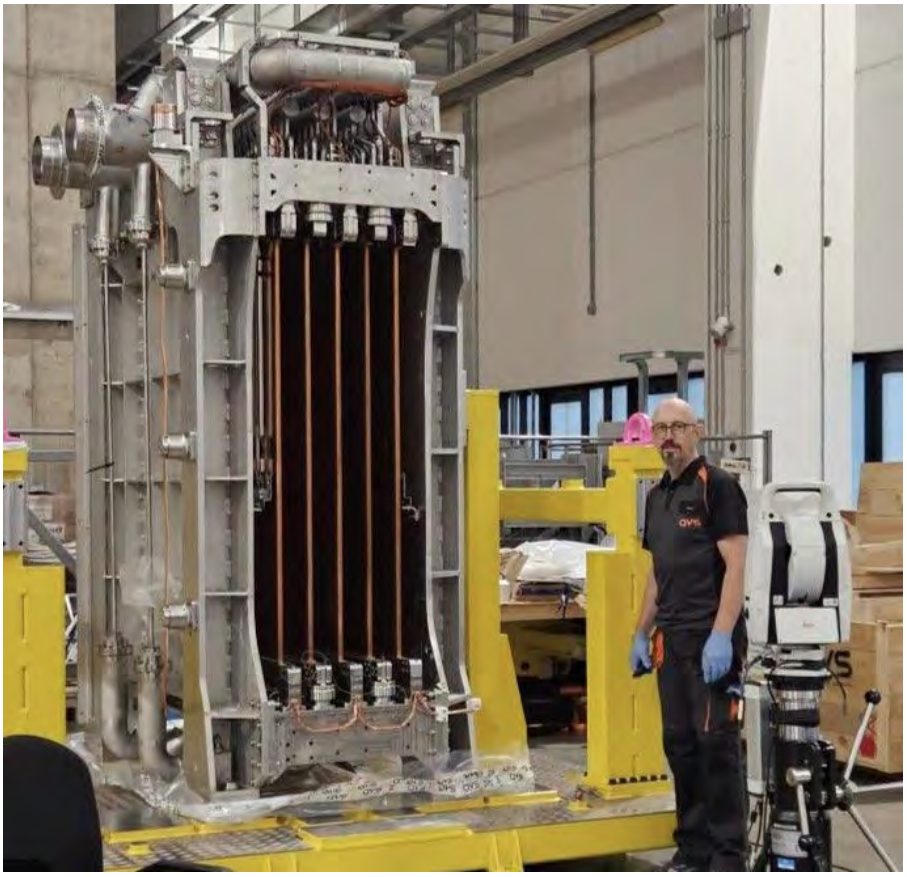


Figure 37: The Electrostatic Residual Ion Dump (ERID) dimensional inspection at MITICA facility.

Figure 38: Neutralizer FAT milestone successfully passed- Neutralizer during FAT leak testing.

NBTF Auxiliary Systems

The implementation of the MITICA Interlock system and of the MITICA Safety system has started. Other tools for MITICA assembly have been completed, including: the drying system, rotating platform, and the cryopump assembly tool.

NBTF Integrated Commissioning

The High Vacuum (HV) insulation tests (in vacuum), with a full-scale mock-up of the MITICA Beam Source started using the original Testing Power Supply (TPS). The voltage was increased slowly, and many aspects have been modified for improved performance (for example the conditioning procedure, the TPS control and HV bushing protection spark gaps). The effect of H2 injection was also investigated before installing an additional intermediate electrostatic screen at 600kV.

ITER HNB Mechanical Components

The NB Confinement PA scope is composed of several work packages, from which the NB Vessels and the Drift Ducts have PA Annexes already signed between IO and F4E. The rest of the Work Packages include the other HNB Front-End-Components (Fast Shutters, Absolute Valves and Exit Scrapers) and the Lead Wall, as well as other parts from the NB Vessel and Drift Duct not needed for SRO operation. The remaining PA Annexes for the rest of the work packages will be signed at a pace depending on the availability of the technical documentation from IO and the need date agreed.

The PA Annex B1 for the NB Vessels was signed in July 2021, and the corresponding manufacturing contract signed in October 2023. During the first months of 2024, the focus was on starting with material procurement (plates and forgings). Production of material started in April 2024 for the plates, and in May for the forgings. The welding qualifications have proceeded during the year as well as the manufacturing engineering. The Manufacturing Readiness Review (MRR) for the NB Vessels has been conducted in phases to allow for an incremental release of manufacturing. The first Delta-MRR meeting was held early August and a second Delta-MRR meeting held in November 2024. Both were successfully and timely completed, allowing the Supplier to proceed with the cutting and machining activities. The first deliveries for the plates and forgings are foreseen for Q1 2025, as well as the completion of all welding qualifications and manufacturing engineering and Non-Destructive Testing (NDT) feasibility assessments.

The PA Annex B2 for the NB Drift Ducts was signed in Dec 2023. The call for expression of interest for the manufacturing of the NB Drift Ducts was sent out in April 2024, and significant interest from the industry was shown. Following a first selection phase among the interested candidates, a shortlist of industrial partners was invited to join the next phase and the invitation to submit a tender was dispatched in October 2024. Plan is to sign the related supply contract within 2025.

During September 2024, a Memorandum of Understanding (MoU) was signed between IO and F4E to ensure F4E participation to the IO's Absolute Valve feasibility study. This was a pre-PA risk mitigation activity aiming at securing sufficient competition for the procurement of these valves. Work on the NB Absolute Valve feasibility design has begun following a successful KoM held in November 2024 with the selected suppliers.

The first Annex B of the PA for the NB Assembly and Testing (53-01 Annex B1), covering assembly tooling, was signed in 2021 (functional specifications). The related contract for the NB Assembly Tooling was signed in November 2024, after a long and intense tendering phase (Competitive Procedure with Negotiation). The Kick-off-meeting was held in December 2024. The approach by batches/options was identified as a main risk mitigation action, with the purpose to absorb the potential changes coming from NB Built-to-Print components design modifications during the Assembly Tooling design phase.

Preparation for the NB Magnetic Shielding PA at level of Build-to-Print, including Passive Magnetic Shield and Active Compensation and Correction Coils, has made good progress in 2024, and it is foreseen to be signed in 2025. To secure a timely delivery in the context of the ITER re-baseline, pre-Procurement activities are starting in anticipation of the corresponding PA signature. Subject to agreement for the adopted procurement strategy and resource priorities, procurement activities will follow in 2025.

ITER HNB Power Supplies

The PA is in execution since July 2009. All power supply components dedicated to the NB Test Facility (NBTD), both for SPIDER and for MITICA, have been manufactured, delivered, installed in Padua and handed over to IO several years ago. In parallel, activities for the ITER units have started, with Final Design Reviews completed for most subsystems: the Residual Ion Dump Power Supplies (RIDPS), the Conversion System of the Acceleration Grid Power Supply (AGPS-CS) progressing, and the 1MV High Voltage Bushing Assembly and the High Voltage Decks. The systems are broadly like the ones installed at the NBTF, with design adaptation focusing mostly on the different external interfaces and site conditions to be considered. A major design change of the Radio-Frequency (RF) generators of the Ion Source Power Supplies is also underway, moving from tetrode-based oscillator technology to solid state amplifiers, starting from an upgrade of the NBTF units (SPIDER and MITICA) to be used as the basis for design adaptation of the ITER units.

The manufacturing and the factory acceptance testing of the RIDPS, AGPS-CS and High Voltage Bushing Assembly and Deck for the ITER units is close to completion and the deliveries to ITER are in progress for the AGPS-CS, the High Voltage Bushing Assemblies and the High Voltage Decks. The delivery of the RIDPS has been put on hold to perform additional tests because several of their components were affected by a flooding at the storage area, which happened in October 2024 in the area of Bologna (Italy), only a few weeks before the expected delivery date.

Under the responsibility of IO and C-RFX, with F4E providing technical expertise, the HV integrated tests of MITICA continued with tests in vacuum using mock-up electrodes. The replacement of the tetrode-based RF generators by solid-state amplifiers is continuing for SPIDER and MITICA under the IO/C-RFX contracts. This experience will be used and optimized by F4E for the final design and fabrication of ISEPS for ITER.

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 is moving from the manufacturing phase, to delivering to the ITER site.

Finally, F4E and ITER IO started a joint exercise to work on the HNB Plant System Control. Over the past year, the focus has been put on clarifying the physical interfaces for the HNB control,

interlock and safety systems. The outcome of this exercise is an advanced conceptual design review that shall allow freezing the interfaces, the preliminary cubicle design and layout and ITER network needs.

Figure 39: Shipment to ITER of the Conversion System of the Acceleration Grid Power Supply for one Neutral Beam heating injector

Figure 40: Successful leakage tests of the HV Bushing Assembly.

1.1.3.6.2 Microwave Heating system

The Electron Cyclotron (EC) is another heating system of ITER, which converts electricity from the grid and supplies it to the gyrotrons. These devices generate strong electromagnetic waves, which in turn, transfer their energy to the electrons of the ITER plasma to start it up, heat it up and control plasma instabilities. F4E is responsible for providing: eight (out of twelve) sets of power supplies and the HV dummy loads for the EC system, six (out of twenty-four) gyrotrons (with their superconducting magnets, controller, and auxiliaries), four upper launchers (together with the ex-vessel waveguides of all upper and equatorial launchers), and the EC plant controller overseeing the configuration and operation of the system and providing integrated protection. The delivery, installation and commissioning of the EC power supplies and gyrotrons is also included in the F4E responsibilities. Each set of the EC power supplies feeds two gyrotrons with high and stable voltages and currents and is composed of one main HV power supply and two body power supplies. A novel design has been developed to meet the stringent accuracy, stability, and dynamics requirements. The following annual objectives were set in 2024 for the EC system (Table 12):

ANNUAL OBJECTIVES				
Milestone ID	Scope Description	Forecast Achievement Date	Type of Milestone	End 2024 status
EU52.01.3000010	Option 1 Signed for TO1 for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q2 2024	Predecessor of GB46	Achieved
EU52.01.4001240	EC Upper Launcher - Design Description Document for UL system - Completed	Q3 2024	Predecessor of GB46	Achieved
EU52.03.17200	Task Order Signed for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets	Q4 2024	WP24 objective	Achieved

Table 12: Electron Cyclotron – Annual Objectives presented in the F4E Work Programme 2024 (EC: Electron Cyclotron, UL: Upper Launcher).

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

The EC Upper Launchers and ex-vessel waveguide systems are in the final design phase- the main on-going activities are related to design and validation by analyses and prototyping.

In parallel, manufacturing activities have continued with the series production of the diamond disks (Annex B1 signed in 2019). The manufacturing for the 1st Batch of the diamond disks, originally required for 1st Plasma (8 Diamond Disks) has been completed in May 2021. Manufacturing of all 9 batches (60 disks) has been completed in July 2023. Optical testing for the first 3 batches (24 Disks) before assembly into the Diamond Window Units were completed with positive results. The testing for the rest of the production is currently ongoing.

Some Upper Launcher and Ex-Vessel waveguide design issues were detected by IO and F4E in April 2021 in the frame of the PA preparation and tendering for the Supply contract. After joint F4E and IO assessment, it was concluded that the Upper Launcher design needed re-addressing in terms of functionality, manufacturing, and assembly. Accordingly, and in agreement with IO, the PA

strategy was changed from a staged built-to-print PA Annex Bs approach to a single functional specifications PA Annex B2 covering the remainder of ECH scope. An industrial Technical Integrator was brought in to resolve the technical issues and finalize the design of the whole system up to FDR closure. The functional specification PA was signed in Dec-2021. The call for tender for the Integrator Framework contract was launched in Q4 2020 and the framework OMF-1120 and first task order with the Technical Integrator were signed in March 2022.

The first task order of the framework contract includes resolution of new Upper Launcher design issues and industrialization of the remaining components designs, up to FDR and manufacturing designs, as well as manufacture of some components (e.g. blanket shield modules, mirrors, material procurement, etc.) and assembly and testing of the EC Upper Launchers. Design ¨redressing¨ of the upper launchers has been completed and final justification for FDR is on-going. The final design activities of the ex-vessel waveguides system are progressing well. Design improvements and optimizations have been developed for the main sub-systems and its justification by analysis is being finalized. Qualification strategy has been approved, and specific qualification plans have been prepared and approved. Design integration has progressed substantially and in parallel, procurement of CuCrZr for series production of the waveguides has been launched. The FDR Meeting is planned mid 2025.

In addition, following recommendations of F4E Technical Advisory Panel, TAP, a second task order was signed in April 2024 encompassing additional prototypes testing with to aim to mitigate some key technical project risks.

Finally, a third task order was signed in November 2024 for the finalization of the design of the EC isolation valves and manufacturing of two prototypes for qualification activities. It is planned that the isolation valves series production will be managed instead via a separate contract with the supplier of the valves.

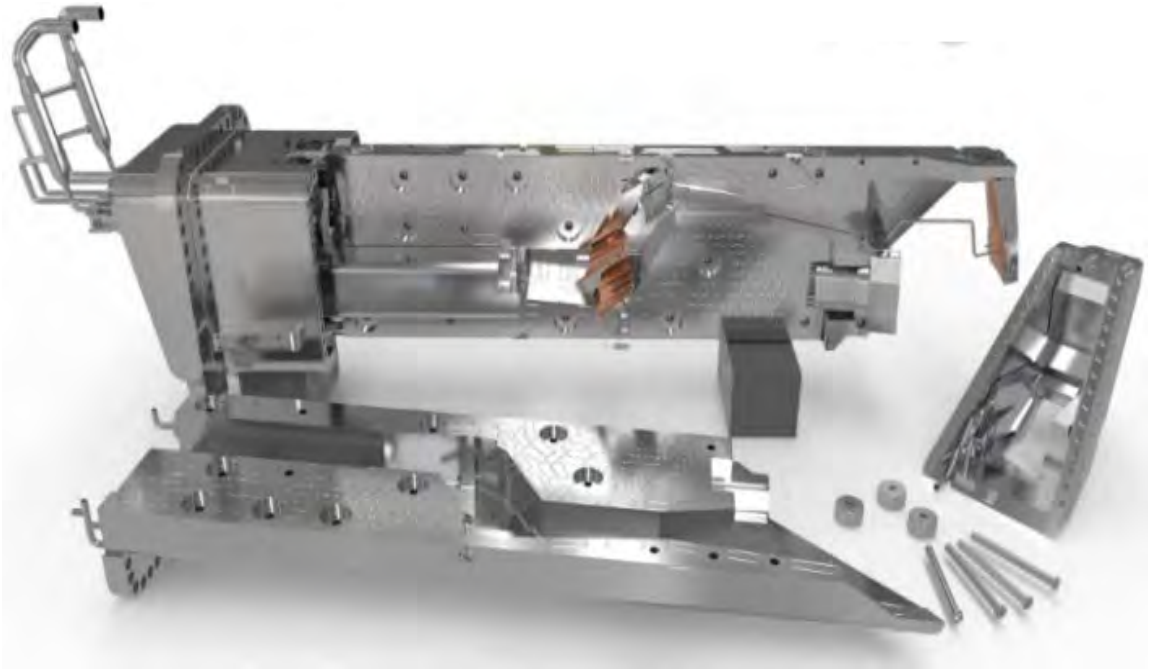


Figure 41: Final iteration of EC Launcher Design, as of July 2024.

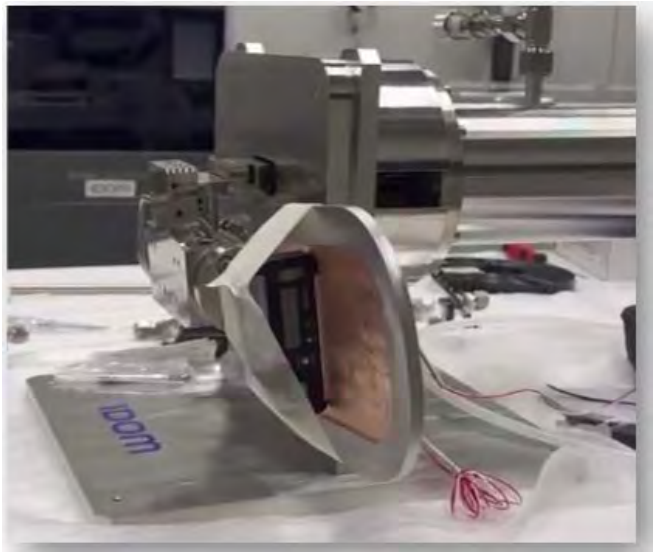


Figure 42: Mirror-4 Steering Mechanism Actuator (M4 SMA) prototype design completed in November 2024.

Electron Cyclotron Power Supplies

For the EC power supply system, the fabrication and factory testing of the complete system was completed in 2024, as well as the delivery and installation at ITER site of all eight Units under F4E scope. Alongside this, the installation of the Long Pulse Dummy Load in the Annex of the ITER RF B15 started in 2024. The commissioning of the Low Voltage (LV) part of the first ECPS was performed in 2024, and will follow in 2025 with the HV commissioning and Site Acceptance Testing at the ITER RF building (#15) of the Main HV power supply and 2 body HV power supplies, integrated with the LV and Control cabinets, and dummy loads.

Figure 43: All eight ECPS units under EU scope were installed and completed in 2024

Electron Cyclotron Power Sources

The F4E Framework Contract was signed with Thales in April 2022 and the Specific Contract for the 6 ITER Gyrotrons was signed in December 2023. The KOM was completed in February 2024 and, after a fruitful visit with the contractor and IO to the ITER site for the supervision of the installation area in B15 Level 3, Thales progressed towards Design finalization and the approval of the baseline schedule, the FDR work plan and the intermediate revision of the FDR documentation, with the FDR planned for mid-2025.

The final design of a Matching Optical Unit has been qualified at the FALCON test stand in October 2024. There are still pending tests to confirm the maximum efficiency to be achieved with the first DTT pre-series gyrotron (ITER-type).

In addition, in November 2024, a new contract has been signed with EU Fusion Labs (KIT as main contractor) for engineering support to F4E during the design and procurement process of the 6 EU Gyrotrons of the original baseline.

Figure 44: DTT pre-series gyrotron was successfully tested at the F4E FALCON facility in 2024

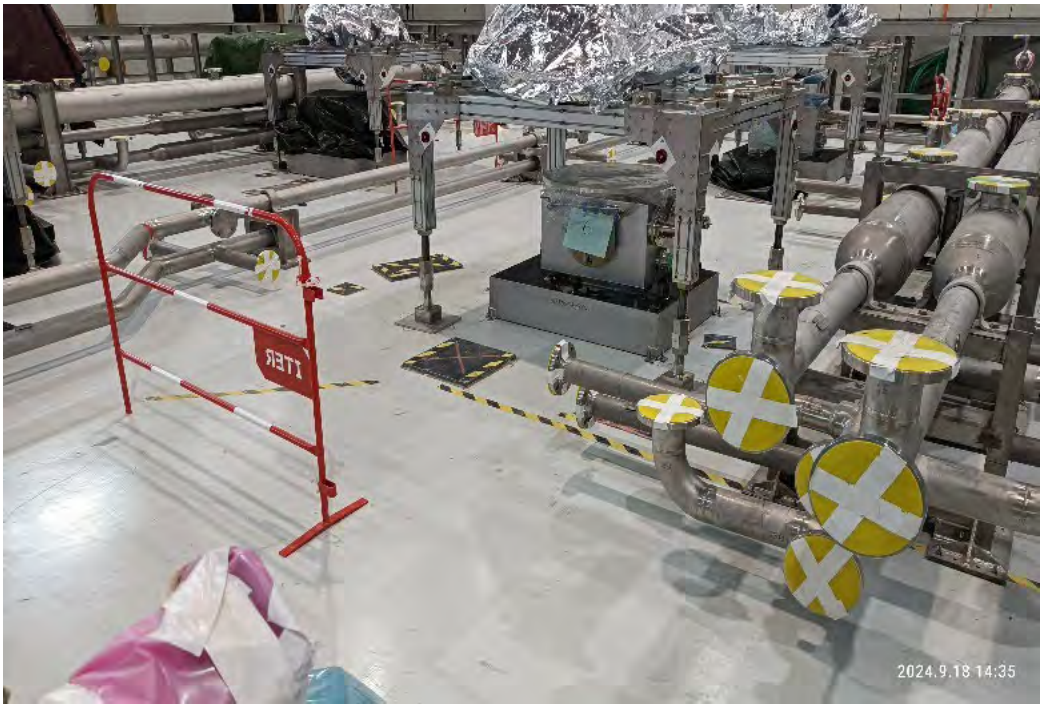


Figure 45: ITER B15, Level 3 status of activities: installation of main water pipes and false floor support checked.

EC Control System

The EC Plant Control system phase 2 is installed and operational and the integration with the available Subsystem Control Units (local controllers) is complete and commissioned.

The system is ready for operation of the Gyrotron Commissioning Components for the site acceptance test of the ITER gyrotrons.

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 2024 focused on the improvement of the voltage holding of the superconducting magnets, the beginning of the first maintenance and enhancements phase of the machine (M/E1) and the continuing preparation of additional diagnostics, heating and in-vessel components for the second operational phase of the machine (OP2). The tokamak was completely warmed up in January, after the very successful first operational campaign, with the achievement of mega-ampere class first plasma, and ready for the yearly safety inspection of the cryogenic system.

After integrated commissioning (IC) it has become clear that the central solenoid would need a more comprehensive repair. To this avail F4E has defined and qualified with an industrial supplier a technique for the *in-situ* repair of the central solenoid by projection of resin using a custom resin delivery system. This idea, originally conceived by F4E in 2022, has been implemented in an industrial environment and validated with a large number of relevant mock-ups, including a 7 m tall full scale mock-up of the central solenoid (Fig. 1).

In March 2024 the possibility of entirely omitting the carbon actively cooled divertor was discussed for the first time between F4E and QST, and was then formally agreed at the Broader Approach Steering Committee 34 in December 2024. By then, the existing procurement contracts were already amended with the inclusion of clauses to guarantee a smooth transition from an inertially cooled carbon to an actively cooled tungsten divertor. Components will become available in time for the installation of the tungsten actively cooled divertor after 2030.

In particular, during 2024, the concept of a tungsten monoblock high heat flux elements was adopted for the vertical targets of the actively cooled tungsten divertor, and relevant technological mock-ups were built and tested in operating conditions (Fig.2) (10MW/m2 steady state heat flux). This opens the way to the manufacturing of more complex mock-ups and the completion of the R&D phase in summer 2025, when also the final integration contract of the divertor units will be open for tender.

During 2024 several power supply systems were successfully installed and accepted on-site (error field correction coil power supply - EFCC PS, electron cyclotron range of frequency power supply - ECRF PS 1), while fabrication has begun on others (ECRF PS 2). F4E has been working intensively on-site in Naka to maintain a smooth progress of the many activities associated with the installation and commissioning of complex power supplies, following the activities of suppliers and participating actively in the troubleshooting and commissioning of the systems.

The divertor cryopumps (Fig.3) provided by F4E were delivered and accepted on-site in Naka after several months of careful inspection, testing and reporting. Additionally, F4E coordinated factory trial welding of the delicate connection of the cryopumps to the helium feeding lines, where QST was invited to witness and learn from the experience of the European supplier. F4E has also taken care of the preparation of a procedure for future use during installation of the cryopumps in the tokamak, scheduled for spring 2025.

In October 2024, the JT-60SA tokamak was awarded the world Guinness Record for the world's largest tokamak plasma, for its 160m³ plasma volume achieved during the first operating phase of the plant (Fig.4). This of course has been very gratifying for the many scientists, engineers and suppliers involved in the achievement of this goal, and strengthened the already strong collaborative spirit between F4E and QST.

In parallel, all around Europe many activities for the preparation of diagnostics for the second operating phase of the tokamak have been progressing rapidly:

- The Thomson scattering system laser, fibers and polychromators have been delivered on-site in Naka, and followed up closely during acceptance by F4E and the EUROfusion partners and Suppliers. The massive mechanical support structures were tested in Europe and prepared for shipment.
- Most of the Divertor Vacuum Ultra Violet (VUV) Spectrometer components have been manufactured and trial assembled, including a large test tank for factory acceptance testing.
- The pellet launching system (PLS) centrifuge has been manufactured and is now entering Factory Acceptance Testing prior to being integrated with the whole system in a dedicated lab for functional testing with pellet extruders. The procurement of extruders had to be restarted due to the current geopolitical situation, but potential suppliers have been identified and design and construction can start in 2025.

Figure 46 - The 1:1 scale mock-up of the central solenoid used to validate the repair procedure

Figure 47 - JT-60SA Actively Cooled Divertor Vertical Target Elements

Figure 48 - A JT-60SA Divertor Cryopump

Figure 49 - JT-60SA Guinness World Record Ceremony

1.2.2 IFMIF/EVEDA

The International Fusion Materials Irradiation Facility (IFMIF) is a neutron source that utilizes an accelerator to generate neutrons with an energy spectrum similar to fusion neutrons. It aims to produce neutron fluxes compatible with the fusion roadmap to qualify materials planned for use in future power reactors. The Engineering Validation and Design Activities (EVEDA) for IFMIF are being conducted in 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.

After significant progress in 2023, LIPAc entered 2024 focusing on finalizing the Phase B+ and preparing for the integration of the SRF Linac. By early 2024, Phase B+ Stage 2 had reached beam currents around 115–120 mA at low duty cycle with 88–92% RFQ (Radio Frequency Quadrupole) transmission efficiency. However, persistent overheating of five O-ring couplers limited the RFQ duty cycle to 10%, triggering further investigation.

Phase B+ Stage 3, which began in March 2024, targeted higher duty cycles through improved RF synchronization. Due to coupler limitations, it was decided with agreement of the IFMIF/EVEDA Project Committee to limit the duty cycle to a maximum of 10% to preserve the RFQ from any

possible damage. Eventually, a maximum of 8.75% duty cycle was achieved at 132 kV and ~115 mA, though attempts at 10% proved unstable. Beam losses at the MEBT (Medium Energy Beam Transport) Extension Line (MEL) exit, tied to low-energy particles and transient pulses, require further mitigation. Despite these challenges, extensive beam characterisation data were collected to refine machine models. All beam diagnostics provided signals, including first-time data from Ionization Profile Monitors and Fluorescence Profile Monitors. However, the Beam Position Monitors (BPMs), a crucial diagnostic for beam operations, revealed connector and front-end electronics issues, which are now scheduled for repair before Phase C can start.

A key challenge in 2024 remained the brazed couplers for the RFQ. A dedicated Working Group—comprising Japanese and European experts—investigated coupler issues and devised new conditioning protocols. Although the High-Power Test Bench (HPTB) was refurbished and a combiner installed to reach 210 kW, a Teflon melting incident in December 2024 caused ash contamination, necessitating repairs and reconditioning. A new test campaign began in February 2025 with a second pair of brazed couplers. Concurrently, spare coupler procurement faced technical capacity limitations, prompting discussions with alternate manufacturers and a proposal for a cooperation agreement between CERN and F4E to develop improved couplers based on the initial design in a timely manner. Given the criticality of the RFQ couplers, and as a final fallback, F4E/DONES is procuring a set of couplers with a completely new design, providing additional mitigation against future RFQ reliability risks.

Regarding the SRF (Superconducting Radio Frequency) Linac, its assembly at Rokkasho resumed in April 2024 following multiple solenoid leak repairs, and corrective work of the cold-warm transitions. Despite progress, new leaks postponed final alignment to January 2025, even though the cold mass was mostly finished by December 2024. Preparations to transfer the SRF Linac into the vault, scheduled for March 2025, proceeded as planned in 2024. These preparations included dismantling the drift line, which was installed in place of the SRF during phase B+, and reinforcing the accelerator vault floor. In parallel, SRF Linac RF system commissioning continued with RF module #4. The latter has been used to power the conditioning of brazed couplers for future high-duty-cycle operations. However, circulator retuning and potential refurbishments have occurred as another challenge.

Starting in November 2024, an injector campaign featuring an 11.25 mm plasma-electrode aperture successfully achieved stable 24-hour beam operation with excellent beam characteristics. These results are pivotal for the preparation of the forthcoming phases C and D. Additionally, the close collaboration with the IFERC/REC project was pursued in 2024 with enhancements to the remote-access tools (RCA/RDA) and user authentication protocols, fostering international collaboration, particularly with IFMIF-DONES.

Overall, Phase B+ yielded extensive beam data and improved RFQ reliability measures. It was partially completed in June 2024 to allow the start of the SRF Linac installation. This final phase aims to complete the engineering validation activities of LIPAc, which are crucial for the construction of the IFMIF-DONES Facility. The completion of Phase B+ will now be integrated into the IFMIF-DONES Commissioning Plan, incorporating all lessons learned and design enhancements already initiated within the commonalities between the two projects.

The efforts to address LIPAc maintainability and obsolescence accelerated in 2024. A stepwise obsolescence strategy, defined with a European accelerator-maintenance expert company, progressed in two phases: initial scope definition and small-scale validation. Although final contracting was delayed by about a year due to administrative processes associated with the use of the Project's common funds, the project's outcomes—due by mid-2025—will guide the next steps

for full-scale implementation for a global maintenance contract that will help significantly address the lack of human resources on Rokkasho site.

In parallel, a Control System Obsolescence study pinpointed urgent issues (e.g., the fast data acquisition system), informing a new maintenance roadmap. Diagnostics electronics also need refurbishment, as electronics and front-end hardware are aging and need upgrade. Additionally, a Computerized Maintenance Management System (CMMS) and the LINDA database were initiated to centralize part-tracking and manage critical spares. These measures aim to free technical teams for higher-value work like beam commissioning and optimization.

The work on LIPAc enhancements, initiated under BA Phase II, aiming to improve the machine's availability, reliability, and maintainability for high-duty-cycle operation, continued in 2024. Three major upgrades are being made: a Machine Protection System (MPS) overhaul, a technology swap from tetrode-based to Solid-State Power Amplifier (SSPA) RFPS for the RFQ, and an injector upgrade featuring improved stability and maintainability. The Factory Acceptance Tests of the MPS were successfully passed as planned in July 2024. However, delay in the availability of cable and interface converter, not in the initial scope of the MPS upgrade, pushed Site Acceptance Tests to late Q2 2025. The development of the SSPA was deferred until June 2025, following recommendations to enhance its efficiency and performance without any impact on the LIPAc project timeline. Meanwhile, the injector upgrade progressed through extended tendering, with a goal of finalizing the design contract by mid-2025.

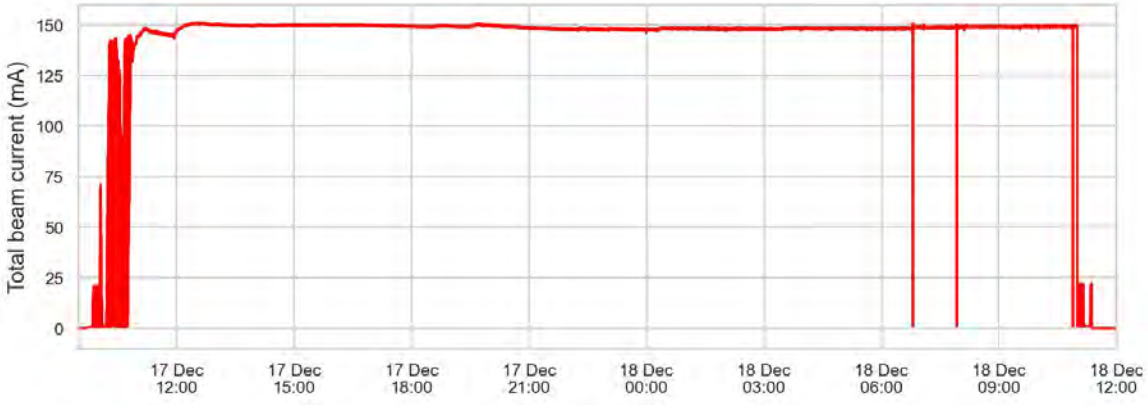


Figure 50: On December 17 and 18, 2024, 24 hours of continuous wave operation were achieved in preparation of the upcoming phase C and D and studies directly applicable to IFMIF-DONES.

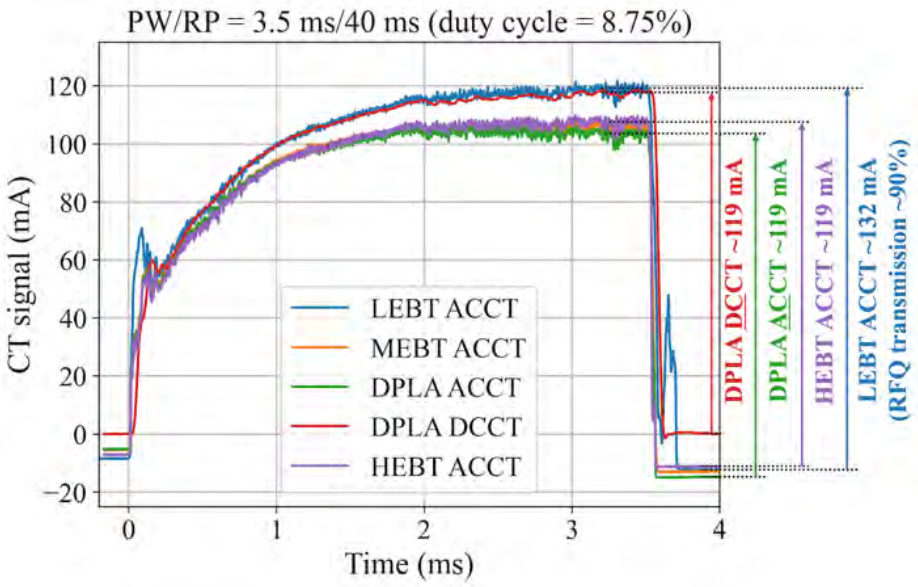


Figure 51: Beam current waveform when 8.75% duty cycle is achieved in LIPAc Phase B+ configuration.

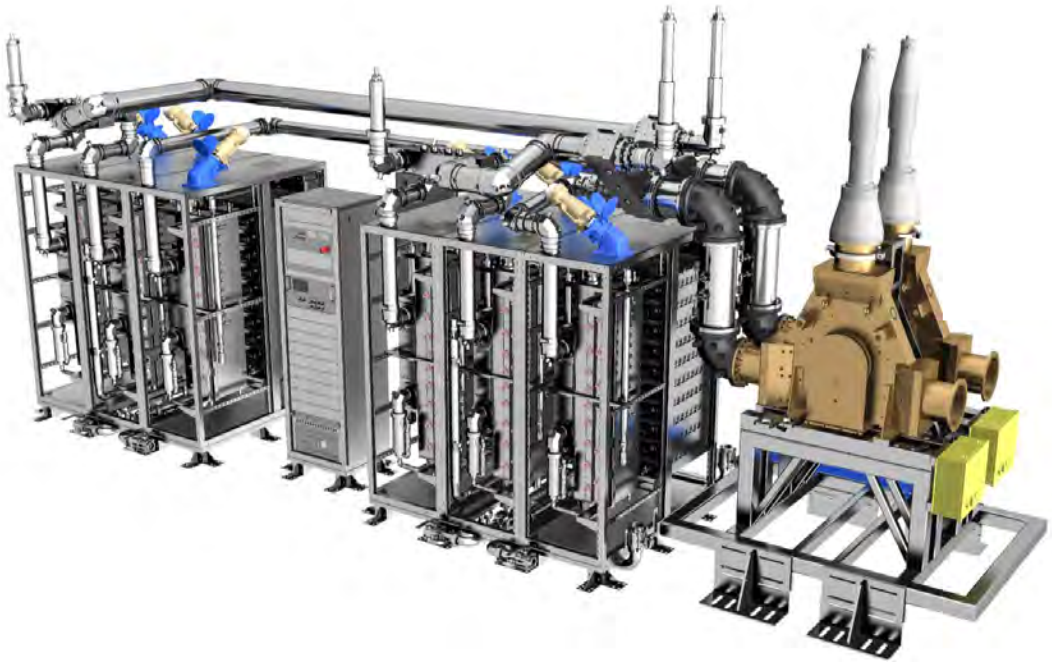


Figure 52: 3 D view of a Solid-State Power Amplifier (SSPA) chain for the LIPAc RFQ

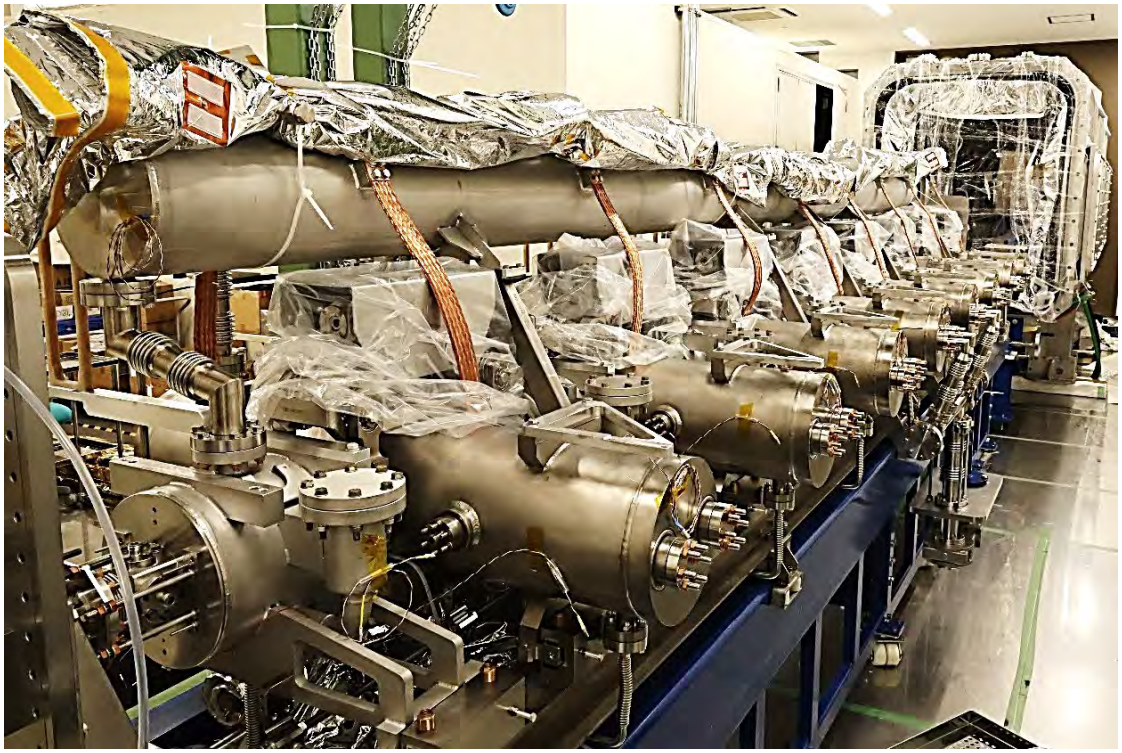


Figure 53: Cold mass of the SFR Linac with a close view on the Half Wave Resonators in December 2024.

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, focused on building and testing pilot Li purification plants in Japan (1:10 scale) and Europe (1:1 scale). Japan finalized plant assembly by December 2024, preparing for Li charging and commissioning in early 2025; Europe began assembly in mid-2024, targeting completion by June 2025. Both will validate key Li-impurity control technologies.

Progress on Li target diagnostics included sub-millimetre flow-height measurements in Japan and a successful prototype sensor trial in Europe's Ga-In-Sn loop. Corrosion analyses of the ELTL pipe in Japan showed nitrogen impurity control can mitigate cracking, while Li fire-risk experiments continued after redesigning the test setup.

Under Engineering Design Activities, tritium migration simulations confirmed design improvements to reduce permeation. Erosion/deposition and accident analyses further refined loop safety systems and design parameters. Lastly, using LIPAc as a testing facility, both Japan and Europe gathered data on neutron/gamma detection and beam loss monitoring, informing better modelling and diagnostic readiness for future high-duty-cycle operation.

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, JT-60SA and other high priority areas. The fifth annual cycle of simulation projects was conducted in 2024 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 2024, joint DEMO Design activities have progressed 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. The collaboration with STP started in 2024.

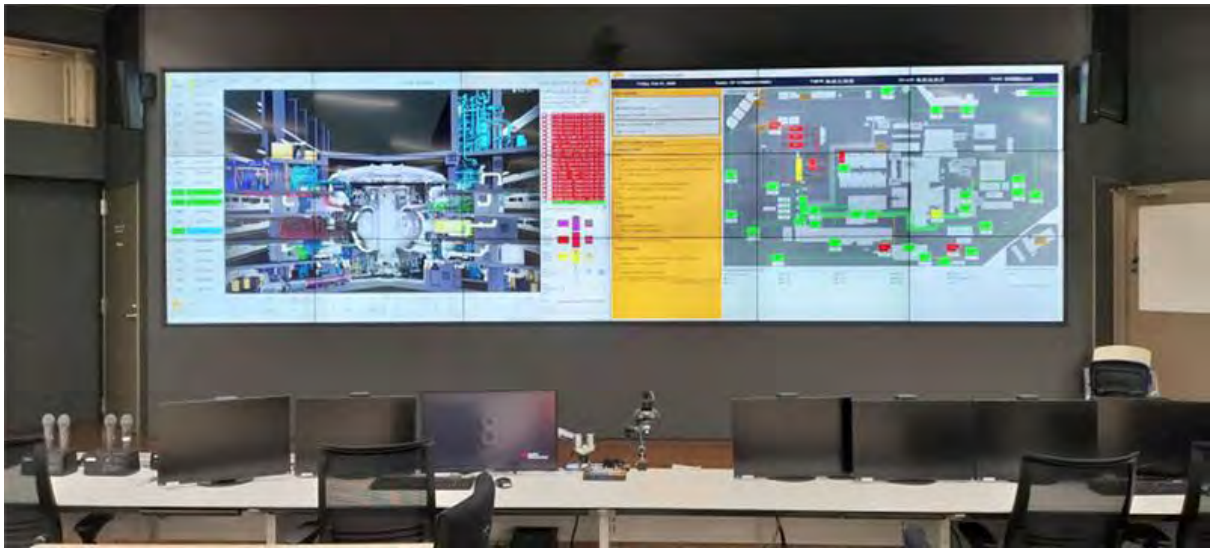


Figure 54: CODAC OPI (OPerator Interface) which is identical to what operators in ITER Main Control Room is watching and (Right) Commissioning Execution Web Page being shown on the REC videowall with 4K resolution

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU.BA.01.10510	Placement of the contract F4E-OFC-1650 for Maintenance and Optimization of HVPS and of SMPS	Q4 2024	WP24 objective	Maintenance and Support Services for BA Projects	Achieved
EU.BA.01.14150	Assembly of the complete cold mass completed	Q4 2024	WP24 objective	LIPAc Activities	Achieved
EU.BA.01.21310	End of installation of Power Supply system for feeding the Error Field Correction Coils on Site	Q4 2024	WP24 objective	Error Field Correction Coils	Achieved
EU.BA.01.38800	Supply of equipment or services for tests with BA Projects and ITER	Q4 2024	WP24 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator	Achieved
EU.BA.01.38860	Delivery of vacuum components of the transmission lines	Q4 2024	WP24 objective	ECRH Transmission	Achieved

Table 13: Broader Approach – Annual Objectives presented in the F4E Work Programme 2024

1.2.4 DONES Programme

The DONES Programme aims at testing and qualifying materials to create a database of materials for the construction of fusion power reactors.

After F4E issued a call for proposals in 2016, the Region of Granada in Spain was selected to host and build the IFMIF-DONES facility in Europe, as proposed jointly by Spain and Croatia.

In November 2022, Spain and Croatia signed a Memorandum of Understanding, and Spain established IFMIF DONES España to oversee construction and operation.

On 16th March 2023, the DONES Programme construction phase started with the setup of a working group aiming to prepare the ramp-up of the DONES Programme. On 14th March 2024, the DONES Programme Team was officially implemented with its interim Programme Manager to avoid any further delay in the implementation of the activities and the signature of the first PAs.

In July 2024 the Governing Board of F4E agreed with the provision of F4E's contribution with the caveat that Spain must secure the full amount of the construction costs of the DONES Programme, as well as early in-kind contribution of essential components for DONES to be tested on LIPAc, as a risk mitigation action and for the development of the supply chain and cash contribution for personnel.

The main activities of F4E in 2024 included the validation of the final design of key components, integration of design improvements incorporating feedback from the ongoing LIPAc engineering validation phases. Work was also carried out with a view also to increasing the availability of LIPAc during the commissioning phases. Additionally, to consolidate the F4E contribution to the DONES

Programme, external support was contracted to consolidate the current baseline and to provide support for the integrated activities during the ramp-up in addition to assignment of F4E staff to the DONES Programme Team.

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU.DO.00270	Placement of the option for engineering support contract F4E-OMF-1159-01-01-100 for the BA/DONES Projects (2023-2025)	Q4 2024	WP24 objective	Programme Team and System Integrated Management	Achieved
EU.DO.00690	Publish Invitation to Tender for Design and Procurement of the cavity	Q4 2024	WP24 objective	SRF Linac	Not achieved
EU.DO.01310	Cash Contribution for DONES Project 2024	Q3 2024	WP24 objective	Cash Contribution	Achieved

Table 14: Dones - Annual Objectives presented in the F4E Work Programme 2024

1.3 Fusion Technologies & Engineering Department

The Fusion Technologies & Engineering Department 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 and the strategic actions by F4E for what concerns technology needs. Technical support is provided in the following areas:

1.3.1 Project Engineering, CAD & Data Management Unit

CAD and technical data management group: Providing Computer Aided Design (CAD) support to F4E's Project Teams by setting up the CAD infrastructure for design collaboration with suppliers and ITER organization; reviewing drawings for Procurement Arrangement signatures; ensuring the traceability of CAD data exchanges; checking the CAD data at different design maturity levels; performing internal mechanical design tasks and specifying CAD tasks to be subcontracted. The group supports the Project Teams in managing technical data and documentation to ensure they are produced, and reviewed according to the requirements specified in the IO PA.

In 2024, the CAD framework contracts were renewed as planned. The new CAD frameworks contracts F4E-OMF-1624 Lot1 and Lot3 were signed at the end of 2024. Ten task orders were signed under the CAD framework contract F4E-OMF-1058 Lot1 to support the CAD activities of the BSM and CAD group which resulted in the budget for the contract being nearly fully expended.

During 2024, the IRIS team consolidated its role in managing technical data and documentation for various Projects and Programme Teams. IRIS adopted a service provider model, centralizing the management of data and documentation experts, rather than assigning resources to individual Projects Teams, and focusing on service delivery performance.

In the area of CAD, the group reviewed CAD data inputs and deliverables for various contracts and systems, between them the more relevant are listed below:

- For BSM, F4E and IO have agreed to update the DCIF for the Architect Engineer PA, including all CAD requirements for the use of the AVEVA suite.
- For Diagnostics Programme Team, the group reviewed the 3D models and 2D drawing of the six European ports: UP01, UP03, UP10, UP17, EP01 and EP10. They had a large volume of models and drawings to review within a tight schedule.
- For Magnets Programme Team, the remaining 3D models for Poloidal Field Coil were reviewed and passed to IO for final acceptance.
- For Cryoplant and Fuel Cycle Programme Team, the 3D models to be used for the Final Design Review of the Cryostat Leak Detection System, Neutral Beam Leak Detection System and Torus&MS Leak Detection System were reviewed by the team.
- For the Remote Handling Programme Team, the 3D deliverables for the Cask and Plug MA-1 RHS of the contract F4E-OMF-1034-01 and Cask and Plug RHS CES and CDS of the contract F4E-OMF-0577-02-02 were reviewed, promoted and transferred to IO.
- For the In-Vessel Programme Team, the CAD data inputs for different design reviews were checked for the following components: First Wall panels FW13A and FW13AD; Inner Vertical Target: PFU, SSS and STD IVT; and Divertor Cassette Body.

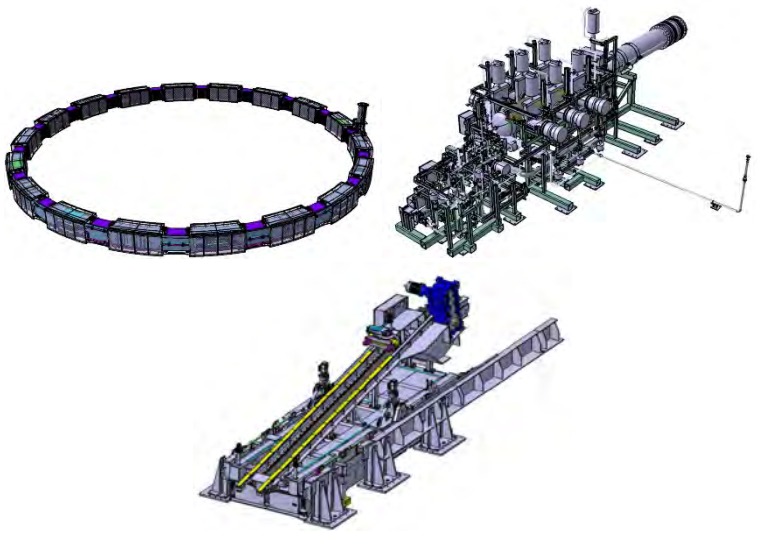


Figure 55: From left to right PFC3, Cryostat Leak Detection Sytems and CPRHS MA-1.

1.3.2 Engineering Analysis, Plasma Engineering and System Qualification

The F4E Engineering Analysis, Plasma Engineering and System Qualification Unit provides specific technical expertise to the F4E ITER Project Teams, Broader Approach Projects as well as direct support to IO. During 2024 the major highlights were as follows:

Support to F4E Project Teams

- Group members have routinely supported our F4E PTs by reviewing hundreds of technical documents, participating to gate reviews, carrying out detailed analysis of various system (e.g. Test Blankets, ECH Launcher, Vacuum Vessel, NBI shields, diagnostics, First Wall Panels etc.) as well as instructing younger, external analysts dedicated to different projects tasks (e.g. vacuum vessel NCRs, RH systems design and analysis, etc.). Last but not list, key support has been provided by liaising on behalf of the PTs with their suppliers and assisting them by transferring knowledge in various field of engineering analysis (e.g. neutronic for ECH, electromagnetic analysis of various diagnostics, seismic and structural analysis of components and structures, qualification of active components by tests or analogy, etc.).
- A series of reports have been produced for a wide range of activities, involving pipe analysis of the AEU+PF system of the TBM, scoping analyses of a convoluted shell solution to connect the VV Splice Plates or a feasibility study of a supporting structure to hold the JT60-SA Central Solenoid during inspection works.

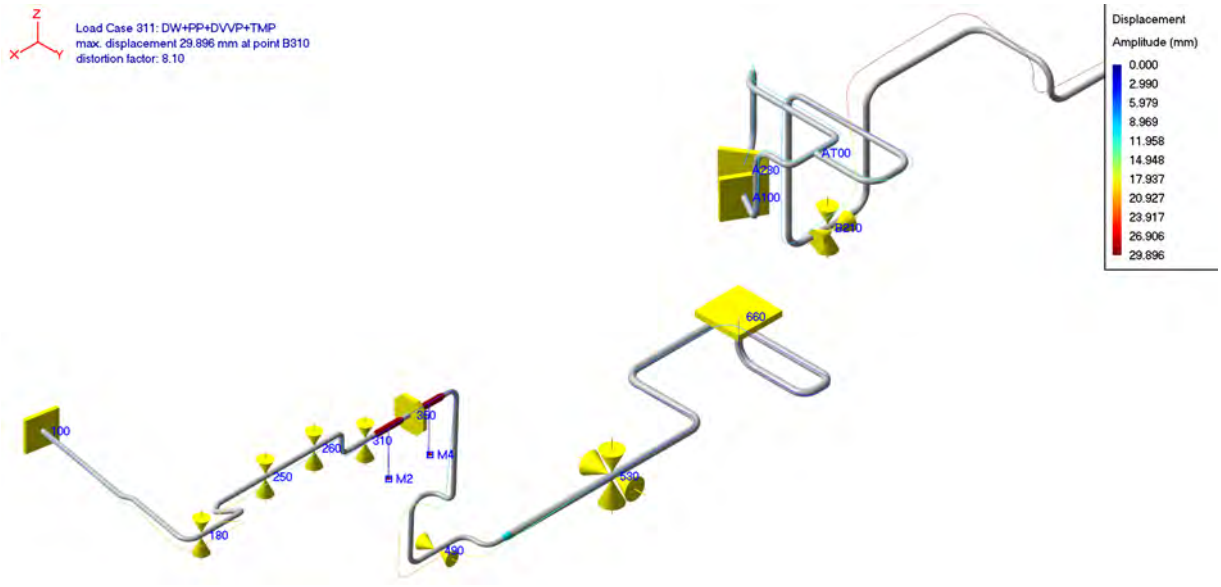


Figure 56: FE structural analyses in Pipestress, showing displacements in Normal Operation Conditions, proving the robustness of the current design for the HPR and PDR-W.

- Development of a significant activity on the 3D formulation for the plasma evolution and implementation of a facility for experimental activities focused on the validation of electromagnetic codes
- Implementation of detailed electromagnetic and thermomechanical analyses of the JT60SA divertor

- Implementation of detailed thermo-mechanical analyses of several FW panels, such as FW#11 and FW#06.
- Support in radiation transport matter and expert judgement for several F4E-PBS for design review, design modification and computation of responses mainly diagnostics and EU TBM (e.g., 396K5E, 2YQZC9).
- Development of JT-60SA MCNP model and computation of responses for EU diagnostics, BA_D_2DFTEC, BA_D_2DM7SW, BA_D_2DLSJK and BA_D_2DE5BC.
- Development and release of the GEOUNED code, a tool for converting between CAD and CSG formats for Monte Carlo transport codes, within the European Fusion Technology Marketplace. This initiative strengthens the European supply chain by eliminating reliance on a proprietary Chinese tool.
- Endorsement and adoption by IAEA of the JADE tool to perform V&V of the FENDL nuclear data libraries for fusion application (e.g., ITER).

Support to IO Project Teams

- Collaboration with IO for the Magnet Grounding and Arcing simulations of the ITER magnets, for the electromagnetic analyses of quench detection voltages in the ITER PF Coil System, for updating the Design Description Documents of ITER magnets, for sharing a common interpretation of RCC-MRX design rules for bolt assessment.
- Collaboration with IO on the design and analysis of the Magnet Cold Test Bench (MCTB). Extensive support was given through implementation of Finite Element thermal and mechanical models as well as thermohydraulic models aiming at simulating the TF coil inside the facility in different scenarios, such as cool down, testing and quench.
- Collaboration with IO in view of the “Vacuum Vessel Dry Field Joint” activity. A large campaign of neutronic analyses have been launched to assess the nuclear deposition in the case of dry field joint. Hydraulic, thermal and mechanical analyses have been developed to study the behaviour of the vacuum vessel and the upper port in this new scenario.
- Collaboration with IO seismic, structural dynamics and qualification by tests. Regular exchanges are aimed at both reducing the gaps in the practice by F4E ad IO and improving the common expertise. A Webinar with 8 sessions was given during October and November 2024 to consolidate the common knowledge in earthquake engineering. The Knowledge Management Community on Qualification have an active participation to the review and the development of a common set of guidelines and documentations for the qualification of active components. Several visits of laboratories including seismic, fire, ageing, electromagnetic or vacuum testing facilities have been organized for F4E, IO and suppliers to insure a good knowledge of the supply chain in charge of the qualification of nuclear components.
- Extensive support in radiation transport matter and expert judgement for several IO-PBS for design review, design modification and computation of responses as usage of LINAC for VV inspection, F4E_D_39UJSQ_v1.1, dry VV field joints assessment F4E_D_385C3F_v2.1, F4E_D_385C3F v2.1, computation of magnet responses F4E_D_2XDX86 v2.1, in-vessel coils responses F4E_D_38B7M4 v1.0.

1.3.3 Materials, Manufacturing and Metrology

Materials, Manufacturing and Metrology Unit proposes, develops, qualifies, assesses and manages coherent and integrated solutions for the manufacturing design, including metrology, and management of geometrical requirements, for the selection of materials, manufacturing processes, influence of operational conditions on components lifetime, follow-up on acceptance and assembly of systems.

Materials and Manufacturing Group:

The group provides versatile service contributions to project teams in the field of materials and fabrication related technologies. The activities cover a wide scope starting from developing new ideas via R&D, elaborating technical specifications, select materials and manufacturing processes, support qualification testing and prototyping, to commissioning and manufacturing follow-up, on-site support and trainings.

A large part of services is provided by transversal staff allocations to specific projects for short- or long-term durations, but also as case-based spot support. The key to achieve success of the group is linked with 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 that is followed by different non-destructive testing activities, like UT, RT, tomography, He leak testing etc.

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.

Additional support in form of Materials testing, qualification of joints, mock-ups, manufacturing processes and NDT are provided via Framework contracts, during 2024 with F4E-OFC-1082 by ISQ, Portugal.

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 2024, substantial efforts were dedicated to supporting the Vacuum Vessel Project. This included successfully completing the dimensional inspections for both the factory acceptance test and the subsequent site acceptance test of sector 5, part of sector 4, and all metrology related to vacuum vessel bevel repair activities. These tasks were carried out in close collaboration with ITER IO, encompassing both European and non-European sectors.

At the same time, and after the effort of past years, the group finally started implementing a structured collaboration with the IO Metrology and Reverse Engineering teams. This integrated approach allowed to streamline both the management and assessment of Tokamak As-Built geometrical data to support the machine's assembly and plant As-Built geometrical data (such as embedded plates and metrology network) to meet the needs of different PBS interfacing with the buildings.

As per 2023, the group continued to refine processes and procedures for managing manufacturing contracts, alongside implementing detailed metrology and reverse engineering strategies. Notable examples include the First Wall project, the IVT project, the Neutral Beam Vessel project, where these strategies have facilitated the tracking and control of a huge number of metrology-related documents.

Furthermore, the group commenced supporting projects during their engineering for manufacturing phases, including Blanket manifolds and various diagnostic and remote handling systems. The group’s involvement in strategic discussions aimed at defining appropriate strategies for managing geometrical requirements throughout projects was achieved, leading to improved quality control in the process of obtaining the manufactured product.

Efforts initiated in 2022 and followed-up in 2023 to support Heating & Current Drive programs reached the implementation phase during 2024, when the agreed strategy for the managing of geometrical assembly requirements for the Neutral Beam project become operative and influenced decision. This allowed to build a strong link between assembly needs and functional needs belonging to each component to be assembled.

In conclusion, like last year, we carried out several metrology supervision activities with a focus on quality. We also executed initiatives to enhance knowledge in metrology and GD&T, aiming to share lessons learned and raise awareness about the importance of defining geometrical requirements accurately within F4E.

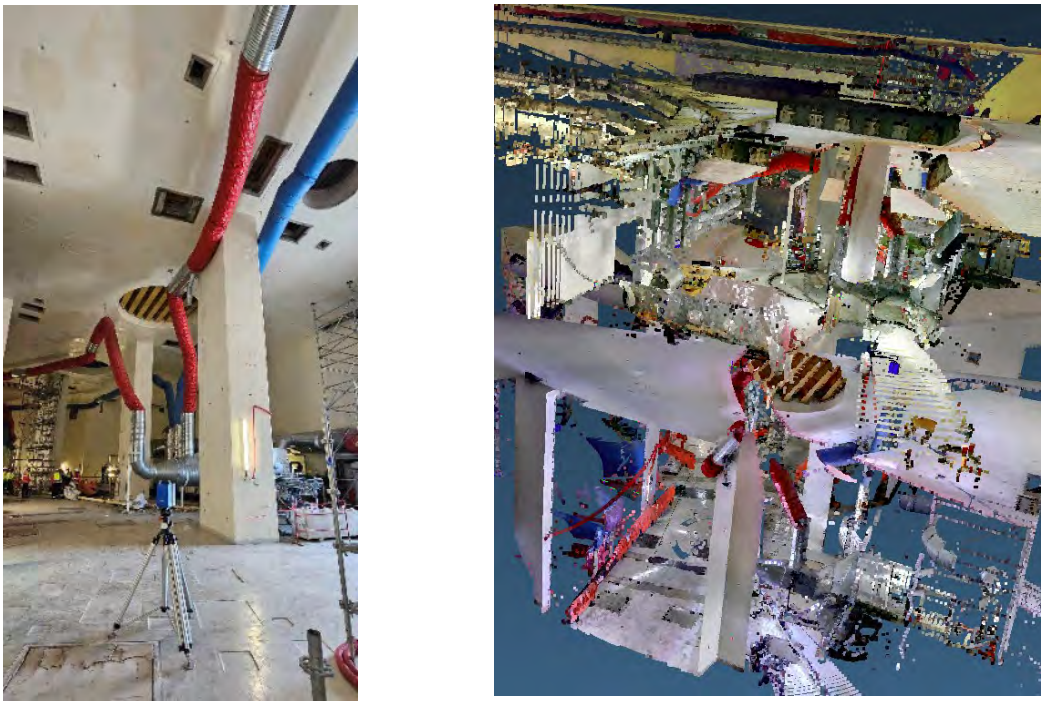


Figure 57: As-Built Reconstruction of NB cell.

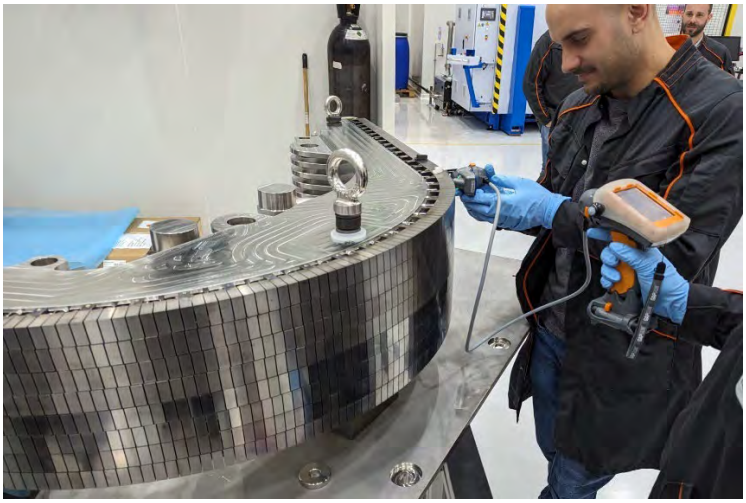


Figure 58: Dimensional Inspection of IVT Gap/Steps.

Figure 59: Geometrical Reconstruction of the VV sector bevel.

Figure 60: Dimensional Inspection of MITICA Vessel.

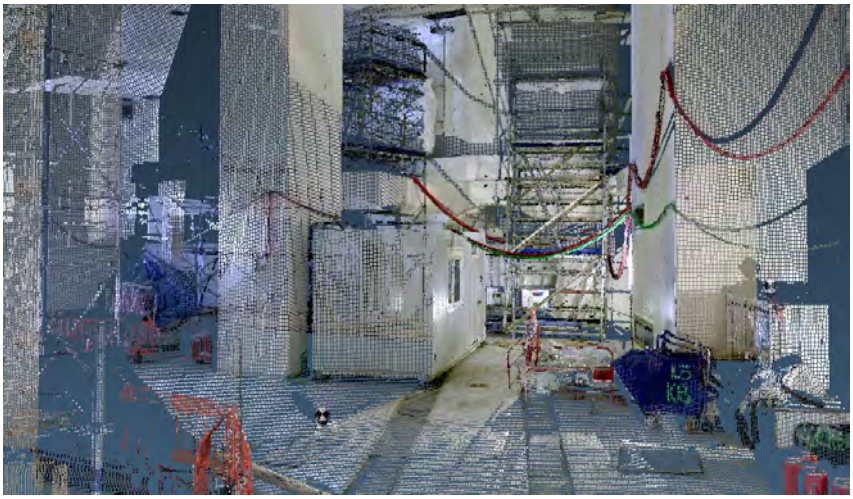


Figure 61: Management of the Plant As-Built data.

1.3.4 Mechanical Engineering

System Design and Mechanical Engineering/Mechanical Engineering Unit: 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.

Mitica:

Delivery on-site and successful SAT of the MITICA Neutralizer and Residual Ion Dump @ Consorzio RFX. A great achievement after more than 4 years of work.

Figure 62: MITICA Components arriving in Padua (IT)

Upper Launcher:

Design-by-analysis of the Upper Launcher and Ex-Vessel Waveguides system ready for FDR, including drafting Analysis Plans and Structural Integrity reports, for the FDR foreseen for Q12025. As well, definition of Interface between JADA's Equatorial Launcher and F4E's Ex-Vessel Waveguides system.

Great progress in the fabrication of the Diamond Disk and definition of strategy to validate the Isolation Valves.

Remote Handling:

DAT (Divertor Assembly Tool)

Re-design of the Divertor Assembly Tool (DAT) for the SRO Assembly: design concepts have been adapted to the actual geometrical configuration of the Vacuum Vessel. Drive Units are at PD level and fully integrated in the DAT CTM. The only tasks currently performed, IB and OB Upper Clamp simplified, Lift Units are at FD level and fully integrated, rescue hydraulic cylinder permanently mounted under/inside lift unit, hydraulic system simplified.

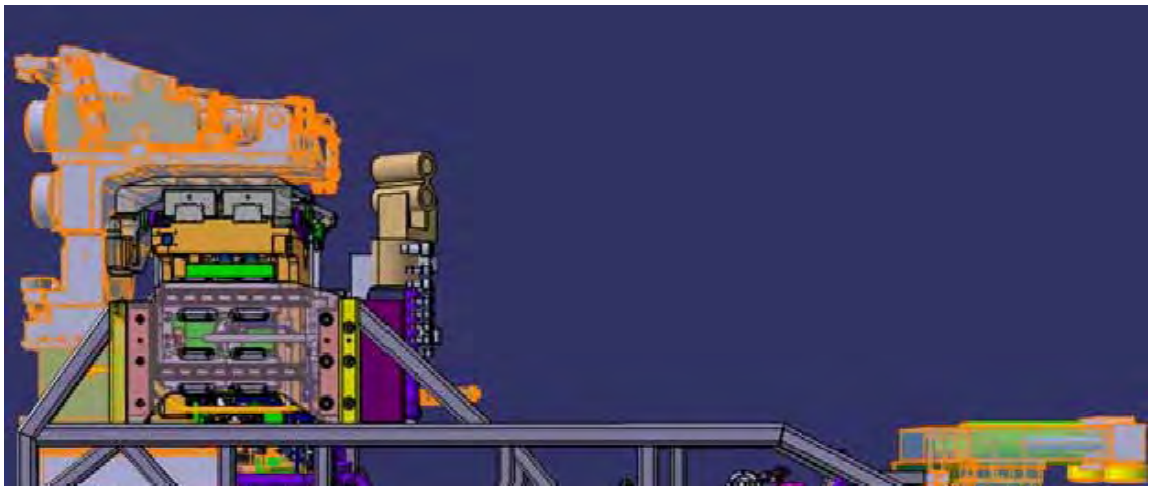


Figure 63: CATIA image of the Divertor Assembly Tool.

IVVS (In Vessel View System):

Design of the support has been completed and test done. IVVS test done to see performance on irradiated components.

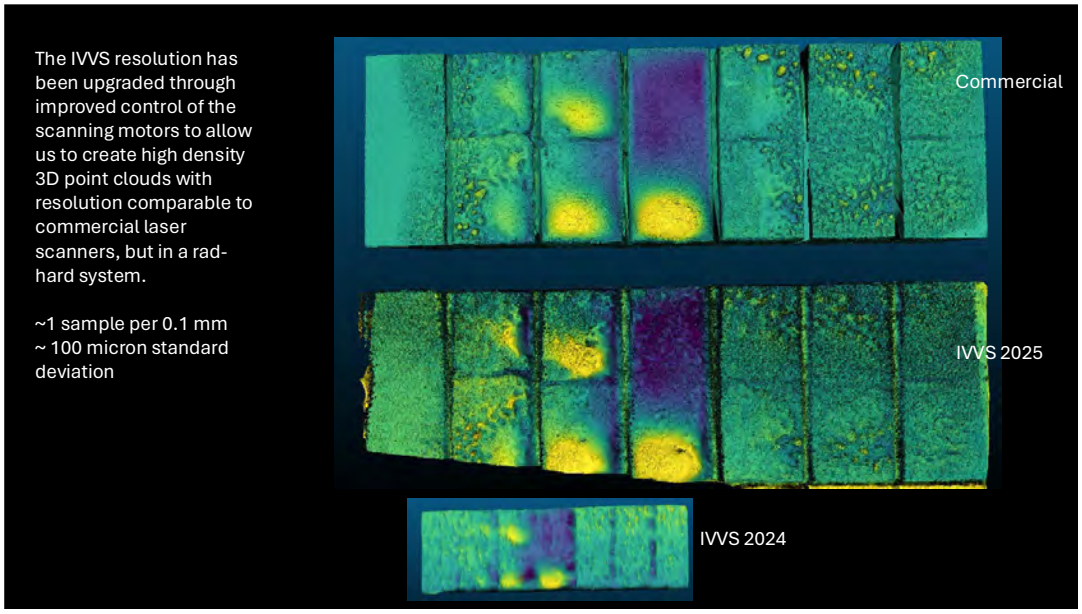


Figure 64: Imagine of the irradiated tales inspected by IVVS.

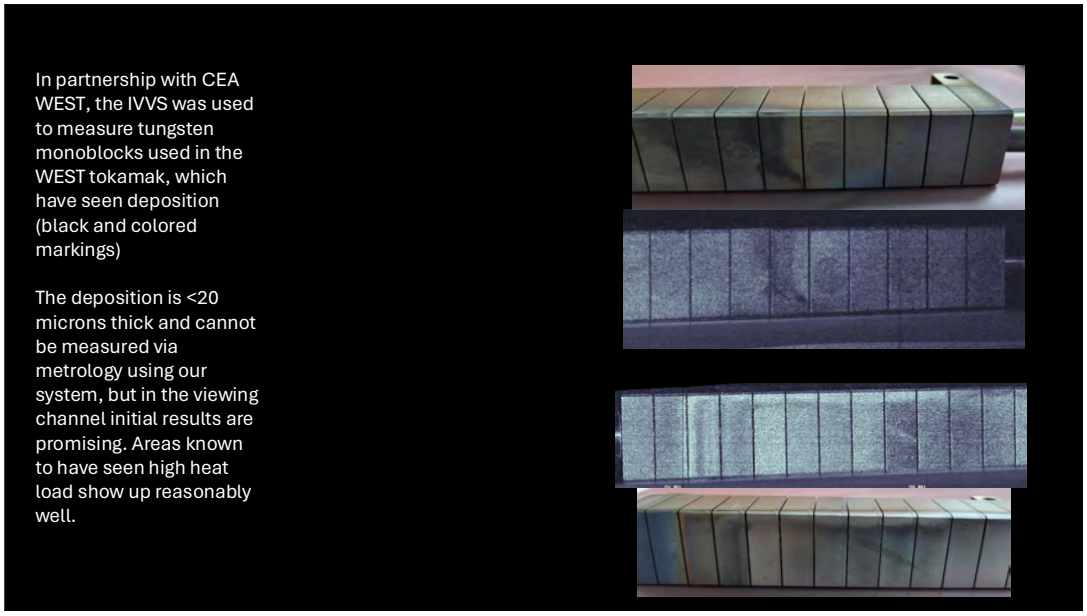


Figure 65: Imagine of the irradiated tales.

Cryoplant:

Developed the Fuel Cycle in Europe, creating a technology breakdown and getting in touch with the most prominent experts in Europe to secure their input and participation in a technology mapping workshop on the topic.

1.3.5 Electrical Engineering – I&C

The Electric Engineering - I&C Unit, 12 F4E staff leveraging four framework contracts, with a total ceiling value of approximately 50 MEUR, has been providing integrated solutions to projects for 15 years.

The unit ambition is to be able to provide a turn-key service to F4E projects. It aims to provide architectural and expert resources to the development and integration of plant system instrumentation, from the conception to the final acceptance.

The activities include 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.

A strong technical conversation with ITER IO is necessary condition to delivering an effective service. Through the mechanism of an ITA the two teams have been focusing at standardisation and adoption of common solutions.

Notable projects include the development of electronics and software for ITER diagnostics, integration into CODAC for the BSM and Fuel Cycle projects, and the design of control systems for EC and NB Plant. Additionally, the unit actively contributes to the Remote Handling program and supports IFMIF EVEDA activities, working on defining their future scope.

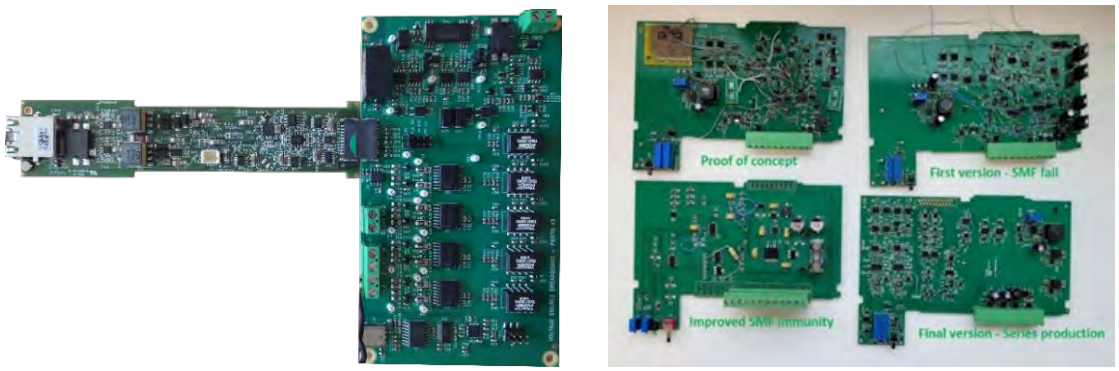


Figure 66: Left, bolometers driver & DAQ functional prototype developed by F4E. Right, Development of a SIL3 signal conditioner for the Hydrogen Monitoring System.

Figure 67: Manufacture of 14 x Control Cubicles (LCCs) and 17 x Pneumatic Enclosures (WMEEn) for Cold Valve Boxes and Cyopumps I&C

On the other side, the Unit also has a clear vision towards the future of I&C ITER control systems that translates into its Technological Development Program, in which standardized solutions, for both software and hardware, are being developed to offer more robust and with longer continuity to ITER I&C systems.

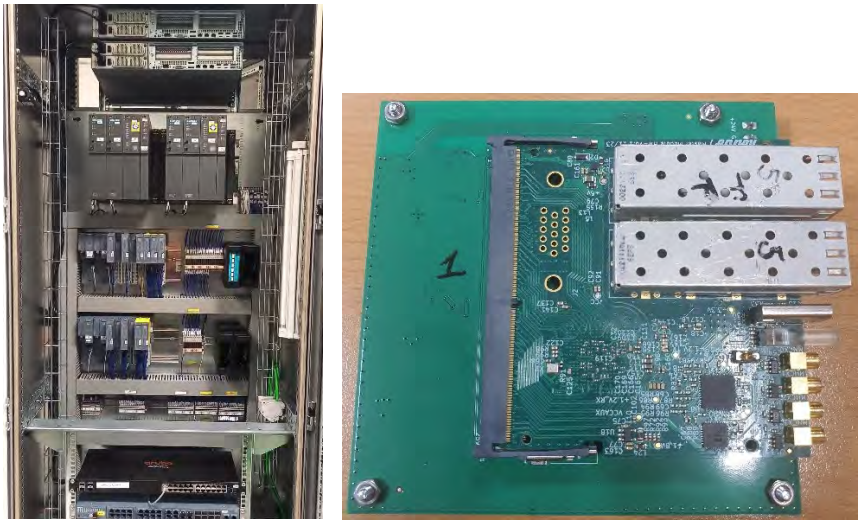


Figure 68: Left, MITICA Central Interlock, delivered to NBTF. Right, Lattice ECP5 FPGA used as part of some of the projects in the Technological Development Program of the Unit.

1.3.6 Engineering Resources Office Cell

Engineering Support Contract: Execution of the Engineering Support Contract signed in 2022 continued during 2024, with more than 120 ESPs providing service to nearly all technical Units and Programmes in F4E. Contract preparation activities started for the renewal of this Framework Contract, which is expected to be signed in the first half of 2025.

Figure 69: Picture taken during a Progress Meeting of Framework Contract F4E-OMF-1159-01-01 with ATG Europe, organised in Cadarache (08/10/2024).

1.3.7 Engineering Processes Cell

During 2024, this cell initiated the identification of the processes and procedures that should define the engineering tasks according to the new organisation and the responsibilities of the new Fusion Technologies and Engineering department. This cell also continued to support Projects Managers in assessing the Technology Readiness Levels of their projects and their development plan

1.3.8 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 2024, this activity mainly covered transportation of non-EU loads and EU-loads between Fos and Cadarache (EU-leg): The TF Transformer (from the Korean Domestic Agency) arrived successfully at the ITER site in January 2024.The first VV Sector #5 from EU DA was transported to the site on October 2024, and the last KO DA Sector #7 was delivered in November 2024.

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 2024.

A new convention for permanent gendarmes was signed to allow the reduction from eight to seven gendarmes and the possibility to use a reserve list in case of need.

In 2024, we negotiated together with IO the extension of the current LSP framework contract as well as the extension of the F4E implementation agreement of this framework contract. We managed to slightly reduce the rates for most activities (-5%). However, the reduction in the number of HEL transports makes the economic model of barging operations unviable for the barging company from 2025. We need to find a solution that guarantees responsiveness and whose price increase is acceptable.

Due to the increase of risks measured by the French Authorities, the Gendarmerie applies stricter rules for the securitization of the ITER transportation convoys and therefore does not accept that HELs or CHELs are grouped in a single convoy. This unfortunately leads to increase costs.

Figure 70: KO-DA VV #7 Barge transfer from Fos Darse Sud to Berre LDB

Figure 71: EU DA VV Sector #5 Direct delivery from vessel to 22x4 self propelled trailer.

1.3.9 RAMI Cell

Reliability, Availability, Maintainability and Inspectability (RAMI)

RAMI activities are a continuity tasks at F4E to assure support to F4E teams as well as F4E suppliers in the appropriate preparation and management of mandatory RAMI files (Functional Analysis, FMECA and Reliability Block Diagrams). These files are mandated by the ITER RAMI Analysis Programme (AD file). RAMI analysis is a specialized engineering discipline and there was the need to provide transversal support to all programs as well as to build a capacity together with key industry stakeholders (common methodology, assumptions, interpretation of results). The RAMI Cell support is intended at guaranteeing that the files do comply with RAMI requirements and good practices before delivery to ITER IO for final acceptance. For this purpose, RAMI cell assures the F4E RAMIO role in the sign-off policy, reviewing all RAMI deliverables and supports F4E suppliers in the rightful application of ITER RAMI Analysis Programme during preparation of those files via ad hoc meetings. RAMI Cell promotes the focus on availability aspects during design to mitigate failure risks occurrence and impact, and their impact of ITER schedules operation and research plan.

1.3.10 TECHNOLOGY DEVELOPMENT PROGRAMME (TDP)

This new F4E Programme was launched in 2024 as one of the implementation branches of the F4E Industrial Policy in line with the Governing Board's mandate. It also fulfils F4E's renewed vision for playing a fundamental role in supporting Fusion European Supply Chain and ensuring its competitiveness in the promising fusion energy sector. It has a broad and strategic scope to support both the technology needs of F4E projects, and the technological demands recognized in the roadmap to fusion power plants, mitigating risks associated with future European fusion endeavors.

The Technology Development Programme aims to regularly identify and assess the fusion key enabling technologies (critical technologies mapping and roadmapping workshops) and support European industry to develop and test those technological capacities for ITER, DONES, DEMO and other fusion projects of European interest (R&D contracts on priority critical technologies). Its focus is currently set at intermediate Technology Readiness Levels (TRLs) in order to bridge the gap between academia and industry scope of work.

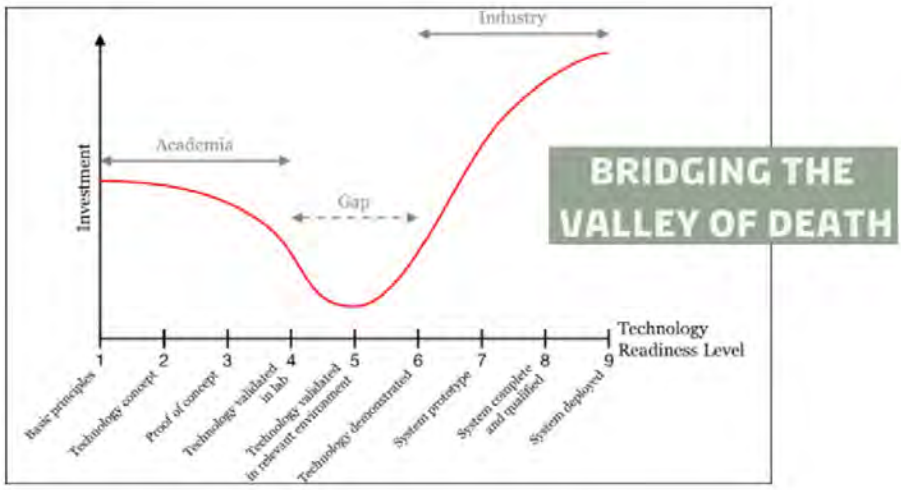


Figure 72: F4E TDP to bridge the Technology Development gap between Academia and Industry

In preparation for a full Technology Development Programme, an initial TDP Pilot work program to assess overall concepts and implementation tools was launched in 2024, including a double Call for Proposal for the signature of five R&D contracts linked to two key technological domains (high tech materials/advanced manufacturing & Tritium Operational Safety). Lessons learned during preparation, tendering and implementation shall be captured and exploited during next action campaign in 2025 that shall address a wider number of activities. The TDP shall reach a full steady state level in the coming years, as resources and budget allocated to it are being allocated.

The Technology Development Programme represents F4E's commitment to foster a culture of excellence and innovation. By focusing on key enabling technology development, we are ensuring that F4E remains at the cutting edge of fusion technology, contributing to a sustainable energy future and reinforcing Europe's leadership in this transformative field.

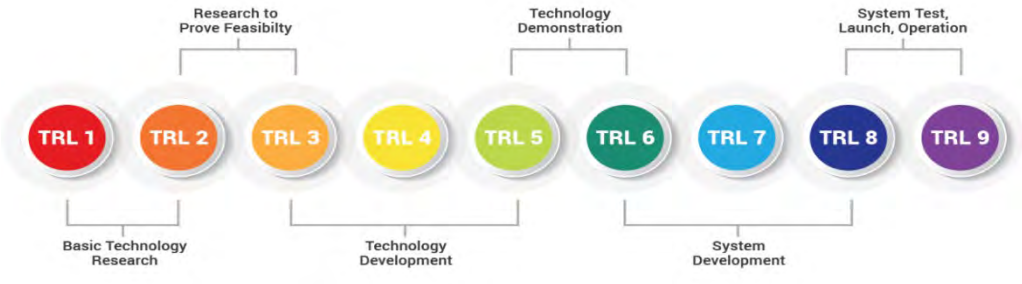


Figure 73: Focus of F4E TDP on intermediate TRL

ANNUAL OBJECTIVES				
Milestone ID	*Scope Description*	*Forecast Achievement Date*	*Type of Milestone*	*Status end Decembert 2024*
EU.ES.01.99200	Published Call for Tender for Provision of CAD Design Support Services	Q2 2024	WP24 objective	Achieved
EU.ES.02.95640	FWC OMF-1674 for Provision of Support in the Area of Nuclear Analysis signed	Q4 2024	WP24 objective	Achieved
EU.NS.01.35080	Framework Contract F4E-OMF-1532 signed for Nuclear Safety Inspections Support	Q2 2024	WP24 objective	Achieved
EU.PE.6103150	Amendment Signed for Plasma Engineering Studies Part I – Modelling for load specifications	Q3 2024	WP24 objective	Achieved
EU.PM.3142420	FWC F4E-OMF-1544 signed for Quality Control Inspectors for Protection Important Components (PIC) of ITER Project	Q2 2024	WP24 objective	Achieved
EU.TR.406040	Task Order Signed for TO 20 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2024	WP24 objective	Achieved
EU.TR.406280	Task Order Signed for TO 21 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2024	WP24 objective	Achieved

Table 15: FuTED – Annual Objectives presented in the F4E Work Programme 2024
Transportation is no longer part of FuTED, but it was initially part of work program 2024.

1.4 Project Performance

This section is added to the CAAR to ensure that it satisfies the requirements of the 2010 and 2018 Council Conclusions in which F4E is requested to provide a report to the Council

1.4.1 Schedule Performance

1.4.1.1 Background

In June 2024 ITER Organization presented a proposal for a new project baseline, prioritizing start of substantial research operations including deuterium-deuterium fusion operation in 2035 followed by full magnetic energy and plasma current operation. The proposal was further evaluated by ITER Organization (including schedule and cost implications) and discussed again at the ITER Council in November 2024. The ITER Council supported the use of Baseline 2024 by the ITER Organization, together with the Domestic Agencies, as a working plan for progress monitoring and operational management this year.

1.4.1.2 F4E Milestone Performance

Using a basket of **milestones** F4E's performance in delivering in-kind contributions to ITER is monitored. This includes major delivery milestones as well as internal milestones related to e.g. procurement. Fig. 17 shows a month-by-month comparison of actual milestones achievement (blue bar) against the plan (grey line).

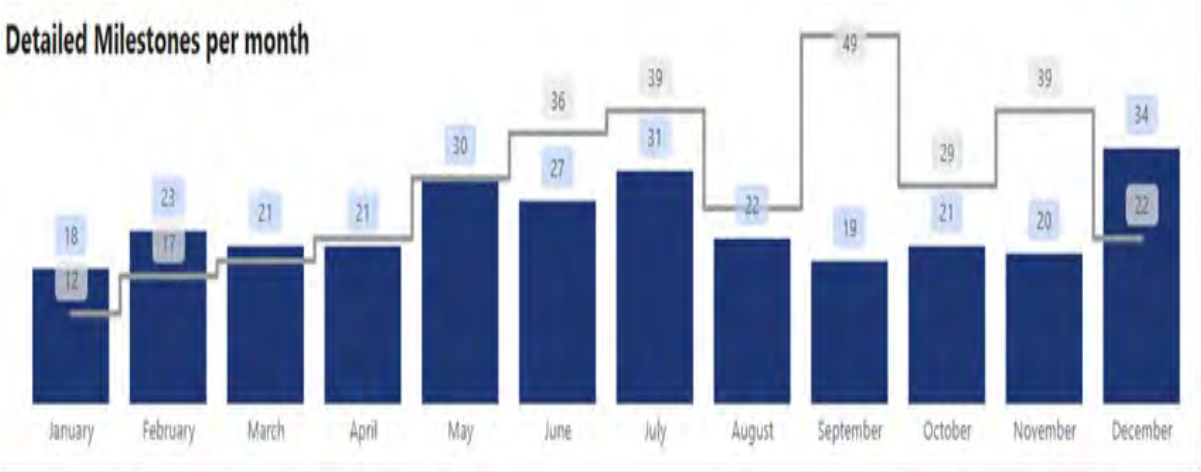


Figure 74: Monthly achievement of milestones related to F4E's in-kind contributions to ITER

In 2024 F4E added to the internal milestones of **Milestone Schedule Performance Index (M-SPI)** joint F4E/IO milestones, as a means of sharing F4E and IO objectives and expand collaboration between F4E and IO.

The M-SPI provides a metric for actual achievement of the milestones each month against the plan with 100% representing an achievement of all planned milestones. Fig. 17 shows the M-SPI evolution during 2024 in which culminated in ending with **84%** compared to a target of **80%** with a strong increase in milestone delivery in December 2024.

This represents a significant improved from **67%** M-SPI achieved in 2023.

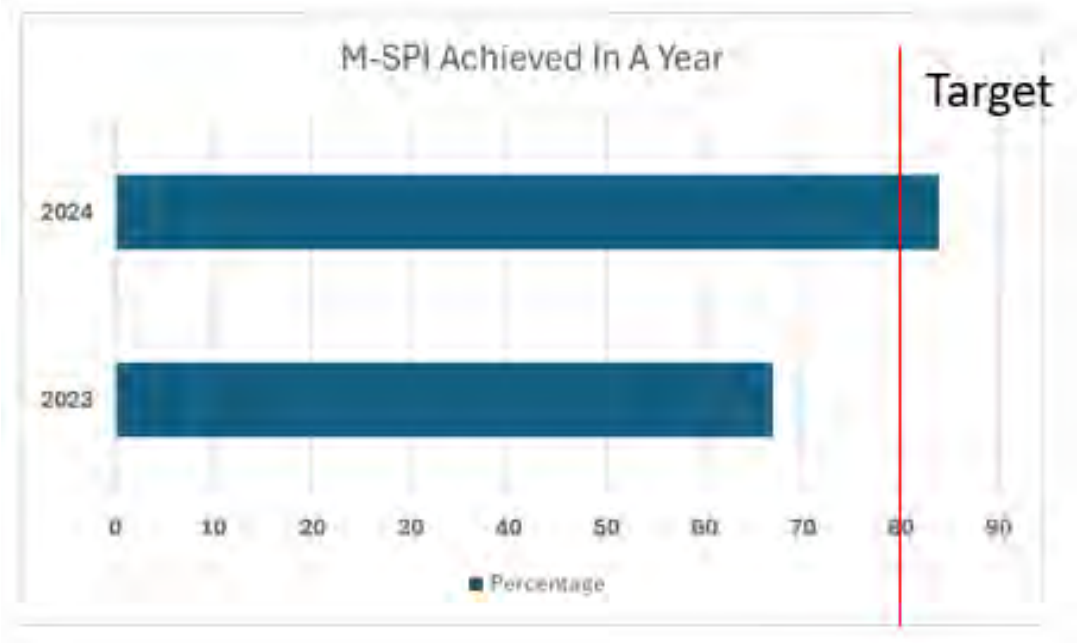


Figure 75: F4E's Schedule Performance Index (M-SPI) for 2024 & 2023 (100% means achievement of all planned milestones)

Detailed analysis of all F4E programmes showed significant improvement in M-SPI for all of them.

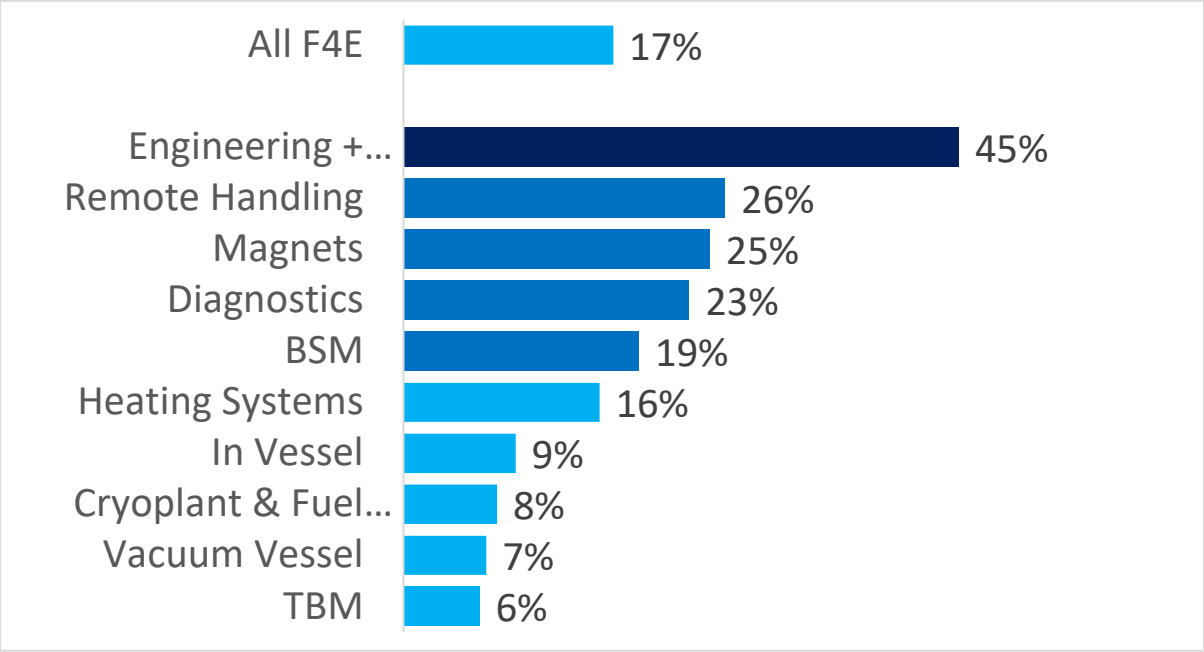


Figure 76: F4E's Schedule Performance Index (M-SPI) improvement in 2024 compared to 2023

1.4.1.3 F4E Earned Value Performance

During 2024 ITER Organization constructed a new working ITER project baseline. This baseline has been used by F4E to elaborate F4E baseline in line with the new ITER project baseline. At present F4E systems are in the process of being updated with an aim to create F4E Earned Value System to measure F4E performance against the new ITER baseline. F4E Earned Value Management reporting will resume in the next edition of this document.

1.4.1.4 BA Earned Value Performance

In the initial phase of the Broader Approach Projects (BA Phase I), contributions to were formalised under Procurement Arrangements between F4E and the Japanese Agency (QST), which in turn were backed predominantly by Agreements of Collaboration between F4E and institutions chosen by the Voluntary Contributors. For the activities where Voluntary Contributors were providing hardware, F4E contributed through its own budget to quality assurance, transportation of components to Japan and integration on site in Japan.

During the current phase of the BA projects (BA Phase II), while some PAs are run in the same way as during BA Phase I, the hardware is predominantly provided through direct contracts placed by F4E. In the preparation and implementation of these contracts, F4E is supported by EUROfusion physicists and engineers.

The final PA under BA phase I was completed in 2024, and we now move entirely to BA phase II.

The accounting of contributions is tracked by an **Earned Value Management** approach using credits (Broader Approach Units of Account). The three Projects use as key performance indicator the ratio of credit awarded under the Broader Approach Agreement to credit planned at that date (fig. 24). It is important to note that the JT-60SA project suffered from a major setback at the beginning of the BA Phase II period. All of the milestones were pushed back as a result of the major repairs that were required on the machine from that time. A re-baselining of the overall project schedule which will affect all of the milestones is currently underway.

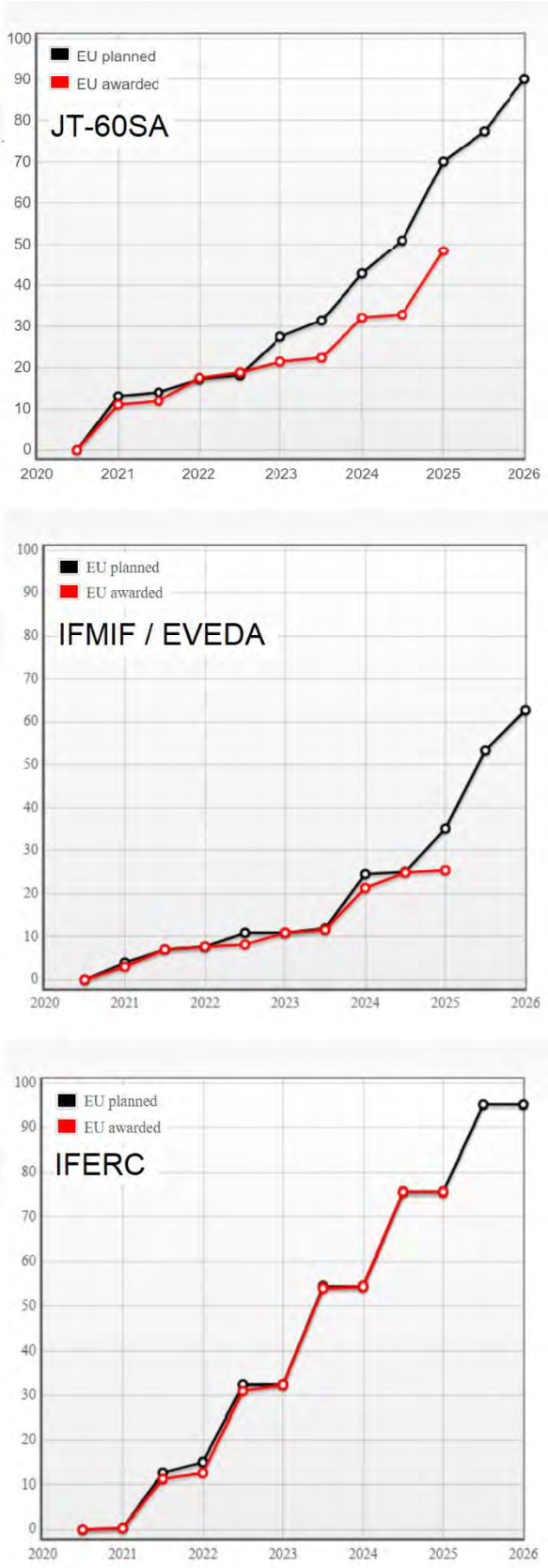


Figure 77: Earned Value for the three Broader Approach projects showing awarded (red line) compared with planned (black line)

1.4.2 Cost Performance

1.4.2.1 Introduction

F4E's costs are mainly associated with the EU's contribution to the ITER project and consist of two major elements:

1. Costs incurred directly by F4E for components and buildings as **in-kind contributions** (~47% of F4E's total costs)
2. Cash contributions (~39% of F4E's total costs), which are:
    a. **To the ITER Organization** for the European share of the costs of the ITER Organization and procurement under ITER's direct responsibility. During the operation phase of ITER Europe contributes 34 % to the overall costs and 45.46 % during the construction phase.
    b. **To Japan** according to the ITER Agreement, corresponding to a 10% transfer of procurement responsibility from Euratom to Japan under the supervision of the ITER Organization.

In addition to the above, F4E has costs of ~14% for the **Broader Approach, IFMF/DONES, TBM, TDP (Technology Development Programme) programmes** and the **running costs of F4E**, for the management of the programmes and projects.

1.4.2.2 Overall Cost Estimates

The **Estimate at Completion (EAC)** combines past actual costs and future estimated costs (including the likely impact of future risks) for the completion of F4E's ITER responsibilities until end-2042. This comprises the costs two phases of the ITER Project: Construction and Operations. The costs after 2042, excluded from the EAC, are the Deactivation costs and Decommissioning Phase costs.

F4E calculates the EAC monthly at the same time as the risk updates. F4E complements this monthly update by biannual "deep-dive" reviews to assess in more detail the quality of the cost estimates underpinning the EAC and the assumptions. F4E's management monitors the EAC each month via Project Steering Meetings. F4E presents the EAC at each biannual Governing Board meeting to the Member State representatives.

When the EAC for a given programme or project is in excess of the allocated budget, then the responsible team has the objective to reduce their cost estimate to respect the budget. F4E management controls the budgets for programmes and projects under a strict change control process to ensure that the total budget it not exceeded.

The F4E systems are currently being updated and EVM reporting on the new ITER baseline will occur from the next edition of this document.

As part of reflection of the new ITER baseline in F4E EAC, the EAC reporting window has been extended until end-2042.

The value of F4E EAC as of end of 2024 stood at 17.6 B Euro (2008 conditions) (excluding post 2042 deactivation and decommissioning costs).

EAC as of December 2024 indicates ~3B Euro (2008) increase compared to December 2023.

The main driver of the increase is the reflection of new ITER baseline in IO and F4E EAC at ~2.6B Euro (2008). Out of 2.6B Euro (2008) EAC increase due to ITER re-baselining, 2.1B Euro (2008) is attributed to increase of Cash Contribution to IO and 0.5B Euro (2008) is driven by the impact of re-baselining on F4E in-kind contribution to ITER and including cost of staff from 2036 to 2042 due to re-baselining factors.

Additionally, EAC has increased by 0.4B Euro (2008), driven by reflection of Technology Development Programme and re-estimate of Remote Handling Programme.

1.4.2.3 Cost Containment Measures

F4E has implemented the following actions to **contain the cost**:

Since 2016, F4E's management reinforced the review of specific critical projects through a monthly **Project Steering Meeting (PSM)**, mainly focussed on both schedule and cost. Milestone trend analyses, Earned Value Management, schedule performance index, budgetary data as well as the cost estimate at completion, risks and issues are presented and discussed in depth and translated into concrete decisions/action

- **Senior Management continues to be directly involved in the solution of critical issues**, in particular for the most critical projects such as the Buildings, Vacuum Vessel and Magnets, where F4E has implemented risk mitigation actions with the contractors.
- A **close follow-up of the risks** in the projects has allowed F4E to detect and tackle potential critical situations, to avoid over costs and/or delays which may affect the EU deliveries at a later stage.
- F4E is continuing to work to **reduce the cost of future in-kind contributions** along several axes**:**
    - Liaison and interaction with the ITER Organisation to reduce design complexity wherever possible.
    - Use of prototyping to reduce development risk.
    - Within staffing constraints, using appropriate contracting approaches to balance the sharing of risks with suppliers, avoiding the need for over-conservative contingencies.

More focus was devoted to the project management aspects to ensure that F4E's industrial partners manage their contracts effectively with the appropriate level of follow-up. More attention was devoted to the profiles of the resources used by the contractor and, in the case of e.g. the Vacuum Vessel, to the coordination and management among the companies in the consortium;

Several additional cost containment measures are conducted such as:

- Performing **Estimate at Completion (EAC) "deep dive" reviews** of all ITER projects to ensure consistent methodology is applied and EACs are of high quality.

- Complementing high-level monthly PSM reviews, bi-weekly **Special Attention Reviews (SARs)** at project level. These anticipate issues and develop recovery plans to put projects back on track.
- **Technology Readiness Level (TRL)**: F4E has adopted the process, templates and forms and used within programme teams. This underpins F4E's estimation of the maturity of project technologies.

Looking ahead, F4E keeps a high priority on cost containment. However, experience shows that risks of cost escalation on first of a kind projects like ITER, are real, and the possibility of further cost increases cannot be excluded.

Part II (a): Management

2.1 Major Developments

2024 has been an important year for the organisation. Some highlights include:

Organisation:

On 1 July 2024, a new organisation structure of F4E was implemented in line with the recommendations of the Governing Board's 2023 ad-hoc group report on the organisation and the 11th annual assessment. One of the main aims was to reinforce the matrix and streamline the organisation with the number of departments reduced from 6 to 4, and the number of units from 25 to 21. This reorganisation, unprecedented at F4E, impacted 26 out of 33 management positions and required a massive wave of selection procedures. To support staff during the transition, internal communication and change management efforts were expanded. A tailored communication plan was deployed alongside HR support services to guide teams and individuals through the new structure.

Governance:

- The Governing Board (GB) appointed Daniel Weselka as GB Vice-Chair and Chair of the Administration and Management Committee (AMC), while Mark Crisp was appointed Chair of the Audit Committee (AC).
- Building on the endorsement of F4E's renewed Vision, 2024 marked the first full year of its implementation, supported by progress in the Technology Development Programme (TDP) and in industrial engagement initiatives.
- The GB encouraged deeper integration with the ITER Organisation and alignment with Europe's evolving fusion strategy.
- The GB closely monitored the roll-out of F4E's new organisational structure, commending the continuity of operations and encouraging transparent social dialogue throughout the process.

Budget and Financial Management:

F4E executed a commitment budget of EUR 811.8 million and payments of EUR 693.7 million in 2024. The implementation rate of commitments stood at 92% and of payments at 93%, an improvement over 2023, despite the continued impact of delays in the ITER schedule update. The administrative budget reached near-full execution with 99.7% in commitments and 92.6% in payments. F4E also introduced a new dashboard tool to monitor execution, forecast estimates, and alignment with the ITER credits.

Procurement:

During 2024 25 operational procedures were launched, 36 operational procurement procedures were awarded and 39 operational contracts were signed, for a total value of around EUR 162 million. For what concerns administrative expenditure, 8 administrative procurement procedures were launched, and 12 contracts were signed, for a total value of EUR 5 million.

Health and Safety:

- On 1 July 2024, the new F4E organisation structure was introduced, establishing a Safety and Quality Unit responsible for managing Occupational Health and Safety (H&S) systems. As a result, the H&S Policy and existing appointments were reviewed. The updated H&S Policy is currently in the approval process, with final approval expected in 2025. Furthermore, all individual occupational risk assessments were revised in the second quarter to align with the new organisational structure. The process is expected to be completed in 2025, pending review by the relevant responsible staff.
- The Safety induction training and General Occupational Risk Outside Offices training were updated for Barcelona and Cadarache and tests were performed to have them delivered in 2025 by the e-learning module.
- Various training sessions were organized to improve H&S knowledge of F4E staff. These initiatives aimed to enhance overall safety and well-being within F4E.

Nuclear Safety:

The Nuclear Safety Unit conducted multiple inspections across ITER component activities. Work continued on enhancing the safety assurance framework in view of the upcoming operational phases of ITER and JT-60SA. F4E also contributed to the development of harmonised safety reporting processes within the ITER-IO integrated project teams.

Internal Audit and Controls:

In 2024 the Internal Audit Service (IAS) concluded two audit follow-ups: one on Project Management of ITER deliverables and another follow-up on the report on Delegations and efficiency of decision making in F4E and cooperation mechanisms with DG ENER. For the former the IAS closed the audit and for the latter remains with open actions.

The Internal Audit Capability (IAC) initiated three main assurance engagements on the Validation of User Access Rights in ABAC and in DACC, the audit of the Magnets Unit – Lessons Learned and the audit of the Diagnostics Programme (in progress at year end). Additionally, IAC performed follow-up activities for seven engagements leading to the closure of 49 out of 70 actions, and the closing of two audits (Broader Approach Agreement, Corporate Governance). IAC's adopted the opinion that F4E's internal control (IC) system is "analysed and managed", meaning that further opportunities remain for control optimisation and integration within the functional area.

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. Some moderate deficiencies were found; however it can be concluded that the system is effective.

European Court of Auditors (ECA):

The European Court of Auditors (ECA) provided reasonable assurance for the implementation of F4E's budget. The ECA's 2023 report included an emphasis of matter section raising awareness on the cost and schedule of the ITER project, on the reorganisation and the impact of international situation, with several recommendations for improvement.

People and Culture Management:

The total headcount by end 2024 was 245 Temporary Agents, 149 Contract Agents, and 37 Officials, representing a slight overall increase compared to the previous year.

F4E successfully met its Governing Board-endorsed gender target of 40% women in senior management positions by the end of 2024. In line with its Strategy on Diversity, Equal Opportunities and Non-Discrimination, F4E maintained regular campaigns marking Women in Science Day, International Women's Day, Disability Day, Pride Day, and International Men's Day, reinforcing its commitment to an inclusive workplace.

The implementation of multiannual and annual objectives set in SPD 2024-2028 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:

Annual objectives:

AREA	Objective	Target	Performance
Overall Costs	Cost estimation for ITER + BA for period up to 2027 should be less than the total budget available for this period.	KPI>1	budget/cost=0.98

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.

Budget KPIs are calculated without additional revenue from ITER IO.

Annual objectives:

AREA	Objective	Target	Performance
Annual M-SPI	Reach a minimum SPI value by end of the year	SPI≥0.8	**0.84**
Annual commitment budget	Implement a defined percentage of Commitment Appropriations by end of the year	90% implementation of commitment	**0.99**
Budgeted forecast of the Work Programme	Implement a defined percentage of allocated commitment appropriation to Work Programme Actions, without reserves, by end of year	95% implementation of commitment	**1.00**
Annual payment budget	Implement a defined percentage of Payment Appropriations by end of the year	95% implementation of payment	**0.99**
Quality – NCR closure time	Ensure Nonconformity Reports (NCR) closure in due time	KPI≥0.8	**0.88**
Quality – NCR closure rate	Close a minimum percentage of NCR annually	KPI≥0.95	**1.07**
Human Resources	Vacancy rate to be less than a defined value by end of the year	Vacancy rate to be less than 4%	**4.8**

Table 17: Annual Objectives.

**Budget KPIs are calculated without additional revenue from ITER IO.*

Comments to table above:

- Annual M-SPI: F4E achieved 84% of the 340 milestones of the 2024 reference representing a 17 point improvement on 2023 Annual M-SPI results. 76% of the causes of delay were due to technical issues, while 23% due to commercial issues.
- Quality: In 2024, the NCR KPI measuring the percentage of long aging NCRs versus the number of open NCRs was 54%. This result is mainly affected by the NCRs coming from the following two programmes:
    - BSM: at the end of 2024, BSM has 127 open NCRs and 70 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 2024, BSM team has managed to monitored the long aging NCR status (older than one year) as mentioned above and to close a high quantity of other NCRs (not long aging). This is why BSM NCR KPI did not improved this year.

  - Vacuum Vessel: at the end of 2024, VV has 202 open NCRs and 148 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 2024 is 92% in commitments and 93% in payments. The main factors impacting F4E's ability to fully execute the 2024 Budget in commitments and payments, were linked to recognition and cashing of assigned revenue from ITER IO, which will be needed in the future for implementing Project Change Requests (PCRs) approved by IO.
- Human Resources: Despite undergoing a major reorganisation and placing strong emphasis on recruiting middle managers, the organisation achieved a significant reduction in its overall vacancy rate—from 6.7% in 2023 to 4.8% in 2024. This improvement represents a notable achievement. Successfully lowering the vacancy rate during a period of substantial internal change highlights the organisation's resilience and commitment to building a more stable and capable workforce.

2.2 Safety

2.2.1 Health and Safety

On 1 July 2024 the new F4E Organisation entered in force, establishing the new Safety and Quality Unit. This unit will be responsible to manage Occupational Health and Safety (H&S) systems, such as risk assessments, investigation of accidents, providing H&S trainings and information, emergency plans, information, and advice about personnel protective equipment.

However, CSU will continue managing the services related to the medical service and wellbeing for the F4E staff in all F4E locations.

Due to this new organisation, a review of the H&S Policy and the existing appointments was conducted. An adjustment of the **F4E H&S Policy** was prepared, where the **Head of Safety & Quality Unit** as H&S Manager Representative takes the responsibilities of the current **Senior Management Responsible for H&S at F4E**.

Regarding the Occupational Risk Assessments, during the second quarter of the year, all individual occupational risk assessments were revised to align with the new organisational structure. This update will be performed in two steps. The first step, completed in 2024, involved the reassignment of staff to their new units following the reorganisation, without changing their individual risk assessments. The second step, scheduled for 2025, will involve reviewing the Occupational Risk Assessments unit by unit, considering the newly appointed Heads of Unit and the new scope of each unit.

Regarding operational processes, in 2024, a few F4E staff members entered radiation-controlled areas at the QST Rokkasho Site. To ensure the health and safety (H&S) of F4E staff exposed to ionizing radiations and comply with relevant regulations, the process was fully reviewed in 2023. Consequently, the Radio Protection Instruction was updated in 2024. Additionally, specific agreements between F4E and QST regarding H&S matters were established and documented in the "Arrangement on the Implementation of Specific Safety Provisions Related to Radiation Protection between F4E and QST.

In March 2024, an instruction was drafted and approved to outline the process for Work Authorisations. This instruction delegates the responsibility of authorizing high-risk activities to the H&S Senior Manager. The high-risk activities identified include:

- Working in Radiation Areas, which poses a risk of exposure to ionising radiation.
- Electrical works or presence in electrical controlled areas, which involves electrical risk.
- Working at height when using a harness, which carries the risk of falls from different levels.
- Beryllium exposure was initially identified as one of the high-risk activities. However, due to the cessation of Beryllium-related activities, no authorisation will need to be issued for this risk at this point.

The coordination between F4E and other companies on H&S matters was significantly improved in Barcelona premises using the Digital Platform of the Building Manager. This allows to manage all the relevant documentation in a fast and efficient manner. The **H&S instruction for Coordination Among Undertakings at F4E Headquarters** was updated consequently in January 2024.

H&S Trainings were organised to increase awareness and improve the H&S knowledge of staff, reducing the risks in activities like Electrical Works, 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

The delivery of Personal Protective Equipment (PPE) to staff has been consistently maintained in accordance with Risk Assessments to ensure their safety. This ongoing effort underscores our commitment to protecting employees by providing the necessary equipment tailored to identified risks, thereby fostering a secure and compliant working environment

In 2024, no incidents or accidents were reported among F4E staff across all working locations, including Rokasho, Naka, Garching, Cadarache, and Barcelona.

Regarding the **F4E Medical Service**, it is to be noted that during 2024 F4E changed its provider for the provision of Medical Advice Services. The successful bidder, GESEME 1996 SL, provides all the services and personnel related with occupational health, such as Medical Advisor, Nurse, On-site Psychologist, Occupational Health Risk Prevention Advisor, as well as other services like the performance of Psychosocial Risk Assessments and First Aid Trainings.

During 2024, before the reorganisation entered into force, two H&S Committee meetings were held (February 29 and June 13).

Despite the transition to new external personnel and the time needed for them to adapt to F4E's internal procedures, a total of **355 annual medical check-ups** were carried out during 2024, representing **81% of F4E staff**. This figure sets a new record for annual medical check-ups performed at F4E. The Medical Advisor also conducted three visits to the Cadarache site to carry out health consultations and annual check-ups for staff based there.

The on-site psychologist service, launched in September 2023, continued to provide one-on-one sessions to F4E staff throughout 2024. This was complemented by a series of psychological talks open to both internal and external personnel. Three sessions were organised: *Stress Management* (held in two separate sessions) and *Dealing with Uncertainty and Continuous Change: Tips, Strategies, and Reflections*, the latter in the context of F4E's reorganisation.

The external on-site psychologist also visited the Cadarache site to conduct in-person sessions with staff based in France and delivered a refresher and feedback session for those who had attended the 2023 Mental Health First Aid Training.

2.2.2 Nuclear Safety

F4E, as a major contributor and the principal external "intervener" in the ITER Project, is responsible for designing, constructing, and delivering safe systems, buildings, and equipment to the ITER Organization.

The primary missions of F4E's Nuclear Safety Group (NSG) within the Safety & Quality Unit are to promote a strong nuclear safety culture within F4E and its supply chain through events and training programs, support nuclear safety-related programs and projects, oversee the implementation of nuclear safety requirements by F4E and its supply chain, and conduct on-site supervisions and inspections as necessary.

Regarding nuclear safety culture, following various internal events in 2021, 2022, and 2023, the focus in 2024 shifted to the supply chain with the F4E Nuclear Safety and Quality Assurance Supplier Workshop, held on April 3 and 4, 2024, at the ITER site. Approximately 100 supplier representatives from 40 Tier 1 contractors participated in discussions on nuclear safety (NS) and quality assurance (QA) management and culture. Additionally, a new e-learning tool on nuclear safety culture has been made available to suppliers.

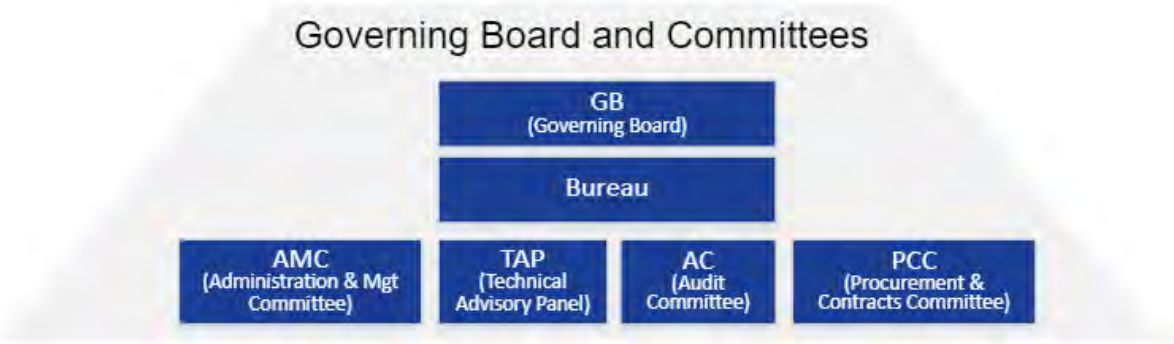
In line with F4E policy, training for F4E staff (both PIA performers and other employees) and external collaborators continued in 2023. As of September 2024, 100% of PIA performers (139) were qualified, while 98% of all other staff (283 out of 289) had completed their training.

The NSG provides expertise and assistance to F4E's programs. In 2024, it led a joint F4E/IO project to simplify and streamline the management of material impurities, which are critical for radiation protection and waste management. The NSG also conducts various inspections during the design and manufacturing phases. In 2024, it reinforced its supervision scheme for nuclear programs, and the team performed 14 nuclear safety inspections. The results indicate that continued efforts are needed to ensure suppliers' compliance with nuclear safety requirements.

The French Nuclear Safety Authority (ASN) also oversees F4E's activities. In 2024, it conducted five inspections at the ITER site, none of which revealed any major issues related to F4E's work. A key milestone was reached in December 2024, when a portion of the ASN Hold Point file (including radiation maps and buildings) was submitted. F4E, in collaboration with its contractors, played a significant role in achieving this milestone.

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 aspects of ITER and other fusion projects under F4E's responsibility. The year was marked by significant progress in F4E's reorganisation, implementation of industrial policy initiatives, and integration efforts with the ITER Organisation (IO). Key strategic discussions focused on adapting to the new ITER baseline, enhancing governance structures, and securing Europe's industrial leadership in fusion technologies.

The main discussions and decisions taken by the Board in 2024 are outlined as follows:

Governance

Following a Decision taken in December 2023, the GB decided to convene for an extraordinary meeting on 12 April 2024 and therefore convened three times in 2024.

Concerning the Technical Advisory Panel (TAP), the GB approved the renewal of Elena Gaio as Vice-Chair until the end of 2025 and the appointment of Joseph Schweinzer as a new TAP member. Additionally, the GB appointed Wolfgang Biel as Chair of the TAP for a two-year term.

In relation to the Audit Committee (AC), the Board appointed Mark Crisp as Chair of the AC, with a call for further nominations to fill an additional AC vacancy.

In December 2024, the GB appointed Daniel Weselka as Chair of the Administration and Management Committee (AMC) and GB Vice-Chair for a two-year term.

Regarding the Procurement and Contracts Committee (PCC), the GB renewed the mandate of Mario Perez as Member of the PCC for two years and as Vice-Chair for one additional year.

F4E's Vision and Industrial Policy

The GB continued to support F4E's strategic vision, endorsing the Technology Development Programme (TDP) as a key driver of innovation and industrial competitiveness. The GB welcomed the expansion of collaboration with European private sector fusion enterprises and the organisation of SME engagement initiatives.

Organisational Optimisation

At its meeting of April 2024, the GB approved the Director's proposal on the improved F4E's organisation and the proposed changes to the organisational structure at the level of departments and final proposal on the allocation of units.

The GB acknowledged the progress of F4E's reorganisation, with nearly all management positions filled by the end of 2024 and a structured implementation of the new organisational framework. Regular updates were provided to ensure that transparency and internal dialogue were maintained throughout the transition.

The GB emphasised the need for maintaining social dialogue and ensuring that the reorganization leads to enhanced operational efficiency, strategic alignment, and improved delivery of F4E's commitments.

F4E-IO Integration

One of the primary objectives 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.

Building upon the F4E-IO Integration Plan, the GB monitored progress on joint programme Key Performance Indicators (KPIs). While positive developments were noted in aligning F4E and IO operations, the GB noted that increased efforts by all Domestic Agencies are necessary to ensure meaningful integration. The Board requested F4E to clarify outstanding integration actions and prepare for a dedicated session with the IO Director-General in early 2025.

Key areas of focus included improving coordination on shared activities, refining the division of responsibilities, and ensuring that integration efforts contributed to cost efficiency and project stability.

ITER Baseline and Budget Implications

Throughout 2024, the GB closely examined the implications of the new ITER baseline noting that the budgetary impact during the current Multiannual Financial Framework (MFF) could be absorbed within the existing allocation. However, risks related to cash contributions, in-kind commitments,

and changes to key project components such as the Hot Cell Facility were discussed for continued monitoring.

A TAP Working Group was tasked with conducting a detailed analysis of the baseline's technical aspects, and the GB mandated F4E to negotiate additional European industrial participation in the Electron Cyclotron Heating (ECH) system and related scope transfers.

Project Planning and Budget

In December 2024, the GB endorsed F4E's 2025 Budget, the Single Programming Document (SPD) 2025-2029, and an early draft of the SPD 2026-2030. Additionally, the Governing Board also adopted two amendments to the 2024 Budget and Work Programme.

2024 Projects Achievements

The GB noted the improvement of F4E's main schedule KPIs and acknowledged the significant progress of F4E's major projects, congratulating F4E for the successful delivery of the first European Vacuum Vessel Sector (S5) to the ITER site.

Annual Accounts and Audit matters

The GB reinforced the importance of timely implementation of Internal Audit Service (IAS) recommendations, particularly concerning the management of External Service Providers (ESPs).

The GB reviewed and approved F4E's 2023 Final Annual Accounts, alongside the assessment of the Consolidated Annual Activity Report for the same year.

The GB also noted F4E's intention to present a revised F4E Financial Regulation and supported further derogations to facilitate integration with IO and enhance European industry's competitive positioning in fusion technology markets.

DONES

The GB maintained strong support for IFMIF-DONES, approving in July 2024 the decision on F4E's financial contribution to DONES of up to EUR 202 million for the construction and commissioning phases.

2.4 Budgetary and Financial Management

This section gives information on the establishment of 2024 Budget, its evolution, and final implementation. More details are available in the 2024 Annual Accounts and in the 2024 Budgetary and Financial Management Report.

2.4.1 Establishment of the 2024 Budget

F4E 2024 Budget was originally adopted by F4E's Governing Board (GB) in December 2023, amounting to EUR 670.3 million in commitment appropriations and EUR 636.7 million in payment appropriations. The budget was modified by F4E GB via two amendments in July and December 2024. The final available appropriations for 2024, including the carry-over from the previous year are EUR 811.8 million in commitment appropriations and EUR 693.7 million in payment appropriations.

2.4.2 Contributions to F4E Budget in Revenue (Payments)

The distribution of the 2024 revenue ensures a fair balance between contributors to F4E budget, in line with their proportional participation during the overall period of ITER construction[1].

The final available appropriations, including the carry-over from the previous year amount to EUR 693.7 million in payment appropriations.

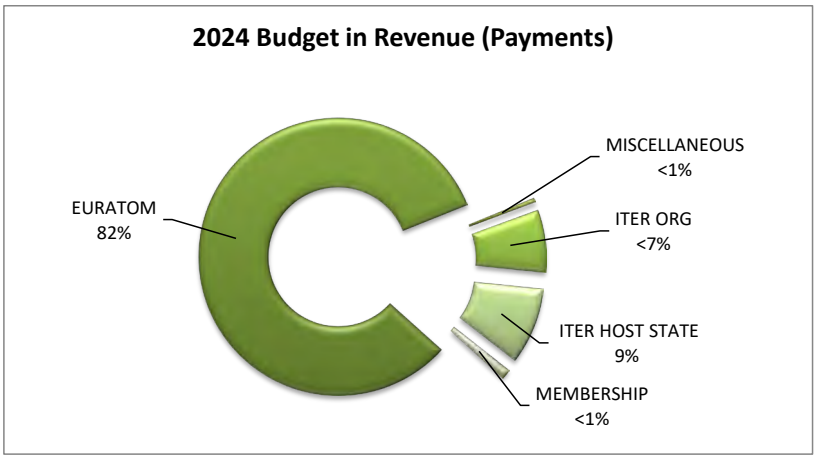


Figure 78: Revenue breakdown in Payment appropriations.

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

2.4.3 Budget implementation for year 2024

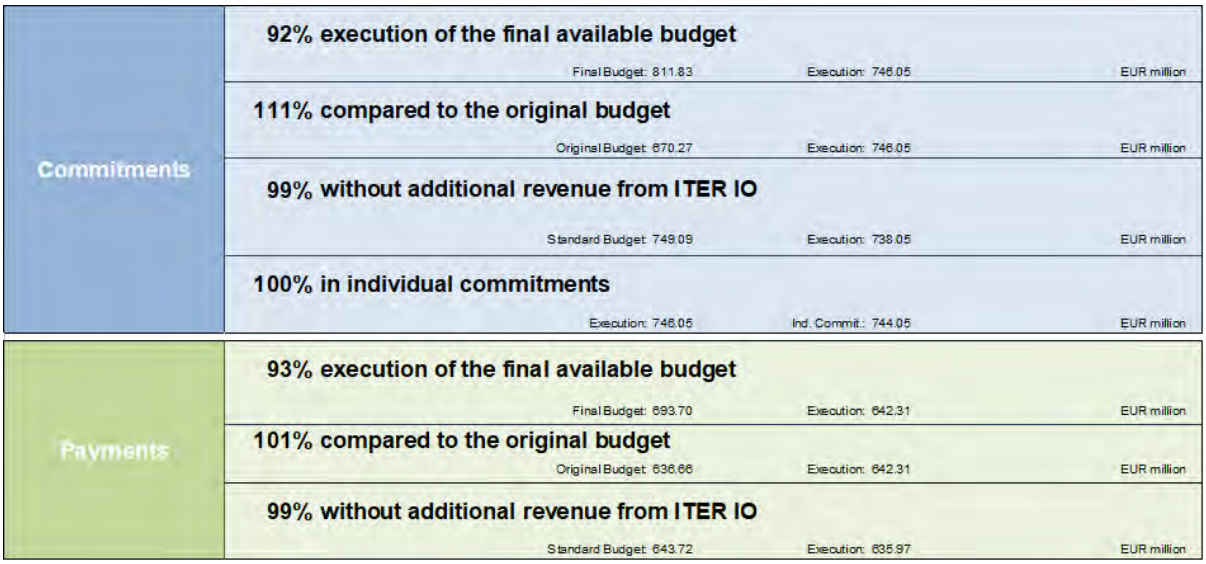


Figure 79: *Budget Implementation in Commitments and Payments*

2.4.3.1 Implementation of the 2024 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 done in 2024 and subsequent payments executed in the next years. In accordance with Article 26 of F4E Financial Regulation, the Director approved in 2024 a series of transfers between Titles 1, 2 and 3 to align the administrative budget to the actual needs and to ensure the highest implementation rate. The execution of the final administrative budget was respectively EUR 77.7 million (99.9 %) of commitments and EUR 76.0 million (91%) in payment appropriations.

2.4.3.2 Implementation of the 2024 Operational Commitments

The Statement of Expenditure[2] for operational commitments was modified by F4E's Governing Board during 2024 via two 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 2024 Work Programme. The final execution of the budget was 92%, of which 99.9% in individual commitments. Expenditure financed by Euratom has been executed at 99% and that of ITER Host State at 97%. Relatively low execution of expenditure financed by ITER reduced the overall execution rate due to related commitment appropriations assigned for needs in the

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

future. One on-going procurement procedure has been globally committed, amounting to EUR 2 million in total.

2.4.3.3 Implementation of the 2024 Operational Payments

Title 3 – Operational expenditure[3] in payments was also amended in 2024 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 93% by the end of 2024. The non-execution is mainly due to assigned revenue 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 2025.

2.4.4 Impact of the 2024 Budget in Commitments

2.4.4.1 Main Commitments

The main operational commitments for the 2024 budget representing EUR 495 million or 74% of the executed operational budget (EUR 668.3 million) were:

Main Commitments	MEUR
Cash Contribution for the ITER Organization	273.1
Architect Engineer Services II	61.3
In-Vessel Targets Pre Series production	57.1
Contingencies for additional scope (TB21)	22.6
Cassette Body acceleration plan	21.1
Vacuum Vessel incentive scheme	18.7
Task Order for Mechanical and HVAC components for B11/B74 (TB21)	12.5
Cash contribution to JT-60	11.8
Task Order for Cable & Cable trays in galleries (TB21)	9.1
Transportation of Vacuum Vessel's sectors	7.7

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

The balance to the executed budget for Title 3 and 4 consisted of 488 commitments for smaller contracts, amounting in total to EUR 173.3 million.

2.4.4.2 Actions Carried Forward to 2025

The F4E obligations amounted to EUR 1 226.8 million at the closure of the 2024 budget, that corresponds to the total outstanding amount on open budgetary commitments, as detailed below:

(EUR)

2024 budget Heading	Open Commitments				
	From previous years (1)	From 2024 budget (2)	Total (3)=(1)+(2)	To be de-committed (4)	Net Total (5)=(3)-(4)
TITLE 1 - STAFF EXPENDITURE	257 505.06	2 223 788.86	2 481 293.92	257 505.06	**2 223 788.86**
TITLE 2 - INFRASTRUCTURE AND OPERATING EXPENDITURE	78 550.64	4 118 961.90	4 197 512.54	78 550.64	**4 118 961.90**
Total TITLE 1 & 2	**336 055.70**	**6 342 750.76**	**6 678 806.46**	336 055.70	**6 342 750.76**
B31 -ITER CONSTRUCTION INCLUDING SITE PREPARATION	449 245 980.34	343 548 807.56	792 794 787.90	0.00	**792 794 787.90**
B32 - TECHNOLOGY FOR ITER AND DEMO	4 586 059.76	6 598 169.11	11 184 228.87	0.00	**11 184 228.87**
B33 - TECHNOLOGY FOR BROADER APPROACH	21 557 052.55	7 477 487.60	29 034 540.15	0.00	**29 034 540.15**
B34 - TECHNOLOGY FOR DONES	0.00	362 982.64	362 982.64		**362 982.64**
B35 - EXTERNAL SUPPORT ACTIVITIES	12 355 081.34	23 498 197.71	35 853 279.05	0.00	**35 853 279.05**
B36 - OTHER OPERATIONAL EXPENDITURE	238 563.90	1 544 651.55	1 783 215.45	0.00	**1 783 215.45**
Total TITLE 3	**487 982 737.89**	**383 030 296.17**	**871 013 034.06**	**0.00**	871 013 034.06
B41 - ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	191 200 957.07	140 929 620.84	332 130 577.91	0.00	**332 130 577.91**
B42 - ACTIVITIES LINKED TO ITER ORGANIZATION	13 208 454.71	4 072 195.40	17 280 650.11	0.00	**17 280 650.11**
B43 - OTHER EARMARKED EXPENDITURE	0.00	0.00	0.00	0.00	**0.00**
Total TITLE 4	**204 409 411.78**	**145 001 816.24**	**349 411 228.02**	**0.00**	349 411 228.02
Total TITLE 3 & 4	**692 392 149.67**	**528 032 112.41**	**1 220 424 262.08**	**0.00**	**1 220 424 262.08**
Total	**692 728 205.37**	**534 374 863.17**	**1 227 103 068.54**	336 055.70	**1 226 767 012.84**

Table 18: Open budgetary commitments at the closure of F4E's 2024 Budget

The open commitments have increased by EUR 32 million in 2024 compared to the end of 2023.

Notes:

- **Title 1 and 2:** Administrative expenditure, carried forward from 2023 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 7.4 million out of the EUR 7.5 million committed globally in 2023 were implemented in 2024 as the on-going procurement procedures have been concluded.
- F4E made use of global commitment in 2024 for a total amount of EUR 2 million, for implementation in individual commitments in 2025. They are included in the total of the F4E obligations/open commitments at the end of 2024.

2.4.4.3 Action Extending for More than One Financial Year

The entire operational budget of F4E consists of differentiated appropriations. About 1394 open commitments positions from the 2024 budget, amounting to EUR 1.218 million, cover actions extending for more than one financial year.

2.4.5 Interest Charged by Suppliers through Late Payments

During 2024, F4E has processed 4 229 payment transactions (excluding salaries). F4E paid EUR 3 654.35 of late interests in 2024.

2.4.6 Procurement Procedures in 2024

In 2024 F4E continued with the focus on the achievement of ITER First Plasma, and it has implemented the vast majority of the procurement and grant procedures planned for ITER components delivery. In addition, F4E has maintained its engagement with Broader Approach activities and has initiated the procurement activity for DONES.

During the year, 25 operational procedures were launched, 36 operational procurement procedures were awarded (including multiple lots) and 39 operational contracts were signed (direct and framework), for a total value of around 162 million euro, covering strategic areas such as Buildings and Site Management (Architect Engineer Services) and In Vessel (Divertor Cassette Body Series).

Of the 36 operational procedures awarded, 3 were awarded following a Competitive Procedure with Negotiation amounting to 91 million euro, 9 were awarded following an Open Procedure representing 50 million euro, 24 following a Negotiated Procedure for a total awarded value of 15 million euro. No Restricted Procedures nor Competitive Dialogue procedures have been concluded by F4E during 2024.

For what concerns administrative expenditure, 8 administrative procurement procedures were launched, and 12 contracts were signed (direct and framework), for a total value of 5 million euro.

Following the renewed vision of F4E, various important achievements were reached this year. F4E's Sustainability Program has been extended to over 50% of its procurements launched, including the operational calls, and a Technology Development Program was put in place with the launch of two procedures foreseeing the signature of 5 contracts. Additionally, the first SME day was organized by F4E in its premises and Integration with ITER IO procurements and contracts teams advanced smoothly with the approval in 2024 of the multiannual WP and identifying potential new joint tenders. Also, in this year there has been a change of the members of the Procurement and Contracts Committee (PCC), including the appointment of the new Chair.

2.4.6.1 Type of Operational Procurement Procedures

A significant share of administrative procurement procedures included ESG considerations in line with F4E's Sustainability Policy

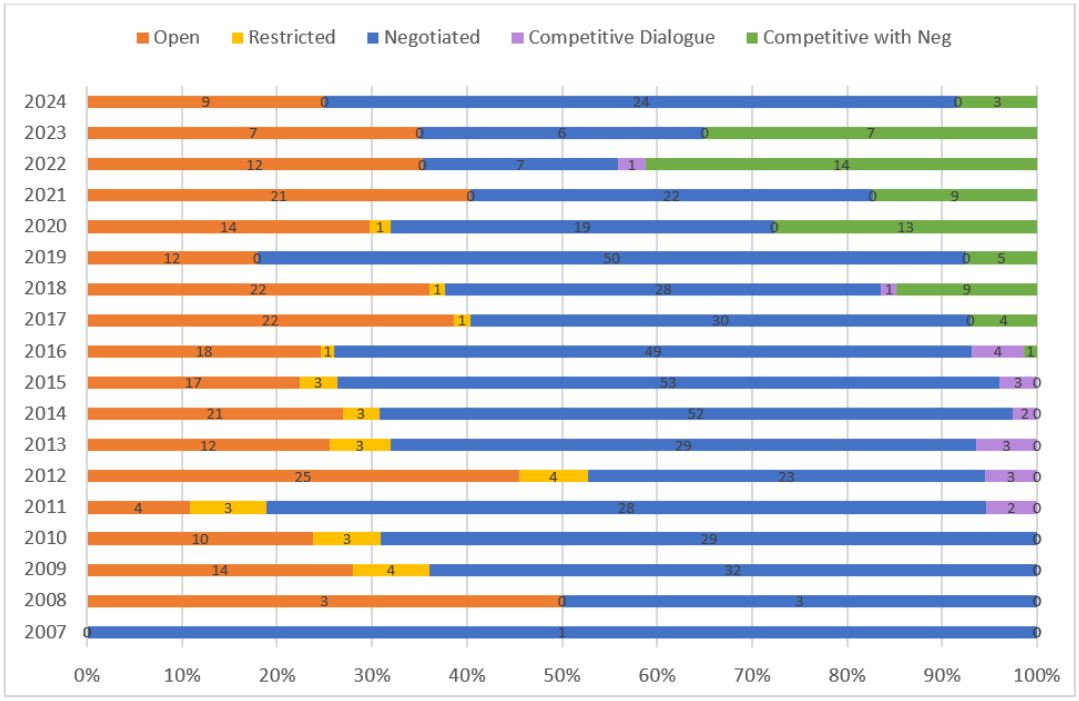


Figure 80: Number of operational procedures (LOT level) awarded by type of procurement procedure.

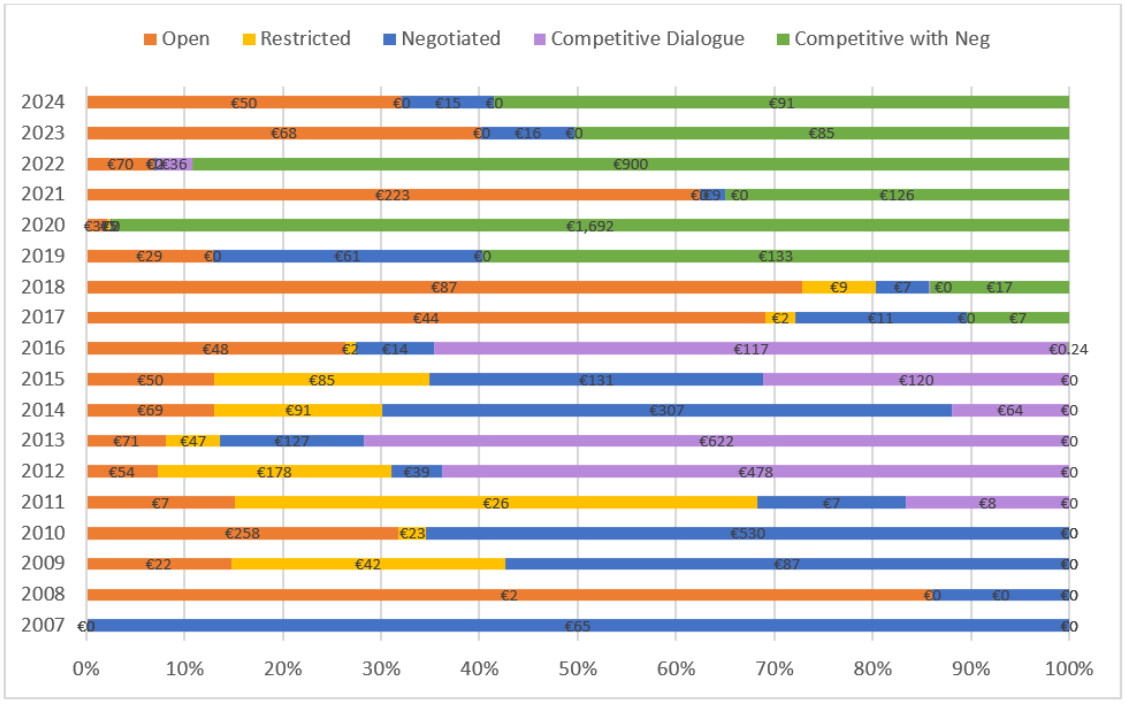


Figure 81: Value of operational procedures (LOT level) awarded by procurement procedure (€ million).

2.4.7 Budget Evolution for 2008-2024

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.

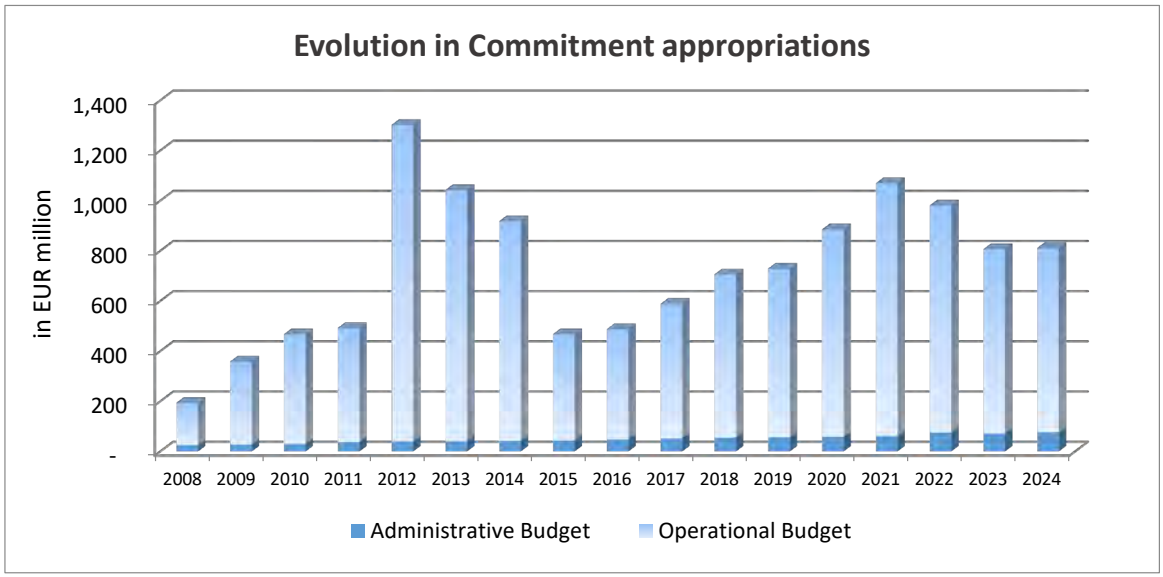


Figure 82: Evolution in commitment appropriations for years 2008 – 2024.

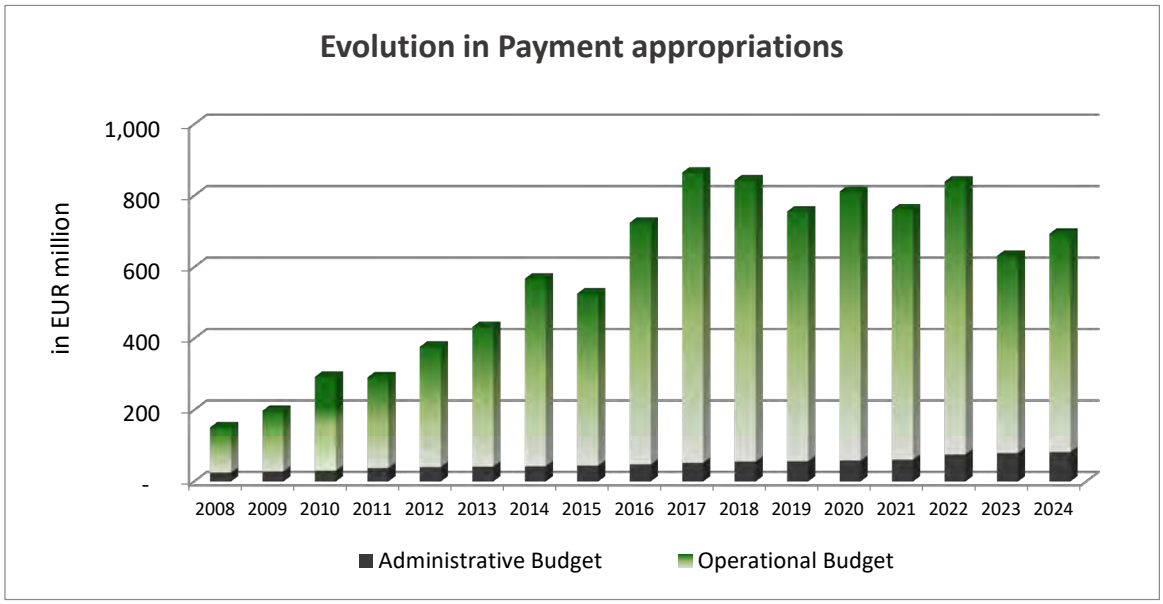


Figure 83: Evolution in payment appropriations for years 2008 – 2024.

Figure 84: Evolution of budget implementation rate for years 2008 – 2024.

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 in 2018, as the operational structure has remained similar. Back in 2022, a consultation exercise with the Heads of Department confirmed the implementation of this approach and the estimated time spent on control activities by each unit was updated to reflect some minor changes. In 2024, the estimated time spent on control activities was revised in accordance with the reorganisation that took place during the year.

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 (1) Operational Control and (2) Internal Control are considered control activities.

The result of this calculation is that out of the 435 staff members at F4E, 80% (348 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 348 FTEs dedicated to control activities at F4E have an estimated cost of **45,593,655** EUR.

In addition to this, F4E made an estimation of the cost of External Service Providers (ESPs) supporting F4E in internal and operational control activities. The amount of these services for 2024 is **25,328,867** EUR. External Service Providers (ESPs) are defined as personnel of external companies that require access to the working tools/environment of F4E staff to deliver the service to F4E meaning:

- permanent access to F4E's office premises; and/or
- login credentials for F4E's Internal Information Systems.

Finally, F4E also calculated the payments made on contracts for audit services, inspection and adjudicators, which resulted in a total of **2,164,933** 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 2024 is **73,087,455** EUR. This represents **9%** of the 2024 executed budget in commitment appropriations (812M EUR) and **11%** of the 2024 executed budget in payment appropriations (694M EUR).

The total cost of control has increased 3 % from 2023 (from 70 685 482 EUR to 73 087 455). Most of this increase is explained by the increase in the cost of control FTEs (F4E staff members carrying out control activities, from 43,998,677 EUR to 45,593,655) due to the increase in the associated costs (as F4E staff numbers have remained stable).

In the previous 3 years, from 2021 to 2023, the costs of controls have always represented 9% of the yearly commitments. These costs are considered as proportionate to the activities F4E carries out, as F4E is mostly managing programmes and projects to procure the different first of a kind 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.

2.5 Delegation and sub-delegation

Delegations and sub-delegations in 2024 followed the organisational structure, with a clear segregation between administrative and operational project management, empowering staff members within their areas of responsibility. During 2024, there were 88 Responsible Authorising Officers (RAOs) in F4E: 1 Authorising Officer, 12 Authorising Officers by Delegation, 33 Authorising Officers by Sub-Delegation and 42 Authorising Officers by Sub-Delegation level 2. Each staff member who received a delegation or subdelegation for the implementation of the 2024 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.

2.6 People & Culture (HR) Management

2.6.1 Major HR Developments

Staff evolution, selections, and recruitment

As at 31 December 2024, the total occupied staff posts at F4E amounted to 438, including 37 Officials, 246 Temporary Agents[4] and 155 Contract Agents[5]. In addition, F4E relied on the support of 14 interim staff (in FTE) and 4 Seconded National Experts. The staff evolution at the end of the year can be seen in the following table:

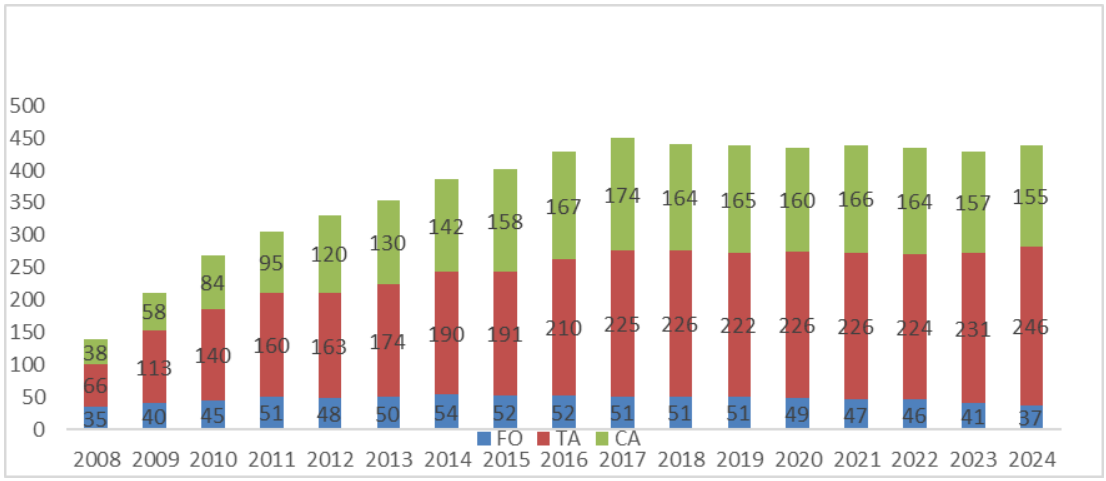


Figure 85: Staff evolution from 2008 to 2024 where FO stands for Officials, TA for Temporary Agents and CA for Contract Agents.

In addition, F4E relied on 313 External Service Providers (ESP). Given the relative size of the ESP complement and the associated business risks (knowledge management, assimilation, value for money, conflict of interest, etc), 2024 has seen the continued development of management systems, tools and procedures to mitigations against the inherent risks of the project's reliance on this external workforce. The main purpose of this on-going effort is to better ensure administrative

[4] Out of which, 1 correspond to a job offer for a newcomer (TA AD)
[5] Out of which, 6 correspond to job offers for newcomers (FG IV)

and contractual alignment, cost containment, accuracy and timeliness of reporting, knowledge retention, conflict of interests' management as well as assimilation.

In 2024, 16 vacancy notices were published externally, including 13 for Temporary Agents and 3 for Contract Agents. A total of 14 selection procedures were completed in 2024, out of which 2 were published in 2023 and 12 published in 2024. Out of the 14 selections completed, 7 were for middle management positions.

As part of the implementation of the 2024 reorganisation, the gender target of 40% for women in senior management was attained, reflecting the organisation's commitment to diversity and inclusivity at the highest levels of the organisation.

The HR/Administration team played a key role in supporting the structural reorganisation effort, particularly in managing the internal mobility and selection procedures that followed. With 26 of 33 management positions impacted, the team ensured all processes were fair, transparent, and efficiently executed. Their responsibilities included coordinating assessments, facilitating timely decisions, and keeping staff well-informed throughout. This support was critical in enabling a smooth transition with minimal disruption to operations.

The introduction of a modernised e-recruitment tool has already shown benefits in the hiring process for both the candidates and the recruiters. The tool enables a reduction in lead times and allows further streamlining of the process. It equally provides a more personalised approach when exchanging with the candidates. While the tool is not yet fully optimised, new key features will be rolled out during 2025, further enhancing efficiency of the process while contributing positively to the overall candidate experience.

In 2024, the average time to recruit was 103 days. For comparison, it was 117 days in 2023. Work in the ambit of selection was most affected by F4E's reorganization, which involved the rehiring virtually all management positions.

A total of 21 newcomers (11 Temporary Agents, 9 Contract Agents and 1 Seconded National Expert) took up duties in 2024. In addition, 13 staff members (12 Temporary Agents and 1 Contract Agent) 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 AD	1 FG II	-
Projects	-	1 AD	-	1 SNE
Office of the Director	-	-	1 FGII	-
Fusion Technologies & Engineering	-	3 AST 6 AD	7 CA FGIV	-
Project Control, Supply Chain & Finance	-	-	-	-

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

Changes to the Establishment Plan during 2024

2 FO AD posts were transformed into TA posts following the departure of two officials. The conversion followed F4E's policy to replace all of its FO positions with TA ones whenever becoming vacant.

Learning & Development

In the ambit of Learning & Development (L&D), F4E continued to leverage online and digital resources, providing staff with flexible access to learning opportunities. A total of 94% of F4E staff members participated in at least one learning activity during the period. The satisfaction rate remained high, with 91% of staff rating the courses as either excellent or good.

Throughout 2024, several corporate initiatives were launched to support F4E's ongoing transformation. These initiatives primarily focused on change management, enhancing communication skills, and fostering mutual trust and respect.

Leadership skills development was made accessible to all staff, regardless of their function or hierarchical position within the organisation. This was achieved by providing curated self-directed learning paths aligned with the F4E competency framework, along individual online coaching in 2024. Additionally, a women's leadership development program was successfully implemented, and attended by 18 colleagues who confirmed the positive impact on their professional growth and leadership skills.

Continuous support was also extended to F4E's pool of internal facilitators, ensuring they possess the necessary skills and methodologies to conduct internal collaborative events. This effort significantly strengthened F4E's internal capability in participatory leadership, enhancing collaboration and knowledge sharing across the organisation.

These positive outcomes are the result of the leadership of the L&D team with an aligned partnership from DTU. Their coordinated efforts in the design, delivery, and promotion of engaging learning initiatives have been instrumental in achieving high levels of participation and learner satisfaction.

Appraisal and Promotions

The 2024 Performance Dialogue exercise was launched on 12/01/2024 and the 2024 Promotion exercise was launched on 15/04/2024 resulting in a timely completion of the Performance Dialogue Exercise.

The 2024 Promotion exercise benefitted from a clear implementation strategy that allowed for alignment and consistency at all levels. Dedicated intranet page was revamped to ensure accessible and clear information related to the process and its implementation. In addition to the communication efforts through the management line and extensive involvement of the staff committee, various information sessions were organised to raise global awareness and understanding on the Promotion/ Reclassification mechanism. All contributed to the timely

implementation of the exercise. The number of appeals fell from 9 to 3 which was the lowest on record. This fall confirms that the approach and strategy are paying off**.**

Traineeship Programme

The 2024 trainee cohort consists of 40 trainees. Out of which 34 are based in Barcelona, 4 in Cadarache, and 2 in Garching. In line with F4E commitment for gender equality, the current cohort consists of 55 % female trainees.

In anticipation of the launch of the call for the 2024/25 cohort, F4E contacted approximately 450 universities to disseminate 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 70 universities expressed a positive response to promoting F4E's Traineeship program. The commitments were ranging from offering to register to the F4E call on the career portals to publishing the call and sharing promotional materials across the social media platforms, newsletters, and other channels.

The communication outreach efforts undertaken in 2024 with key organisations such as CERN, IAEA, EUROFusion, and FuseNet paved the way for future collaboration, fostering a stronger bond within the nuclear community. These interactions laid a foundation for building partnerships that will benefit F4E and foresee an 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.

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 Sklodowska-Curie Fellowship Programme. This agreement with the IAEA was signed in spring 2024 and will attract additional female trainees in the first quarter of 2025.

In March 2024, Fusion for Energy signed an agreement with DONES Xcitech school (University of Granada). Under the scheme, a one-week training for a female candidate is made available. This scholarship was successfully implemented and provision for another scholarship is foreseen for 2025.

Inov Contacto Portugal offers another valuable opportunity for young, recent graduates under 29 with a technical background to participate in a 10-month internship in Big Science Organi**s**ations, such as F4E. This program benefits F4E by bringing talented individuals who contribute fresh perspectives to our projects. The stipend, which covers travel, medical and accident insurance, accommodation, and other expenses, ensures that interns can focus fully on gaining hands-on experience.

The internship allows these young professionals to gain advanced technical knowledge within a professional setting. This experience can be fed back into the Portuguese industry, fostering valuable cross-border collaboration and growth. Three students will start nine-month internships at F4E in 2025. F4E expects further collaboration with other stakeholders to boost capacity for cutting-edge science and innovation.

Diversity

F4E remains committed to promoting a diverse and inclusive workforce. Throughout 2024, the organisation consistently implemented its Strategy on Diversity, Equal Opportunities, and Non-Discrimination. This commitment was underscored through various awareness campaigns celebrating significant dates such as International Women's Day, International Day of Women and Girls in Science, International Day of Persons with Disabilities, LGBTQ Pride Month, and International Men's Day. These observances have become fixtures on F4E's annual calendar, reinforcing the organisation's dedication to diversity and inclusivity.

F4E actively engaged in numerous learning initiatives, addressing unconscious bias, promoting gender and cultural equity, and enhancing gender intelligence, and leadership development efforts. Notably, the first F4E Women Leadership Development Programme, endorsed by F4E Director Marc Lachaise, ran from February 2024 to September 2024. The organisation has witnessed positive progress in gender balance within managerial roles, with women occupying 40% of positions in the Leadership team in 2024 and aims to see an increase in middle management positions filled by female colleagues in the next few years.

Gender /	CA		FO		TA		Grand Total	
Category	Staff	%	Staff	%	Staff	%	Staff	%
Female	**83**	**55.7%**	**14**	**37.8%**	**66**	**26.9%**	**163**	**37.8%**
AD	N/A		8	21.6%	56	22.9%	64	14.8%
AST			6	16.2%	10	4.1%	16	3.7%
GFII	11	55.7%	N/A				11	2.6%
GFIII	44						44	10.2%
GFIV	28						28	6.5%
Male	**66**	**44.3%**	**23**	**62.2%**	**179**	**73.1%**	**268**	**62.2%**
AD	N/A		19	51.4%	157	64.1%	176	40.8%
AST			4	10.8%	22	9.0%	26	6.0%
GFII	2	44.3%	N/A				2	0.5%
GFIII	6						6	1.4%
GFIV	58						58	13.5%
Grand Total	**149**		**37**		**245**		**431**	

Table 20: Gender balance of staff in place on 31 December 2024.

	2015		2019		2020		2021		2022		2023		2024	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Female Senior Managers	0	0	0	0	1	14%	1	14%	1	25%	1	33%	2	40%
Male Senior Managers	3	100%	7	100%	6	86%	6	86%	3	75%	2	67%	3	60%
Total	**3**		**7**		**7**		**7**		**4**		**3**		**5**	
Female Middle Managers	2	8%	4	16%	4	16%	5	20%	5	19%	5	23%	3	21%
Male Middle Managers	22	92%	21	84%	21	84%	20	80%	22	81%	17	77%	11	79%
Total	**24**		**25**		**25**		**25**		**27**		**22**		**14**	

Table 21: Gender balance on Senior and Middle Management.

Geographical balance

Notwithstanding its efforts towards a better geographical balance of its workforce, attainment of this goal remains a challenge. In this respect, the relative over representation of Spanish nationals (37.4%) reflects the location of the F4E Headquarters in Spain. Italian nationals (17.2%) and French nationals (18.6%) 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	8.6%	17	3.9%
Bulgaria	3	0.9%	1	1.0%	4	0.9%
Croatia	1	0.3%		0.0%	1	0.2%
Czechia	2	0.6%	2	1.9%	4	0.9%
Estonia	1	0.3%		0.0%	1	0.2%
Finland	4	1.2%	1	1.0%	5	1.2%
France	64	19.6%	16	15.2%	80	18.6%
Germany	8	2.5%	6	5.7%	14	3.2%
Greece	6	1.8%	3	2.9%	9	2.1%
Hungary	6	1.8%		0.0%	6	1.4%
Ireland	6	1.8%	2	1.9%	8	1.9%
Italy	55	16.9%	19	18.1%	74	17.2%
Lithuania			3	2.9%	3	0.7%
Malta	1	0.3%		0.0%	1	0.2%
Netherlands	4	1.2%		0.0%	4	0.9%
Poland	5	1.5%		0.0%	5	1.2%
Portugal	10	3.1%	1	1.0%	11	2.6%
Romania	7	2.1%	1	1.0%	8	1.9%
Slovakia	1	0.3%		0.0%	1	0.2%
Slovenia	1	0.3%		0.0%	1	0.2%
Spain	123	37.7%	38	36.2%	161	37.4%
Sweden	3	0.9%		0.0%	3	0.7%
United Kingdom	7	2.1%	3	2.9%	10	2.3%
TOTAL	326	100.0%	105	100.0%	431	100.0%

Table 22: Geographical balance on 31 December 2024

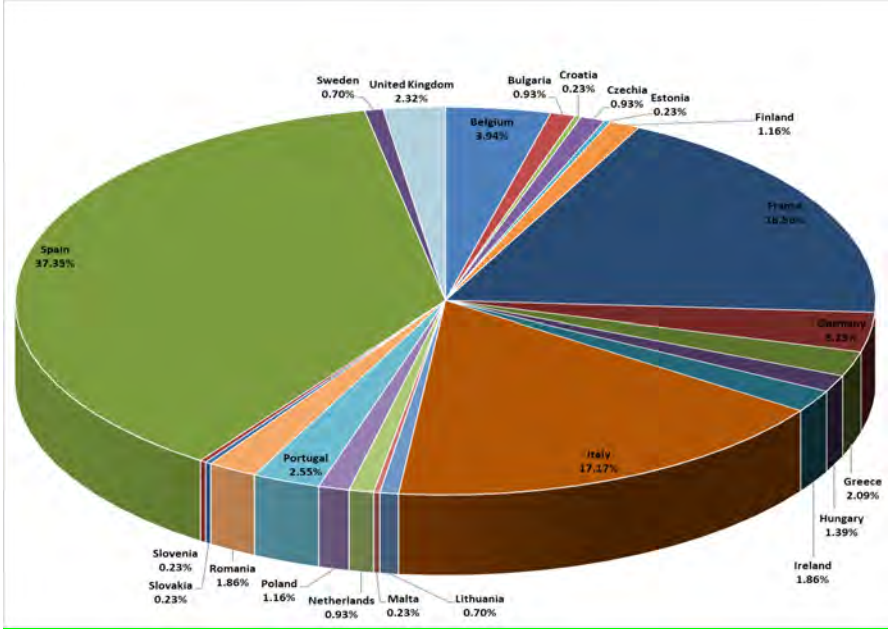


Table 23: Geographical distribution - All F4E staff

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 is a slight decrease of *Top management posts* in favour of more *Programme Management and Implementation* resources.
- 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

F4E manages its corporate improvement projects through the direction of its leadership team, monitoring the improvement results and proposing corrective actions if needed.

F4E uses, between other methods, 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, 32 % of efficiency gain: • Before (2017) = 152 days 2024 = 103 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 below 2M EUR, 37 % of efficiency gain: • Before (2017) = 287 days 2024 = 181 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 following an open procedure below 2M EUR (from award to legal commitment), 37 % of efficiency gain: • Before (2017) = 41 days 2024 = 26 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: • Before (2017) =16 days 2024 = 7 days	Further financial modules are in place in 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 22 %. • Before (2017) = 23 days 2024 = 18 days Reduction of the average time to pay for the 60 days payment type by 19%. • Before (2020) = 42 days 2024 = 34 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, 56 % of efficiency gain: • Before: 90 days End of 2024: 40 days	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.

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 carried out an audit on Human Resources Management and Ethics.

Audit on Human Resources Management and Ethics

The objective of the audit was to assess the adequacy of the design of the internal control systems put in place by F4E in managing its human resources and promoting an ethical environment in compliance with the applicable EU rules, as well as to assess the adequacy and effectiveness of the measures for ensuring staff wellbeing.

The scope of the audit covered the design and implementation of the different sub-processes of HR management and ethics such as the comprehensiveness of the HR implementing rules, policies and procedures in place, the set-up of the HR function, the assessment of HR needs and planning of human resources, the use and monitoring of the use and performance of ESPs, the selection and recruitment procedures, the appraisal process, the career development of staff, the ethics framework, and the measures for ensuring staff wellbeing.

The auditors recognised the ongoing efforts and actions pursued by F4E to improve staff wellbeing. To this end, F4E has taken steps towards closing the gap in mutual trust between staff and management by encouraging and supporting F4E staff to participate in the identification of the problems and the development of workable solutions, together with the management. F4E has successfully implemented measures for psychological support of staff (helpline, on-site and video consultations, advice on psychological matters for managers and HR staff), provides related trainings (on stress awareness, compassion and mindfulness) and organises mental health campaigns.

The audit was concluded in January 2024 and the IAS issued concluded with 5 recommendations, 2 of them Very Important, in the areas of (1) Human Resources strategy and Human Resources needs assessment at F4E's level and (2) Use of External Service Providers (ESP) and 3 Important recommendations, in the areas of (3) Appraisals and Promotions, (4) Recruitment and Selection process and (5) Change Agenda.

F4E prepared and action plan agreed with the IAS that included a total of 20 actions in response to the above recommendations. The current target date for implementation of the action plan is September 2025.

Annual Report of the IAS

Article 78(7) of the F4E Financial Regulation[6] 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 did not issue this report for 2024. In February 2025 it finalized a follow up on the Audit on Delegations and efficiency of decision making at F4E and on the Audit on Human Resources management and ethics. Based on the results, the IAS concluded that the 2 remaining recommendations for the audit on Delegations and efficiency of decision making and recommendation 4 of the audit on Human Resources management and ethics have been adequately and effectively implemented and were therefore be closed.

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

2.8.2 Internal Audit Capability (IAC)

In 2024, 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 the Magnets Unit – Lessons learned (initiated in 2023)
- the audit of the Diagnostics Programme (in progress as of year-end)

The Validation of User Access Rights in ABAC and in DACC resulted in 23 observations leading to 5 recommendations.

Additionally, IAC performed follow-up activities in 2024 for seven engagements (Broader Approach Agreement, Ecosys, Nuclear Safety, Vacuum Vessel Contract, Corporate Governance, Digitalisation and Cybersecurity, Administrative Procurement and Contract Management), leading to the closing of 49 actions out of 70 reviewed, and the closing of two audits (Broader Approach Agreement, Corporate Governance).

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".

6 https://industryportal.f4e.europa.eu/mainmenu/how-to-do-business/procurement-documents\

An external quality assessment of the IAC's conformance with the IIA Standards was performed and resulted in the opinion that IAC "Generally Conforms" with IIA Standards. The detail results were presented to the Audit Committee, as well as an action plan to address remaining areas of progress.

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 2024, the European Court of Auditors (ECA) adopted the final Annual report on the EU Joint Undertakings for the financial year 2023.

The ECA 2023 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. Finally, Chapter 3 contains, for each of the 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 2023 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 2023 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 sub-section 'Emphasis of Matter' raising awareness on the following:

- 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 €21.2 billion (in 2023 values), pointing out that the 2023 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.
- introductory part of the F4E JU's 2023 annual accounts that states that the new F4E director – nominated in May 2023 - was asked by the F4E Governing Board to reorganise the current F4E

organisational structure to become more efficient and better suited to achieving its present and future objectives, including those relating to the future ITER baseline.

- point d) of the introductory part of the F4E JU's 2023 annual accounts: "Impact of international situation", which describes the significant and protracted inflationary impact on F4E's operations due to supply chain issues triggered by COVID-19 and the war of aggression against Ukraine. The F4E JU estimated that the total impact on its estimate at completion will amount to €258 million (at 2008 values).

The ECA concludes that their opinion is not modified in respect of these matters.

Observations of current and previous years

The 2023 ECA report contains 15 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 2023 report also maintains as on-going one observation from 2019, one observation from 2021, and 3 observations from 2022.

The following table provides an overview of the status of these observations at the end of 2024:

ECA – Annual Report on F4E's 2023 Accounts - Status of Observations

Area		In Progress	Implemented	No Action	Total
Cost estimate at completion for ITER				3	**3**
Significant reorganisation			1	2	**3**
Budgetary Management				3	**3**
Incomplete planning, monitoring and reporting of resources		2		1	**3**
Absence of a comprehensive risk assessment for external service providers		1			**1**
Insufficient cooperation between the JU's risk management and internal audit function			1		**1**
Absence of internal control policy on sensitive functions		1			**1**
TOTAL from 2023		**4**	**2**	**9**	**15**
Follow-up of previous years´ comments					
2019	Insourced resources	1			**1**
2021	Use of external staff poses risks for working environment	1			**1**
2022	Low budget implementation			1	**1**
	Senior management in transition		1		**1**
	Risk Management		1		**1**
Total from Follow up		**2**	**2**	**1**	**5**
GRAND TOTAL		**6**	**4**	**10**	**20**

Table 25: Observations and actions taken by F4E.

The status of the actions in progress is the following:

- **Incomplete planning, monitoring and reporting of resources:** F4E is working in a draft F4E strategic workforce strategy that will address the concerns expressed by the ECA and the IAS in their audit on Human resources management and ethics by June 2025.
- **Absence of a comprehensive risk assessment for external service providers:** In addition to the risk register, F4E is reinforcing existing actions through resource planning initiatives to improve management, administrative capacity, and address risks associated with ESPs. Along with addressing the ECA and IAS findings, these risks include knowledge retention and staff assimilation at corporate level, and turnover due to ESP's financial conditions or lack of experience at contract level.
- **Absence of a internal control policy on sensitive functions:** F4E has been working in implementing this policy and putting in place the necessary controls, the action will be completed in June 2025.
- **Insourced resources** (observation from 2019) **and its use posing risks for working environment** (observation from 2021): F4E has been driving various improvement initiatives in the ambit of resource planning and management to mitigate the risks and address the recommendations of the IAS in relation to the ESPs. In particular, in August 2024 a major update to F4E's 2020 policy on the use of ESPs was adopted and is in line with the practices of the Commission. These initiatives will enhance the organization's management of its ESP contingent and also address the challenges associated with the work environment and will be implemented by September 2025, in line with the action plan in response to the IAS audit on Human Resources management and ethics.

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 2024 is as follows:

Audit Name	Audit Source	Actions	In Progress	Ready for review	Cancelled	Obsolete/ Suspended	Implemented %
Action plans issued before 2023							
Nuclear Safety Management	IAC	24	1	23	0	0	96%
ECOSYS - Systems and Controls ensuring reliability of financial planning data	IAC	28	1	25	0	2	96%
Vacuum Vessel contract	IAC	17	2	15	0	0	88%
Corporate Governance Audit	IAC	14	0	12	1	1	100%
Delegations and efficiency of decision making	IAS	19	0	19	0	0	100%
Audit of Digitalisation and Cybersecurity	IAC	16	7	8	1	0	53%
total before 2023		118	11	102	2	3	90%
Action plans issued in 2024							
Audit of Human Resources management and ethics	IAS	20	12	8	0	0	40%
Total from 2024		20	12	8	0	0	40%
TOTAL PORTFOLIO		**138**	**23**	**110**	**2**	**3**	**83%**
			17%	**80%**	**1%**	**2%**	

** Implemented % is equal to the number of actions implemented per total number of actions that can be executed (Cancelled, Obsolete and suspended 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 2024, for which the implementation rate has reached 90% (with 102 actions already set as ready for review), and one action plan from 2024, related to the IAS audit on Human Resources management and ethics, already implemented at 40%.

Of the 7 action plans in F4E's porfolio, 2 have been fully implemented from management point of view, and have been subject to follow-up by the auditor in the beginning of 2025 with a positive result considering that all actions were effectively implemented and therefore considering both audits as closed.

More focus in the implementation of audit actions

F4E is improving in effectively implementing the actions in response to the audit reports. The current leadership team reviews monthly the status of implementation of all the actions, monitoring any delay and prioritizing actions and or allocation of resources when needed.

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

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). F4E is following up on recommendations following OLAF investigations.

2.10 Follow-up of observations from the discharge authority

For the financial year 2022, the European Parliament (EP) granted, in its plenary session of May 2024, the Discharge in respect of the implementation of the budget to F4E and the closure of its accounts. They issued 42 observations related to the following:

- "Emphasis of Matter" of the ECA raising concerns on the cost and schedule risks of F4E and the ITER project, impact of the COVID 19 and the war of aggression against Ukraine, and the new baseline of the ITER project,
- Under implementation of F4E budget,
- Gender and geographical balance of F4E staff,
- Instability in Senior Management,
- Working environment at F4E and wellbeing of the staff,
- Anti-fraud strategy and conflict of interest,
- Use of insourced resources.

In September 2024, F4E submitted a report to the EP on the measures taken in the light of the observations accompanying the EP's discharge decision for 2022, in accordance with Article 107 of the F4E Financial Regulation. Out of 42 observations of the European Parliament, 36 required no action from F4E, 2 were reported as "Implemented" and the remaining 4 as "Ongoing".

The observation referring to the instability of the senior management level has been in the meantime addressed with the new stable top management team in place since November 2024. At the end of 2024, the status of the ongoing observations is the following:

- **Use of insourced resources and risks associated (2 observations):**

  F4E has been driving various improvement initiatives in the ambit of resource planning and management to mitigate the risks and address the recommendations of the IAS in relation to the external service providers (ESPs). In particular, in August 2024 a major update to F4E's 2020 policy on the use of ESPs was adopted and is in line with the practices of the Commission. These initiatives will enhance the organization's management of its ESP contingent and also address the challenges associated with the work environment and will be implemented by September 2025, in line with the action plan in response to the IAS audit on Human Resources management and ethics.

- **Gender and geographical balance:**

  To tackle its gender imbalance, 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. Concerning the Senior Management, after the final appointments of the new leadership team at the end of 2024, there were 40% women, exceeding the target of 35%. Concerning the Middle Management, at the end of 2024 there were 21% of female middle managers, below the target. The situation improved at the beginning of 2025 with the nomination of 2 additional female middle managers.

  Notwithstanding its efforts towards a better geographical balance of its workforce, attainment of this goal remains a challenge. In this respect, the relative over representation of Spanish nationals (37.4%) reflects the location of the F4E Headquarters in Spain. Italian nationals (17.2%) and French nationals (18.6%) are the next two most represented nationalities.

2.11 Environment Management

F4E aims at reaching for the medium and long term the organisation of 'carbon neutral events' or minimize as much as possible the carbon footprint throughout its life cycle (design, set-up, implementation, and dismantling) and compensates its residual impact by participating in environmental offsetting projects.

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.

Environmental considerations are gradually being included in our administrative procurement processes. For example, the contract for Office Supplies (F4E-AFC-1734) awarded in 2024 required tenderers to comply with the European Eco-Management and Audit Scheme (EMAS) or the international standard ISO 14001 as part of the technical selection criteria. Consequently, 63% of the items in our current catalogue of office supplies (53 out of 89 items) meet environmental criteria.

Additionally, F4E has developed a specific methodology to measure CO2 emissions from its main meetings and events in Barcelona, as part of its commitment to tracking and calculating its carbon footprint. The provision of catering and event services (AMD-1643) requires the contractor to assist F4E in accounting for and reporting CO2 emissions by providing emissions results from each meeting/event carried out by the contractor, according to the GHG (GreenHouse Gas) Protocol and ISO 14064-1.

To enhance energy efficiency and reduce costs, F4E closed its headquarters for 3 weeks in August 2024. This initiative aligns with sustainability practices adopted by other EU agencies and Commission buildings, which also close during the summer. The estimated savings from this measure in 2024 were €43k, with one-third directly related to energy savings.

2.12 Assessment by Management

2024 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 to some key ITER components delivered by other members remained on schedule and assembly of the machine was restarted. Several significant milestones were achieved including successful helium liquefaction in the cryoplant. Additionally, the project underwent a comprehensive schedule reassessment, resulting in a new baseline that prioritizes a robust start to operations, with first plasma planned for 2034 and deuterium-tritium operations in 2039.

At F4E level, 2024 has been a very important year for F4E marked by the implementation of a new organisation structure. One of the main aims was to reinforce the matrix and streamline the organisation. This reorganisation, unprecedented at F4E, impacted 26 out of 33 management positions and required a massive wave of selection procedures. To support staff during the transition, internal communication and change management efforts were expanded. A tailored communication plan was deployed alongside HR support services to guide teams and individuals through the new structure.

Despite the impact of the major reorganisation, F4E continued to deliver on ITER and the Broader Approach (BA) activities, drawing lessons from these key projects while contributing to other experiments as part of the fusion roadmap. Together with its partners in industry and research organisations, F4E achieved many milestones, such as:

- First European ITER Vacuum Vessel Sector manufactured, a massive industrial achievement.
- Final Poloidal Field Coil delivered to ITER, one of the largest superconducting magnets ever.

- Handover of key ITER buildings, ready for upcoming assembly and integration activities.
- Progress towards continuous wave at the LIPAc accelerator.
- Upgrades in JT-60SA, the world's largest tokamak, built by Europe and Japan.
- Start of construction for the DONES facility to develop fusion materials.

F4E also made progress in other areas such as In-Vessel components, Remote Handling, Diagnostics, External Heating and Fuel Cycle Systems. To optimise resources and improve efficiency, F4E pursued further integration with the ITER Organization, especially in civil engineering and buildings.

To deliver its projects, F4E closely with European industry, SMEs and research organisations. Since 2007, F4E has signed 1.350 contracts with a cumulative value exceeding 7 billion EUR. These successes were matched by excellent project and financial execution, improving from previous years. The positive performance is reflected in the impressive completion rate of planned activities for the ITER project, reaching 84%.

F4E also strengthened its collaboration with the EUROfusion consortium, to better connect research and industry. F4E also launched the Technology Development Programme to map and advance key technologies for the future of fusion. In parallel, F4E kept expanding its engagement with the industrial supply chain to ensure Europe's involvement in an ever-evolving fusion landscape. Last but not least, F4E started exploring partnerships with private fusion initiatives, paving the transition from experimental to commercial fusion.

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 2024, the Governing Board agreed that the European Commission interim evaluation of F4E would be in line with the scope of the annual assessment of F4E requested by the Council of the EU and should therefore be considered to constitute the 12th annual assessment of F4E to be conducted in 2024.

The preliminary conclusions of the interim evaluation of F4E were presented to the Board in December 2024, assessing the progress and effectiveness of F4E's activities, while identifying areas for improvement in the implementation of the European budget by F4E and supporting the preparation of the next Multiannual Financial Framework (MFF).

Key recommendations included refining F4E’s organisational structure to prevent overlapping responsibilities, addressing resource allocation imbalances, enhancing integration with IO to improve efficiency, increasing SME participation, and streamlining procurement and reporting processes. The evaluation further underscored the importance of continued reforms within F4E and ITER and the necessity of a coordinated EU fusion strategy to maintain European leadership in fusion technology.

The findings of the evaluation will be formally transmitted to the Council of the EU and the European Parliament in 2025 following the approval by the College of Commissioners.

To meet the Council’s request for 2025, F4E’s Governing Board approved the Terms of Reference for the 13th Annual Assessment in December 2024. A Steering Committee, composed of the GB Chair, Vice-Chairs, and Euratom representatives, was established to oversee the evaluation process.

The aim of this study will be to assess the economic benefits and broader impacts of F4E’s activities in reinforcing the role of the EU in the field of fusion activities. It will evaluate F4E’s added value, its impact on Europe’s economy and competitiveness, and provide data and recommendations for the next MFF negotiations. The updated analysis will measure the return on EU investment in fusion since the last review (2008–2017) conducted in 2018.

Part III Assessment of the effectiveness of the internal control systems

3.1 Effectiveness of internal control systems

The 'F4E Management and Internal Control Standards' (MICS) mirror the 2017 European Commission Internal Control Framework covering the five components: control environment, risk assessment (including risks of fraud), control activities, information and communication and monitoring activities. It contains the below 20 standards:

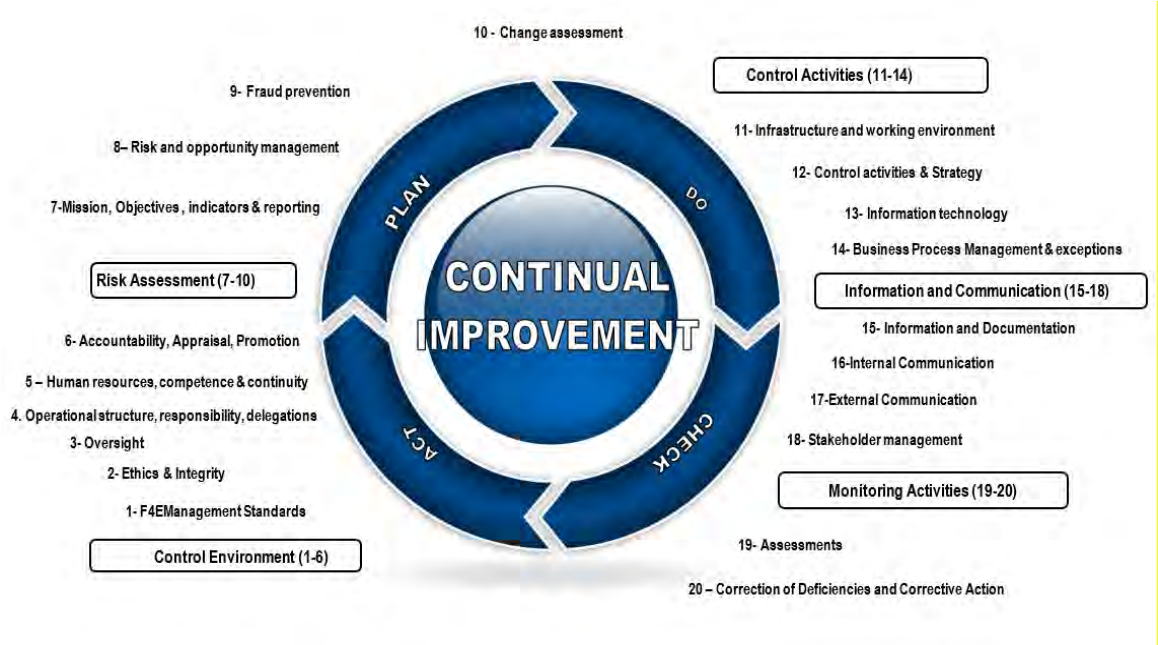


Figure 86: F4E Management and Internal Control Standards (MICS).

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 Self-Assessment (from now on, the self-assessment).

F4E has followed a step-by-step approach on the identification of strengths and weaknesses of the Internal Control system based on any deficiences identifed 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 2023 CAAR

In last year's Consolidated Annual Activity Report, F4E concluded that all the components were operating together in an integrated manner. Nevertheless, as a combination of one major and several moderate deficiencies exists, it was concluded that the system was **partially effective**.

The major deficiency was identified in MICS 5 (Human Resources, Competence & Continuity) and related to the 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). 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.

F4E has been driving various improvement initiatives in the ambit of resource planning and management to mitigate the identified risks and address the recommendations issued by the IAS in relation to the ESPs (see section 2.8.1). In particular, in August 2024 a major update to F4E's 2020 policy on the use of ESPs was adopted and is in line with the practices of the Commission. These initiatives will enhance the organization's management of its ESP contingent and also address the challenges associated with the work environment and will be implemented by September 2025, in line with the action plan in response to the IAS audit on Human Resources management and ethics.

3.1.2 Methodology for the Internal Control System annual assessment for 2024

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

I. Assessment of the Internal Control Monitoring Criteria including the results of the MICS questionnaire to all the staff;

II. Analysis of sources available in RAPID (F4E's database to follow-up actions): ECA annual report, assessments of External Assessors, audit reports from IAC and IAS, actions proposed for exceptions and non-compliances and Anti-Fraud Strategy action plan;

III. Other sources: Corporate Risk and Opportunity register, Declarations of Assurance of the Responsible Authorising Officers (RAOs), inputs by assurance providers and senior managers responsible for each of the MICS, weaknesses reported by Staff;

IV. Preliminary assessment made by the Internal Control Coordinator with a conclusion per MICS and on the Overall System;

V. Workshop for Leadership Team endorsement; and,

VI. Determination of the Severity of Deficiencies per MICS and proposal of corrective actions;

VII. Preparation of the Director's Declaration of Assurance and CAAR.

The results of the assessment and a corrective action plan for 2025 were endorsed as follows:

- 11 MICS have been identified as effective and functioning well.
- 9 MICS have been identified as effective with moderate deficiencies.

The corrective actions proposed as a result of the assessment will be regularly monitored by the Leadership Team and the Assurance Network.

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	MODERATE deficiency	F4E has actively monitored and mitigated risks related to the reorganization and the change in the Leadership Team, no significant impact/disruption happened so far, showing the resilience of our processes. However, the detailed RASCI (Responsible, Accountable, Support, Consulted, and Informed) matrix is currently being reviewed and adapted to the new organization, and the underlying processes will need to be reviewed accordingly. This impacts also MICS 14 Business Process Management	Detailed RASCI matrix and underlying processes will be reviewed during 2025 Implement action in response to IAC audit on Administrative Procurement.
MICS 5: Human Resources, Competence & Continuity	MODERATE deficiency	The IAS audit on Human Resources Management and Ethics identified some risks that F4E has been addressing during 2024 and the beginning of 2025, in the area of HR Strategy (including Learning and Development) and the use of External Service Providers (ESPs).	The remaining actions on workforce planning and allocation and enhancing the controls on the use of ESPs will be finalized by September 2025.

		Human resources has been a key player in securing the reorganization. The vacancy rate ate the end of 2024 was 4.8%.	Situation will be stabilized in 2025 there will be an improvement of the vacancy rate.
MICS 6: Accountability, Appraisal and Promotion	MODERATE deficiency	The IAS audit on Human Resources Management and Ethics identified some risks in this area.	F4E has already improved the appraisal exercise for 2024. During 2025 it will address the remaining action on properly informing all the staff members on the revised job descriptions.
MICS 7 - Mission, Objectives, Indicators and Reporting	MODERATE deficiency	The IAS audit on Human Resources Management and Ethics identified some risks in this area.	The staff objectives for 2025 will be SMART (specific, measurable, achievable, relevant, and time-bound) in response to the IAS recommendation.
MICS 8: Risk and Opportunity Management	MODERATE deficiency	ECA has issued an observation to improve the risk management process and the sharing of information between the IAC and Risk Function.	Implementation of actions in response to ECA and improved monitoring of risks.
MICS 12 - Control Activities and Strategy	MODERATE deficiency	Internal Control Strategy should be updated after the reorganization and aligned with the update to the RASCI matrix (see MICS 4). In addition, there are some corrective actions in response to internal auditors, external assessors' recommendations and to non-compliances.	Update Internal Control Strategy Implement actions in response to internal auditors, external assessors and non-compliances.
MICS 13 - Information Technology	MODERATE deficiency	3 actions are planned to comply with the EU Cyber Security Regulation.	Implement actions in response to IAC audit on Digitalisation and Cybersecurity. These are regularly followed up by the Leadership Team and presented to the Audit Committee
MICS 14 - Business Process Management and Exceptions	MODERATE deficiency	The detailed RASCI matrix is currently being reviewed and adapted to the new organisation (see MICS 4).	Alignment and simplification of actual processes (stepped approach) will be carried out during 2025.
MICS 19 - Assessments	MODERATE deficiency	Internal Control Strategy not updated with recent organizational changes (see MICS 12)	Update Internal Control Strategy

It is worth highlighting the institutional stability ensured during a demanding year, especially in the context of the structural reorganisation, the support to transition teams, and the reinforcement of the ESP controls. During 2024 F4E has consolidated the actions undertaken to address the staff wellbeing in view of the recent reorganisation, the further integration and the rebaseline exercise.

On the level of the System

All the MICS are operating together in an integrated manner. As a combination of several moderate deficiencies exists, it can be concluded that the system is effective with some improvements needed. See above the detail of the deficiencies identified for each of the MICS and the proposed corrective actions.

3.1.4 Prevention, Detection, Correction of Fraud

The Anti-Fraud (OLAF) and Ethics Officer is responsible for overseeing the implementation of the new F4E Anti-Fraud Strategy (AFS) and the accompanying Anti-Fraud Action Plan, which cover the period from 2024 to 2027. The updated AFS builds upon its predecessor by focusing on fraud prevention and detection, ensuring the more effective implementation of existing regulations.

In this context, the Anti-Fraud (OLAF) and Ethics Officer has monitored and guided the execution of the actions outlined in the current Anti-Fraud Action Plan for 2024 through targeted communications, individual meetings with action owners, and compliance-oriented meetings. The implementation of the actions in the Anti-Fraud Action Plan has been systematically tracked using a dedicated database (RAPID), which documents progress regarding the implementation of anti-fraud actions in 2024. The implementation status was reported at Audit Committee meetings. Additionally, the F4E internal network of fraud correspondents was kept informed individually and during regular Assurance Network meetings.

Throughout the year, the Anti-Fraud (OLAF) and Ethics Officer provided information and support on fraud prevention, notably to staff involved in procurement, contracts management, finance, and human resource management. Anti-fraud awareness events were organised for F4E staff and management, including training sessions for newcomers.

F4E operates in a specialised market for staff and companies. Mitigating risks of conflicts of interest and favouritism is a key priority in the updated F4E Anti-Fraud Strategy. This includes proposed measures for procurement, contracting, and recruitment. In November 2024, the F4E Anti-Fraud (OLAF) and Ethics Officer organised OLAF training on these issues for all F4E staff.

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

Ethics and Conflict of Interest guidelines are shared with staff via the F4E Manual on the intranet. In 2024, the Anti-Fraud (OLAF) and Ethics Officer educated F4E staff and managers on handling declarations of interest to prevent conflicts. He also assisted individually in preparing and assessing these declarations and maintained a Conflict of Interest Register. Since 2022, all F4E staff must submit an annual General Declaration of Interest, managed through a digital F4E Conflict of Interest Register for better follow-up and traceability.

The F4E Charter of Engagement provides staff with guidelines based on integrity, trust, respect, teamwork, high achievement, contribution, flexibility, and innovation. It includes recourse to the Ethics Officer and/or the F4E Ethics Committee. In 2024, the Ethics Officer handled several cases and raised awareness amongst staff. As part of the F4E Improvement Agenda, feedback sessions were held with each unit to assess the organisational values and the Charter's effectiveness. The results have been presented to senior management, aiming to update the Charter accordingly.

The Charter of Engagement is a cornerstone for fostering an ethical work environment within F4E. By emphasising these core values, the organisation aims to ensure that every employee understands their role in maintaining a positive and productive workplace. Specific cases handled by the Ethics Officer in 2024 included issues related to conflicts of interest and non-compliance with internal policies. These cases were resolved through appropriate actions, thereby reinforcing the importance of ethical conduct.

The feedback sessions conducted under the F4E Improvement Agenda with each F4E units provided valuable insights into how well the Charter is being implemented across the organisation. Employees shared their experiences and suggested improvements, highlighting areas where the Charter could be more impactful. This collaborative approach not only helped identify gaps but also fostered a sense of collective responsibility towards upholding the organisation's values which are currently under review. A planned update to the Charter is expected to reflect these insights, making it more aligned with the current organisational culture and challenges, thus better supporting F4E's mission and goals.

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. There are moderate deficiencies in 9 of the 20 MICS, therefore it can be concluded that the system is fully effective.

3.3 Statement of the Senior Manager in charge of risk management

I, the undersigned, Kristel Tans, in my capacity as senior manager in charge of risk management, declare that in accordance with F4E Internal Control System, I have reported my advice and recommendations on the corporate and project risks and opportunities to the Director and governance bodies.

Kristel Tans
Head of Project Control, Supply Chain and Finance Department

Barcelona, 30 April 2025

3.4 Statement of the Internal Control Coordinator

I, the undersigned, Raquel Raspall Infante, in my capacity as Internal Control Coordinator, declare that in accordance with F4E Internal Control System, I have reported my advice and recommendations on the overall state of internal control in F4E to the Director.

I hereby certify that the completeness and reliability of management reporting on the state of internal control is to the best of my knowledge, accurate, reliable and complete.

Raquel Raspall Infante
Internal Control Coordinator

Barcelona, 13 May 2025

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.

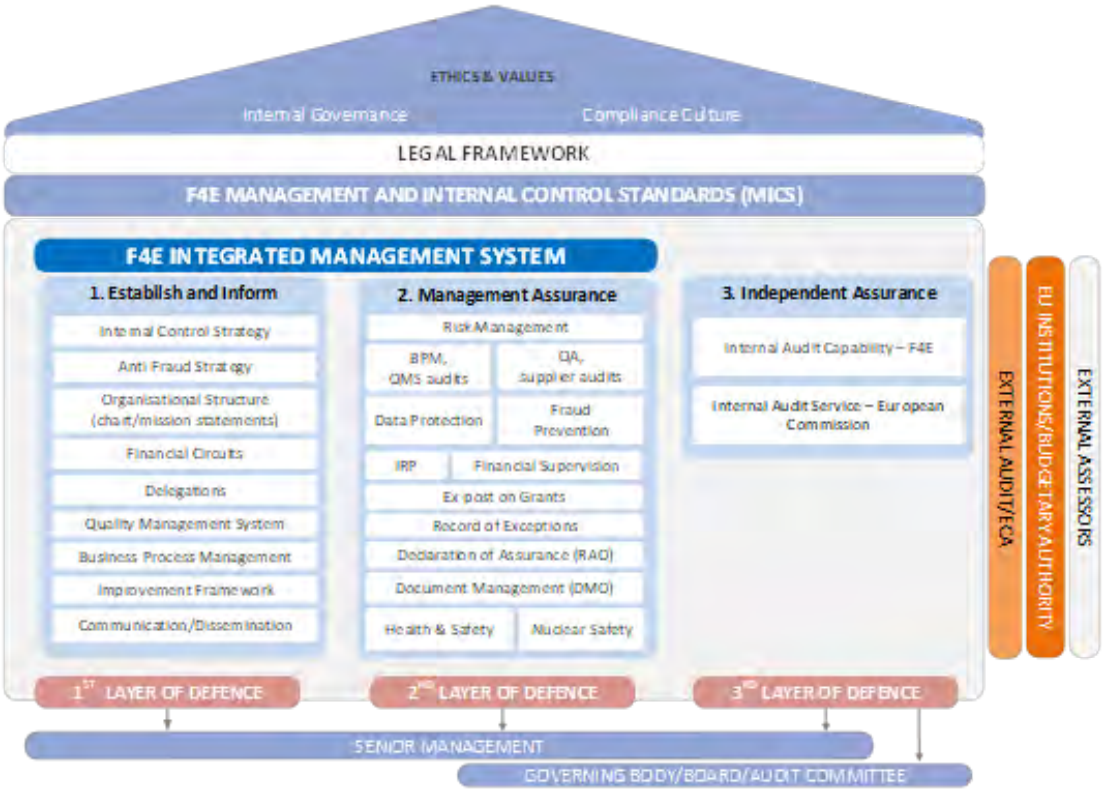


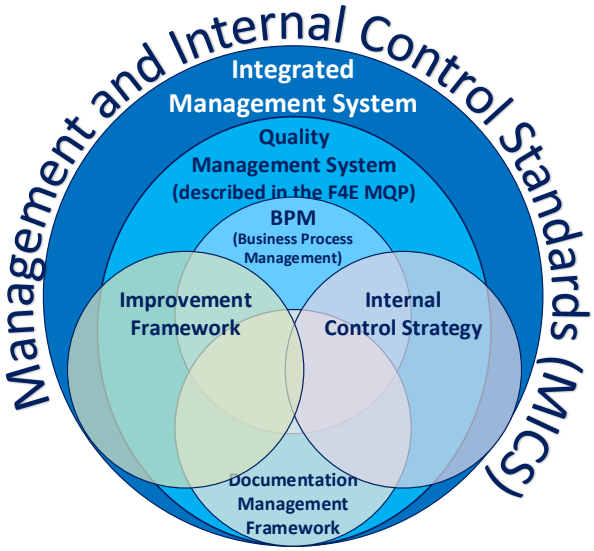
Figure 87: F4E Internal Control System.

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

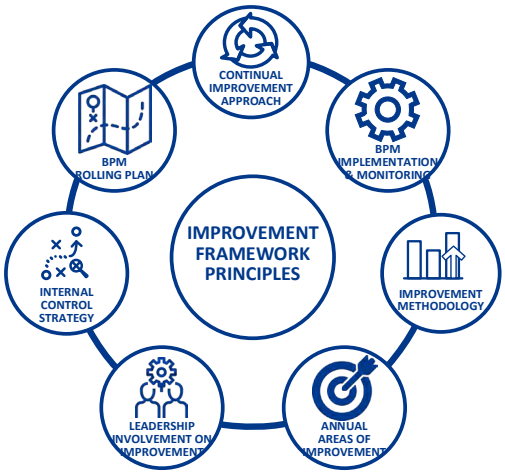
The Management and Internal Control Standards (MICS) are the backbone of the Integrated Management System, implemented with the objective to provide reasonable assurance regarding the achievement of the organisation's mission and objectives in line with the EC Internal Control Framework and the ITER-wide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

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.



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, 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.

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 leadership monitoring.

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.

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 2024, out of the:

- 4 planned Quality Management System audits: 2 were performed with result of meeting the audit criteria. These audits resulted in 19 findings, classified as follows: 3 strong areas, 2 nonconformities and 15 improvement areas.
- 10 planned Supplier Audits: 13 Supplier audits were performed (8 with result meeting the audit criteria, and 4 with partially meet criteria, 1 performed with IO system result). These audits resulted in 19-65-20-7 findings, classified as follows: 19 strong areas, 65 improvement areas, 20 nonconformities and 7 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 2024

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

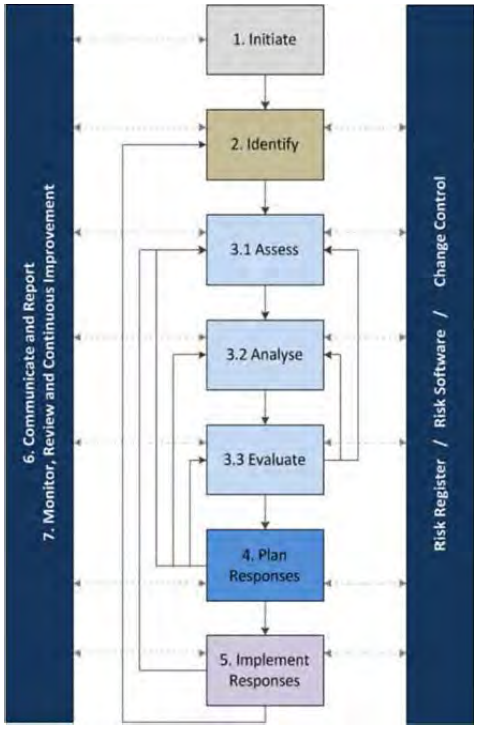


Figure 88: Risk & Opportunity Management Procedure

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.

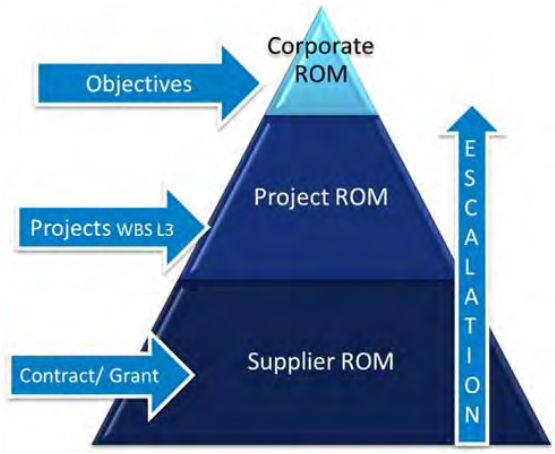


Figure 89: Risk & Opportunity Management Framework

During 2024, 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 judgment and on the information at my disposal, such as the results of the annual assessment of the Internal Control System and 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 2023 Annual Report “the 2023 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 in early 2024, the ITER International Organization (ITER-IO) developed a revised project plan (2024 baseline) for the ITER project, replacing the previous 2016 baseline. In June, the ITER Council took note of the proposed revised baseline and supported that the ITER-IO and the Domestic Agencies (such as F4E) use it as a working plan for progress monitoring and operational management of the ITER project. This should however be without prejudice to the overall cost and annual budgetary procedures. Consequently, F4E with support of its Governing Board started to adjust its operations planning according to the 2024 baseline. In parallel F4E continued 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 ITER-IO. The most significant risks affecting F4E’s in-kind contributions to ITER remain the changes of requirements due to design instability, and complexity of design and manufacturing first of a kind components.

F4E underwent a major reorganisation in 2024, impacting 26 of the 33 management positions at that time, with the aim to improve the performance of the organisation and reinforce matrix management. Another focus of 2024 was implementing the renewed long-term vision of F4E and consolidating the actions undertaken to continue improving the staff wellbeing. F4E is now ready to better deliver its contribution to ITER and other projects in the very challenging landscape of fusion development.

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

Marc Lachaise
Director

Barcelona, 20 May 2025

Annexes

Annex I Core Business Statistics

Key Performance Indicators for 2024

ITER Project Progress

- 84% completion of the activities in 2024, as reported by F4E.
- 100% completion of the planned activities on critical path in 2024, as reported by ITER Organization.

Broader Approach Project Progress

- 71% of the EU contributions (planned vs. achieved up to end of 2024) to the Satellite Tokamak (JT-60SA) delivered.
- 72% of the EU contributions (planned vs. achieved up to end of 2024) to the IFMIF/EVEDA project delivered.
- 100% of the EU contributions (planned vs. achieved up to end of 2024) to the IFERC project delivered.

F4E Project Performance

- F4E's current and planned budget compared to Estimate at Completion is 69%.
- 84% Annual Schedule Performance achieved on a basket of reference milestones.
- For the main ITER Council and Governing Board milestones, F4E has:
    - 37 achieved.
    - 20 at risk of being delayed.

F4E Procurement

- 51 contracts signed in 2024 for a value of €167m.
- Total cumulative value of contracts €6,8bn.

*F4E Annual Budget Performance**

** The annual budget performance without additional revenue from ITER IO is 99% execution for commitments and 99% execution for payment*

- Annual Commitments 92 % of the final available budget, 111 % compared to original budget.
- Annual Payments 93 % of the final available budget, 101 % compared to original budget.

.F4E Quality

F4E has 237 F4E Non-Conformity Reports (NCRs) open for > 12 months compared to 440 NCRs still open giving a ratio of 54% (not achieving the 2024 target of ≤25%)

F4E Human Resources

- Assignment of human resources to different areas:
  - 61% Projects, FUTED and Safety & Quality
  - 39% PCSCF and Administration
- 4,8% Vacancy Rate, (target 4%).
- 2,2% Turnover Rate.
- 4% Absenteeism.

F4E Organisational Improvement

- Implemented 83% 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 2024 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 27. Table 27: Technical objectives and KPIs used for monitoring purposes.

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 27: 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 2024 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 28: Multiannual objectives and KPIs used by F4E and a set of annual objectives that are show in Table 29: 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 28: Multiannual objectives and KPIs used by F4E.

AREA	Objective
Annual M-SPI	Reach a minimum SPI value by end of the year
Annual commitment budget	Implement a defined percentage of Commitment Appropriations by end of the year
Budgeted forecast of the Work Programme	Implement a defined percentage of allocated commitment appropriation to Work Programme Actions, without reserves, by end of year
Annual payment budget	Implement a defined percentage of Payment Appropriations by end of the year
Quality – NCR closure time	Ensure Nonconformity Reports (NCR) closure in due time
Quality – NCR closure rate	Close a minimum percentage of NCR annually
Phase gate – Annual implementation	Execute a minimum number of phase gates planned during the year
Human Resources	Vacancy rate to be less than a defined value by end of the year

Table 29: 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 2024 Work Programme Objectives

Action 1. Magnets

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU11.1A.11820	IPL > Delivery of TF18 (EU 10) by EU-DA to ITER Site	Q2 2024	WP24 objective	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	Achieved
EU11.1A.28115	HPC- Approval by IO for Document CFAD (HP 9.1.6) / TF-EU10 (IC64 /GB54)	Q2 2024	GB54	PA 1.1.P1A.EU.01 Procurement of Toroidal Field Magnets	Achieved
EU11.3B.01160	IPL > Delivery of PF3 Coil by EU-DA to IO	Q2 2024	WP24 objective	PA 1.1.P3A-B.EU.01 Poloidal Field Magnets 2,3,4,5,6	Achieved

Action 2. Vacuum Vessel

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU15.1A.08500	IPL > Delivery of Sector 5 by EU-DA to ITER Site	Q4 2024	GB16	GB16	Achieved
EU15.1A.3081300	S5 - Start of FAT	Q1 2024	Predecessor of GB16	Predecessor of GB16	Achieved
EU15.1A.3119198	S9 - Start of Outer Shell fit-up	Q4 2024	Predecessor of GB25	Predecessor of GB25	Achieved
EU15.1A.80540	S9 - Inner Shell welding completed	Q2 2024	Predecessor of GB25	Predecessor of GB25	Achieved

Action 3. In Vessel – Blanket

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU15.2A.10200	Task Order Signed for Task 3 - Chimney Pipes	Q4 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds	Achieved
EU15.2A.12115	Manufacturing and Inspection Plan of the prototype Bundle for Task 1.A (Contractor #02) approved	Q3 2024	WP24 objective	PA 1.6.P6.EU.01 Blanket Manifolds	Achieved
EU.16.01.101790	Request for Final Tenders for Release of TASK 3.XX - Reopening of competition #1 OMF-900	Q4 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall	Achieved
EU.16.01.12406760	MS#03 Manufacturing Readiness Review approved for Task 1 and Task 2 of Standard parts	Q4 2024	WP24 objective	PA 1.6.P1A.EU.01 Blanket First Wall	Achieved

Action 4. In Vessel – Divertor

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU17.01.1175580	HP - Reception of the Load Test Report the SF1 (CB#16)	Q4 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body	Achieved
EU17.01.1367140	Manufacturing approved for Pins, Sleevs & PFC Links Series by MRR Panel (M_PISLLI_04)	Q4 2024	WP24 objective	PA 1.7.P1.EU.01 Cassette Body	Achieved
EU17.2B.140310	OMF-1139-02-01 Signed for IVT Series - OMF-1139-02-01	Q4 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target	Achieved
EU17.2B.982280	M_CAD-8_ Approval of the SSS manufacturing drawings- OMF-1139-01-01	Q4 2024	WP24 objective	PA 1.7.P2B.EU.01 Inner Vertical Target	Achieved

Action 5. Remote Handling

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU23.03.14069040	CPRHS TO-577-02-02 Subtask 9 CDS Lift completed	Q3 2024	Predecessor of GB41	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	Achieved
EU23.03.14074440	CPRHS OMF-1034-01-06 DDL-047 D2.5.02 Assembly Drawing CTS approved	Q4 2024	Predecessor of GB40	PA 2.3.P3.EU.01 Cask and Plug Remote Handling System	Achieved
EU23.05.14054460	M6 - CDH Concept Design Review [OPE-1252]	Q4 2024	Predecessor of GB42	PA 2.3.P5.EU.01 Neutral Beam Remote Handling System	Achieved
EU57.01.14062860	[M12] CMS Prototype tested successfully	Q4 2024	Predecessor of GB47	PA 5.7.P1.EU.01 In-Vessel Viewing System	Achieved

Action 6. Cryoplant and Fuel Cycle

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU31.01.10261	IPL > Delivery of First Torus & Cryostat Cryopumps by EU-DA to ITER Site	Q2 2024	GB33	PA 3.1.P1.EU.03 Torus and Cryostat Cryopumps	Achieved
EU31.01.12290	Strategy proposal of PA Amendment 3.1.P1.EU.04	Q2 2024	Predecessor of GB50	PA 3.1.P1.EU.04 Neutral Beam Cryopumps	Achieved
EU31.03.25790	Pre-FDR completed for CDLDS and NBDLDS	Q4 2024	Predecessor of GB35	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	Achieved
EU31.03.40260	Cryostat Direct Leak Detection System qualification completed	Q4 2024	Predecessor of GB18	PA 3.1.P3.EU.01 Primary and Cryostat Leak Detection System	Achieved

Action 7. Heating & Current Drive

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU52.01.3000010	Option 1 Signed for TO1 for Design Finalization, Manufacturing & Assembly of the EC UL Port Plug	Q2 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	Achieved
EU52.01.4001240	EC Upper Launcher - Design Description Document for UL system - Completed	Q3 2024	Predecessor of GB46	PA 5.2.P1B.EU.02 Electron Cyclotron Upper Launcher	Achieved
EU52.03.17200	Task Order Signed for Technical Follow-up of Gyrotron Tubes & Super Conducting Magnets	Q4 2024	WP24 objective	PA 5.2.P3.EU.01 Electron Cyclotron Gyrotrons	Achieved
EU53.TF.4446460	Delivery On-Site Completed (M89) - MITICA Neutralizer	Q3 2024	WP24 objective	PA 5.3.P9.EU.01 Neutral Beam Test Facility Components	Achieved

Action 8. Diagnostics

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU55.02.226450	PDR Panel Approval of Chit Resolution Plan for VV & DIV Cameras	Q4 2024	WP24 objective	PA 5.5.P1.EU.03 Diagnostics - Bolometers	Achieved
EU55.06.697220	IPL > Delivery of in-vessel cables for VV Sector 3 (Batch 7) by EU-DA to IO ITER site	Q4 2024	WP24 objective	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	Achieved
EU55.06.707200	PQMP Vactron Approved	Q4 2024	Predecessor of GB36	PA 5.5.P1.EU.18 Diagnostics - Tokamak Services	Achieved
EU55.11.205760	Approval of chit close-out action plan for resolution of CAT-1 chits raised at PDR for ExV Components	Q3 2024	WP24 objective	PA 5.5.P1.EU.04 Diagnostics - Core-Plasma Charge Exchange Recombination Spectrometer	Achieved

Action 9. Test Blanket Modules

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU56.01.1242855	F4E-OFC-1497-01 TO-01 Signed for EUROFER design limits codification in RCC-MRx	Q4 2024	WP24 objective	NA	Not achieved
EU56.01.1259955	F4E-OFC-1350-01 Task Order 02 Signed for Set of Additional Accident Analyses for WCLL TBS	Q4 2024	WP24 objective	NA	Achieved
EU56.02.1240200	F4E-OFC-1063-01 TO4 Signed for Handling, Cutting Storage Services for Steel Products related to the EU TBMs	Q1 2024	WP24 objective	NA	Achieved
EU56.06.1242780	Technical Specification Approved for TO-01 OFC-1497 for EUROFER design limits codification in RCC-MRx	Q4 2024	WP24 objective	NA	Achieved

Action 10. Site and Buildings and Power Supplies

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU62.05.460	IPL > Construction of Cryoplant Coldbox Building (52) Completed	Q4 2024	GB21	MAIN MILESTONES	Achieved
EU62.05.620	IPL > Construction of Fast Discharge & Switching Network Resistor Building (75) Completed	Q4 2024	WP24 objective	MAIN MILESTONES	Not achieved
EU62.604260	Construction of 2 Bus-Bar Bridges (between B32 &74 and B33 &74) Completed	Q3 2024	GB58	AUX BUILDINGS D&B TB12	Achieved
EU62.886781	Civil works completed for MV Distribution Bldg LC/2B (47) - Level 4	Q3 2024	WP24 objective	AUX BUILDINGS D&B TB13	Achieved

Action 11. Cash Contributions

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EUCC.01.280	Cash Contributions to ITER Organization 2025	Q4 2024	WP24 objective	Cash Contributions to ITER Organization	Achieved

Action 12. Supporting activities

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU.ES.01.99200	Published Call for Tender for Provision of CAD Design Support Services	Q2 2024	WP24 objective	All	Achieved
EU.ES.02.95640	FWC OMF-1674 for Provision of Support in the Area of Nuclear Analysis signed	Q4 2024	WP24 objective	All	Achieved
EU.NS.01.35080	Framework Contract F4E-OMF-1532 signed for Nuclear Safety Inspections Support	Q2 2024	WP24 objective	All	Achieved
EU.PE.6103150	Amendment Signed for Plasma Engineering Studies Part I – Modelling for load specifications	Q3 2024	WP24 objective	All	Achieved
EU.PM.3142420	FWC F4E-OMF-1544 signed for Quality Control Inspectors for Protection Important Components (PIC) of ITER Project	Q2 2024	WP24 objective	All	Achieved
EU.TR.406040	Task Order Signed for TO 20 for Convention 4 for Real Convoys for Gendarmerie Services	Q2 2024	WP24 objective	All	Achieved
EU.TR.406280	Task Order Signed for TO 21 for Convention 4 for Real Convoys for Gendarmerie Services	Q4 2024	WP24 objective	All	Achieved

Action 13. Broader Approach

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU.BA.01.10510	Placement of the contract F4E-OFC-1650 for Maintenance and Optimization of HVPS and of SMPS	Q4 2024	WP24 objective	Maintenance and Support Services for BA Projects	Achieved
EU.BA.01.14150	Assembly of the complete cold mass completed	Q4 2024	WP24 objective	LIPAc Activities	Achieved
EU.BA.01.21310	End of installation of Power Supply system for feeding the Error Field Correction Coils on Site	Q4 2024	WP24 objective	Error Field Correction Coils	Achieved
EU.BA.01.38800	Supply of equipment or services for tests with BA Projects and ITER	Q4 2024	WP24 objective	Collaborative activities with JT-60SA, ITER, and the IFMIF/EVEDA LIPAc accelerator	Achieved
EU.BA.01.38860	Delivery of vacuum components of the transmission lines	Q4 2024	WP24 objective	ECRH Transmission	Achieved

Action 14. DONES

ANNUAL OBJECTIVES					
Milestone ID	Scope Description	Forecast Date	Milestone Type	PA / ITA	End 2024 Status
EU.DO.00270	Placement of the option for engineering support contract F4E-OMF-1159-01-01-100 for the BA/DONES Projects (2023-2025)	Q4 2024	WP24 objective	Programme Team and System Integrated Management	Achieved
EU.DO.00690	Publish Invitation to Tender for Design and Procurement of the cavity	Q4 2024	WP24 objective	SRF Linac	Not achieved
EU.DO.01310	Cash Contribution for DONES Project 2024	Q3 2024	WP24 objective	Cash Contribution	Achieved

Annex III. Statistics on Financial Management

Annex III. a. Evolution of Expenditure in Commitments

(EUR)

Heading of the 2024 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)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	Execution (10)	% (11)=(10)/(9)	
A1 STAFF EXPENDITURE												
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	**49 470 000.00**			-4 352 877.11	**45 117 122.89**				**45 117 122.89**	**45 117 122.89**	100.0%	-8.8%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	**12 910 000.00**			485 000.00	**13 395 000.00**				**13 395 000.00**	**13 395 000.00**	100.0%	3.8%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	**964 000.00**			-119 802.75	**844 197.25**				**844 197.25**	**844 197.25**	100.0%	-12.4%
A13 MISSION EXPENSES	**650 000.00**			530 232.75	**1 180 232.75**	1 956.52			**1 182 189.27**	**1 180 232.75**	99.8%	81.6%
A14 SOCIO-MEDICAL INFRASTRUCTURE	**592 000.00**			82 565.00	**674 565.00**				**674 565.00**	**674 565.00**	100.0%	13.9%
A15 TRAINING	**807 000.00**			130 000.00	**937 000.00**				**937 000.00**	**937 000.00**	100.0%	16.1%
A16 EXTERNAL SERVICES	**800 000.00**			-140 000.00	**660 000.00**				**660 000.00**	**660 000.00**	100.0%	-17.5%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	**5 000.00**			-2 000.00	**3 000.00**				**3 000.00**	**3 000.00**	100.0%	-40.0%
A18 SOCIAL WEALFARE	**60 000.00**			11 000.00	**71 000.00**				**71 000.00**	**71 000.00**	100.0%	18.3%
A19 OTHER STAFF RELATED EXPENDITURE	**4 293 000.00**			-722 291.92	**3 570 708.08**				**3 570 708.08**	**3 570 708.08**	100.0%	-16.8%
TITLE A1 - Total	**70 551 000.00**	**0.00**	**0.00**	**-4 098 174.03**	**66 452 825.97**	**1 956.52**	**0.00**	**0.00**	**66 454 782.49**	**66 452 825.97**	**100.0%**	**-5.8%**
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE												
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	**2 056 000.00**			-549 389.59	**1 506 610.41**	75 289.58			**1 581 899.99**	**1 506 611.41**	95.2%	-26.7%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	**5 235 000.00**			1 118 259.76	**6 353 259.76**				**6 353 259.76**	**6 353 259.76**	100.0%	21.4%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	**460 000.00**			-348 272.81	**111 727.19**				**111 727.19**	**111 727.19**	100.0%	-75.7%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	**2 113 500.00**			10 856.49	**2 124 356.49**				**2 124 356.49**	**2 124 356.49**	100.0%	0.5%
A25 POSTAGE / TELECOMMUNICATIONS	**639 000.00**			-119 300.00	**519 700.00**				**519 700.00**	**519 700.00**	100.0%	-18.7%
A26 MEETING EXPENSES	**576 000.00**			-158 402.00	**417 598.00**				**417 598.00**	**417 598.00**	100.0%	-27.5%
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES					**0.00**		14 530.88		**14 530.88**		0.0%	-
A28 INFORMATION AND PUBLISHING	**40 000.00**			-30 000.00	**10 000.00**				**10 000.00**	**10 000.00**	100.0%	-75.0%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	**269 000.00**			-17 301.44	**251 698.56**				**251 698.56**	**251 698.56**	100.0%	-6.4%
TITLE A2 - Total	**11 388 500.00**	**0.00**	**0.00**	**-93 549.59**	**11 294 950.41**	**75 289.58**	**14 530.88**	**0.00**	**11 384 770.87**	**11 294 951.41**	**99.2%**	**-0.8%**
TITLE A1 & A2 - Total Administrative Expenditure	**81 939 500.00**	**0.00**	**0.00**	**-4 191 723.62**	**77 747 776.38**	**77 246.10**	**14 530.88**	**0.00**	**77 839 553.36**	**77 747 777.38**	**99.9%**	**-5.1%**

(EUR)

Heading of the 2024 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)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	Execution (10)	% (11)=(10)/(9)	
B3 OPERATIONAL EXPENDITURE												
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	**416 958 506.00**	9 415 543.56	16 481 322.60	8 560 765.73	**451 416 137.89**	2 826 710.55		8 538 402.46	**462 781 250.90**	**455 846 018.16**	98.5%	9.3%
B32 TECHNOLOGY FOR ITER AND DEMO	**10 012 547.00**	2 081 196.00	-4 593 743.00	-530 666.53	**6 969 333.47**				**6 969 333.47**	**6 969 333.47**	100.0%	-30.4%
B33 TECHNOLOGY FOR BROADER APPROACH	**49 583 165.00**	-18 744 660.00	-7 438 505.00	-1 268 592.08	**22 131 407.92**				**22 131 407.92**	**22 131 407.92**	100.0%	-55.4%
B34 TECHNOLOGY FOR DONES	**1 800 000.00**	2 221 000.00	-2 021 000.00	-37 017.36	**1 962 982.64**				**1 962 982.64**	**1 962 982.64**	100.0%	9.1%
B35 EXTERNAL SUPPORT ACTIVITIES	**20 259 068.00**	5 039 597.00	3 701 335.00	-129 678.81	**28 870 321.19**	11 995.40			**28 882 316.59**	**28 870 321.19**	100.0%	42.5%
B36 OTHER OPERATIONAL EXPENDITURE	**6 607 383.00**	-12 676.56	-607 383.00	-2 403 087.33	**3 584 236.11**	17 012.72			**3 601 248.83**	**3 596 912.67**	99.9%	-45.6%
Title B3 - Total	**505 220 669.00**	**0.00**	**5 522 026.60**	**4 191 723.62**	**514 934 419.22**	**2 855 718.67**	**0.00**	**8 538 402.46**	**526 328 540.35**	**519 376 976.05**	**98.7%**	**2.8%**
B4 EARMARKED EXPENDITURE												
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	**83 111 912.00**	6 161 242.92			**89 273 154.92**	**1 394 668.78**	54 198 962.96		**144 866 786.66**	**140 929 620.84**	97.3%	69.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	**p.m.**				**0.00**	**35 443 566.68**	35 832 907.70	-8 538 402.46	**62 738 071.92**	**7 994 454.86**	12.7%	-
B43 OTHER EARMARKED EXPENDITURE	**p.m.**				**0.00**	52 150.00			**52 150.00**	**0.00**	0.0%	-
Title B4 - Total	**83 111 912.00**	**6 161 242.92**	**0.00**	**0.00**	**89 273 154.92**	**36 890 385.46**	**90 031 870.66**	**-8 538 402.46**	**207 657 008.58**	**148 924 075.70**	**71.7%**	**79.2%**
Titles B3 & B4 - Subtotal	**588 332 581.00**	**6 161 242.92**	**5 522 026.60**	**4 191 723.62**	**604 207 574.14**	**39 746 104.13**	**90 031 870.66**	**0.00**	**733 985 548.93**	**668 301 051.75**	**91.1%**	**13.6%**
Total BUDGET in Commitment appropriations	**670 272 081.00**	**6 161 242.92**	**5 522 026.60**	**0.00**	**681 955 350.52**	**39 823 350.23**	**90 046 401.54**	**0.00**	**811 825 102.29**	**746 048 829.13**	**91.9%**	**11.3%**

Annex III. b. Evolution of Expenditure in Payments

(EUR)

Heading of the 2024 Budget Payment Expenditure	Evolution of the statement of expenditure									Implementation			
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	On B2024 commitments (10)	On B2023 commitments (11)	Execution (12)=(10)+(11)	% (13)=(12)/(9)
A1 STAFF EXPENDITURE													
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	**49 470 000.00**			-4 352 877.11	**45 117 122.89**		90 000.01		**45 207 122.90**	45 037 122.89	48 400.52	**45 085 523.41**	99.7%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	**12 910 000.00**			485 000.00	**13 395 000.00**		157 003.39		**13 552 003.39**	13 140 979.83	109 879.69	**13 250 859.52**	97.8%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	**964 000.00**			-119 802.75	**844 197.25**		37 327.34		**881 524.59**	552 386.65	26 172.07	**578 558.72**	65.6%
A13 MISSION EXPENSES	**650 000.00**			530 232.75	**1 180 232.75**	1 956.52	77 505.61		**1 259 694.88**	791 390.16	52 627.40	**844 017.56**	67.0%
A14 SOCIO-MEDICAL INFRASTRUCTURE	**592 000.00**			82 565.00	**674 565.00**		161 787.83		**836 352.83**	450 591.36	85 113.57	**535 704.93**	64.1%
A15 TRAINING	**807 000.00**			130 000.00	**937 000.00**		605 940.32		**1 542 940.32**	303 397.90	492 455.55	**795 853.45**	51.6%
A16 EXTERNAL SERVICES	**800 000.00**			-140 000.00	**660 000.00**		106 576.61		**766 576.61**	479 325.06	79 736.13	**559 061.19**	72.9%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	**5 000.00**			-2 000.00	**3 000.00**		1 348.46		**4 348.46**	1 185.20	0.00	**1 185.20**	27.3%
A18 SOCIAL WEALFARE	**60 000.00**			11 000.00	**71 000.00**		10 664.10		**81 664.10**	12 552.52	2 149.00	**14 701.52**	18.0%
A19 OTHER STAFF RELATED EXPENDITURE	**4 293 000.00**			-722 291.92	**3 570 708.08**		743 900.31		**4 314 608.39**	3 460 105.54	703 490.52	**4 163 596.06**	96.5%
TITLE A1 - Total	**70 551 000.00**	**0.00**	**0.00**	**-4 098 174.03**	**66 452 825.97**	**1 956.52**	**1 992 053.98**	**0.00**	**68 446 836.47**	**64 229 037.11**	**1 600 024.45**	**65 829 061.56**	**96.2%**
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE													
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	**2 056 000.00**			-549 389.59	**1 506 610.41**	75 288.58	559 499.61		**2 141 398.60**	1 126 840.91	350 936.12	**1 477 777.03**	69.0%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	**5 235 000.00**			1 118 259.76	**6 353 259.76**		1 871 633.46		**8 224 893.22**	3 964 087.73	1 663 732.58	**5 627 820.31**	68.4%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	**460 000.00**			-348 272.81	**111 727.19**		143 894.24		**255 621.43**	88 328.80	103 233.12	**191 561.92**	74.9%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	**2 113 500.00**			10 856.49	**2 124 356.49**		602 880.98		**2 727 237.47**	1 329 739.41	523 882.90	**1 853 622.31**	68.0%
A25 POSTAGE / TELECOMMUNICATIONS	**639 000.00**			-119 300.00	**519 700.00**		191 343.12		**711 043.12**	259 152.77	133 535.12	**392 687.89**	55.2%
A26 MEETING EXPENSES	**576 000.00**			-158 402.00	**417 598.00**		240 563.63		**658 161.63**	248 956.41	163 908.73	**412 865.14**	62.7%
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	**40 000.00**			-30 000.00	**10 000.00**		4 193.41		**14 193.41**	2 675.46	1 738.39	**4 413.85**	31.1%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	**269 000.00**			-17 301.44	**251 698.56**		73 074.58		**324 773.14**	156 208.02	49 602.77	**205 810.79**	63.4%
TITLE A2 - Total	**11 388 500.00**	**0.00**	**0.00**	**-93 549.59**	**11 294 950.41**	**89 819.46**	**3 687 083.03**	**0.00**	**15 071 852.90**	**7 175 989.51**	**2 990 569.73**	**10 166 559.24**	**67.5%**
TITLE A1 & A2 - Total Administrative Expenditure	**81 939 500.00**	**0.00**	**0.00**	**-4 191 723.62**	**77 747 776.38**	**91 775.98**	**5 679 137.01**	**0.00**	**83 518 689.37**	**71 405 026.62**	**4 590 594.18**	**75 995 620.80**	**91.0%**

(EUR)

Heading of the 2024 Budget Payment Expenditure	Evolution of the statement of expenditure									Implementation			
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	On B2024 commitments (10)	On B2023 commitments (11)	Execution (12)=(10)+(11)	% (13)=(12)/(9)
B3 OPERATIONAL EXPENDITURE													
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	**344 320 000.00**		79 629 351.22	8 731 761.92	**432 681 113.14**	2 608 706.12		8 538 402.46	**443 828 221.72**	443 828 221.72		**443 828 221.72**	100.0%
B32 TECHNOLOGY FOR ITER AND DEMO	**6 500 000.00**		-2 800 000.00	-1 040 703.68	**2 659 296.32**				**2 659 296.32**	2 659 296.32		**2 659 296.32**	100.0%
B33 TECHNOLOGY FOR BROADER APPROACH	**50 500 000.00**		-27 200 000.00	262 574.09	**23 562 574.09**				**23 562 574.09**	23 562 574.09		**23 562 574.09**	100.0%
B34 TECHNOLOGY FOR DONES	**2 000 000.00**			-400 000.00	**1 600 000.00**				**1 600 000.00**	1 600 000.00		**1 600 000.00**	100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	**20 000 000.00**		5 000 000.00	-2 300 147.12	**22 699 852.88**	11 995.40			**22 711 848.28**	22 699 852.88		**22 699 852.88**	99.9%
B36 OTHER OPERATIONAL EXPENDITURE	**5 000 000.00**			-1 061 761.59	**3 938 238.41**	4 336.16	12 676.56		**3 955 251.13**	3 942 574.57	12 676.56	**3 955 251.13**	100.0%
Title B3 - Total	**428 320 000.00**	**0.00**	**54 629 351.22**	**4 191 723.62**	**487 141 074.84**	**2 625 037.68**	**12 676.56**	**8 538 402.46**	**498 317 191.54**	**498 292 519.58**	**12 676.56**	**498 305 196.14**	**100.0%**
B4 EARMARKED EXPENDITURE													
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	**126 400 000.00**	-66 400 000.00			**60 000 000.00**		1 500 000.00		**61 500 000.00**	61 333 174.81		**61 333 174.81**	99.7%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	**p.m.**				**0.00**	33 714 489.01	24 801 517.80	-8 538 402.46	**49 977 604.35**	6 342 698.62		**6 342 698.62**	12.7%
B43 OTHER EARMARKED EXPENDITURE	**p.m.**				**0.00**		388 991.47		**388 991.47**	336 841.47		**336 841.47**	86.6%
Title B4 - Total	**126 400 000.00**	**-66 400 000.00**	**0.00**	**0.00**	**60 000 000.00**	**33 714 489.01**	**26 690 509.27**	**-8 538 402.46**	**111 866 595.82**	**68 012 714.90**	**0.00**	**68 012 714.90**	**60.8%**
Titles B3 & B4 - Subtotal	**554 720 000.00**	**-66 400 000.00**	**54 629 351.22**	**4 191 723.62**	**547 141 074.84**	**36 339 526.69**	**26 703 185.83**	**0.00**	**610 183 787.36**	**566 305 234.48**	**12 676.56**	**566 317 911.04**	**92.8%**
Total BUDGET in Payment appropriations	**636 659 500.00**	**-66 400 000.00**	**54 629 351.22**	**0.00**	**624 888 851.22**	**36 431 302.67**	**32 382 322.84**	**0.00**	**693 702 476.73**	**637 710 261.10**	**4 603 270.74**	**642 313 531.84**	**92.6%**

Annex III. c. Transfers Adopted by F4E Director

in EUR

	Fusion for Energy 2024 TRANSFERS	Type of appropriation	Transfer N°1 F4E.23315 18-06-2024	Transfer N°2 F4E.23645 01-10-2024	Transfer N°3 F4E.23681 16-10-2024	Transfer N°4 F4E.23803 26-11-2024	Transfer N°5 F4E.23877 11-12-2024	Transfer N°6 F4E.24044 19-12-2024	Transfer N°7 F4E.24045 19-12-2024	Transfer N°8 F4E.24046 19-12-2024	TOTAL TRANSFERS
10	SALARIES AND ALLOWANCES Of which ESTABLISHMENT PLAN POSTS	commitments and payments	-2,480,000.0		-300,000.0		-1,279,000.0	429,561.9		-723,439.0	-4,352,877.1
11	SALARIES AND ALLOWANCES Of which EXTERNAL PERSONNEL	commitments and payments	790,000.0				-305,000.0				485,000.0
12	EXPENDITURE RELATING TO STAFF RECRUITMENT	commitments and payments	260,000.0				-122,400.0	-257,402.8			-119,802.8
13	MISSIONS EXPENSES	commitments and payments	250,000.0		300,000.0			-19,767.3			530,232.8
14	SOCIAL-MEDICAL INFRASTRUCTURE	commitments and payments		57,565.0		25,000.0					82,565.0
15	TRAINING	commitments and payments	130,000.0								130,000.0
16	EXTERNAL SERVICES	commitments and payments				-25,000.0	-77,500.0	-37,500.0			-140,000.0
17	RECEPTION, EVENTS AND REPRESENTATION	commitments and payments					-500.0	-1,500.0			-2,000.0
18	SOCIAL WELFARE	commitments and payments		17,000.0				-6,000.0			11,000.0
19	OTHER STAFF RELATED EXPENDITURE	commitments and payments		-452,565.0			-162,335.0	-107,391.9			-722,291.9
	SUB TOTAL TITLE 1	**commitments and payments**	**-1,050,000.0**	**-378,000.0**	**0.0**	**0.0**	**-1,946,735.0**	**0.0**	**0.0**	**-723,439.0**	**-4,098,174.0**
21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	commitments and payments					-106,719.5		-247,742.0	-194,928.1	-549,389.6
22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	commitments and payments	800,000.0	378,000.0			-47,740.2		579,976.8	-591,976.8	1,118,259.8
23	MOVABLE PROPERTY AND ASSOCIATED COSTS	commitments and payments					-46,000.0		-260,872.8	-41,400.0	-348,272.8
24	CURRENT ADMINISTRATIVE EXPENDITURE	commitments and payments	250,000.0				-112,636.3			-126,507.2	10,856.5
25	POSTAGE AND TELECOMMUNICATIONS	commitments and payments					-63,900.0			-55,400.0	-119,300.0
26	MEETING EXPENSES	commitments and payments					-57,600.0		-48,962.0	-51,840.0	-158,402.0
27	RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES	commitments and payments									0.0
28	INFORMATION AND PUBLISHING	commitments and payments					-4,000.0		-22,400.0	-3,600.0	-30,000.0
29	OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	commitments and payments					-352.6			-16,948.9	-17,301.4
	SUB TOTAL TITLE 2	**commitments and payments**	**1,050,000.0**	**378,000.0**	**0.0**	**0.0**	**-438,948.7**	**0.0**	**0.0**	**-1,082,600.9**	**-93,549.6**
	TOTAL TITLE 1 + TITLE 2	**commitments and payments**	**0.0**	**0.0**	**0.0**	**0.0**	**-2,385,683.7**	**0.0**	**0.0**	**-1,806,040.0**	**-4,191,723.6**
31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	commitments					2,578,319.1			5,982,446.6	8,560,765.7
		payments					356,080.6			8,375,681.4	8,731,761.9
32	TECHNOLOGY FOR ITER AND DEMO	commitments								-530,666.5	-530,666.5
		payments								-1,040,703.7	-1,040,703.7
33	TECHNOLOGY FOR BROADER APPROACH	commitments				-1,500,000.0				231,407.9	-1,268,592.1
		payments				-1,500,000.0	1,000,000.0			762,574.1	262,574.1
34	TECHNOLOGY FOR DONES	commitments								-37,017.4	-37,017.4
		payments								-400,000.0	-400,000.0
35	EXTERNAL SUPPORT ACTIVITIES	commitments				1,500,000.0	2,200,000.0			-3,829,678.8	-129,678.8
		payments				1,500,000.0	2,000,000.0			-5,800,147.1	-2,300,147.1
36	OTHER OPERATIONAL EXPENDITURE	commitments					-2,392,635.5			-10,451.9	-2,403,087.3
		payments					-970,396.9			-91,364.7	-1,061,761.6
	SUB TOTAL TITLE 3	**commitments**	**0.0**	**0.0**	**0.0**	**0.0**	**2,385,683.7**	**0.0**	**0.0**	**1,806,040.0**	**4,191,723.6**
	SUB TOTAL TITLE 3	**payments**	**0.0**	**0.0**	**0.0**	**0.0**	**2,385,683.7**	**0.0**	**0.0**	**1,806,040.0**	**4,191,723.6**
	TOTAL	**commitments**	**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**

Annex III. d. Resources allocated to F4E Work Programme 2024

2024 Work Programme		Grant		Procurement		Cash Contribution		TOTAL	
		Amount (€)	Variation (%)	Amount (€)	Variation (%)	Amount (€)	Variation (%)	Amount (€)	Variation (%)
B3-1 & B4-1 ITER Construction	Original WP	1,200,000.00	-	286,334,235	-	212,536,183.00	-	**500,070,418**	**-**
	Last amended WP	2,356,979.00	96%	321,941,009	12%	278,910,115.00	31%	**603,208,103**	**21%**
	Execution	2,356,979.00	0%	321,275,166	0%	273,143,494.00	-2%	**596,775,639**	**-1%**
B3-2 Technology for ITER	Original WP	0	-	10,012,547	-	0	-	**10,012,547**	**-**
	Last amended WP	0	-	7,500,000	-25%	0	-	**7,500,000**	**-25%**
	Execution	0	-	6,969,333	-7%	0	-	**6,969,333**	**-7%**
B3-3 Technology for Broader Approach	Original WP	0	-	35,533,165	-	14,050,000	-	**49,583,165**	**-**
	Last amended WP	0	-	9,435,896	-73%	13,964,104.00	-1%	**23,400,000**	**-53%**
	Execution	0	-	8,167,304	-13%	13,964,104	0%	**22,131,408**	**-5%**
B3-4 Technology for DONES	Original WP	0		1,800,000	-	0	-	**1,800,000**	**-**
	Last amended WP	0		400,000	-	1,600,000	-	**2,000,000**	**11%**
	Execution	0		362,983	-9%	1,600,000	-	**1,962,983**	**-2%**
B3-5 External Support Activities	Original WP	0		20,259,068	-	0	-	**20,259,068**	**-**
	Last amended WP	0		29,000,000	-	0	-	**29,000,000**	**43%**
	Execution	0		28,870,321	-	0	-	**28,870,321**	**0%**
B3-6 Other Expenditure	Original WP	0	-	6,607,383	-	0	-	**6,607,383**	**-**
	Last amended WP	0	-	6,000,000	-9%	0	-	**6,000,000**	**-9%**
	Execution	0	-	3,596,913	-40%	0	-	**3,596,913**	**-40%**
B4-2 Activities linked to ITER Organization	Original WP	0	-	0		0	-		**-**
	Last amended WP	0	-	49,022,219		0	-	**49,022,219**	**-**
	Execution	0	-	7,994,455	-84%	0	-	**7,994,455**	**-84%**
TOTAL	**Original WP**	**1,200,000**	**-**	**360,546,398**	**-**	**226,586,183**	**-**	**588,332,581**	**-**
	Last amended WP	**2,356,979**	**96%**	**423,299,124**	**17%**	**294,474,219**	**30%**	**720,130,322**	**22%**
	Execution	**2,356,979**	**0%**	**377,236,475**	**-11%**	**288,707,598**	**-2%**	**668,301,052**	**-7%**

Variations: Last amended WP compared to Original WP and Execution to Last amended WP
Due to some additional internal and external assigned revenues, the final appropriations available at the end of 2024 amount 734 Meur

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

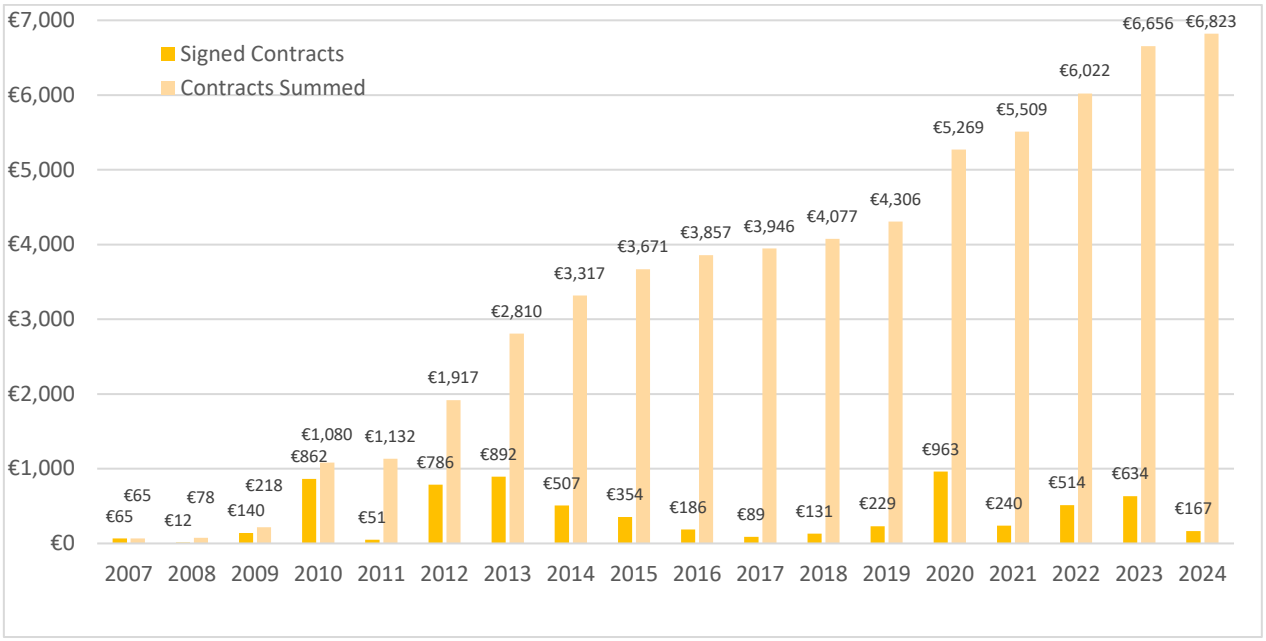


Figure 90: Annual and cumulative value of operational and administrative contracts and grants signed by F4E (€ million, in-year values).

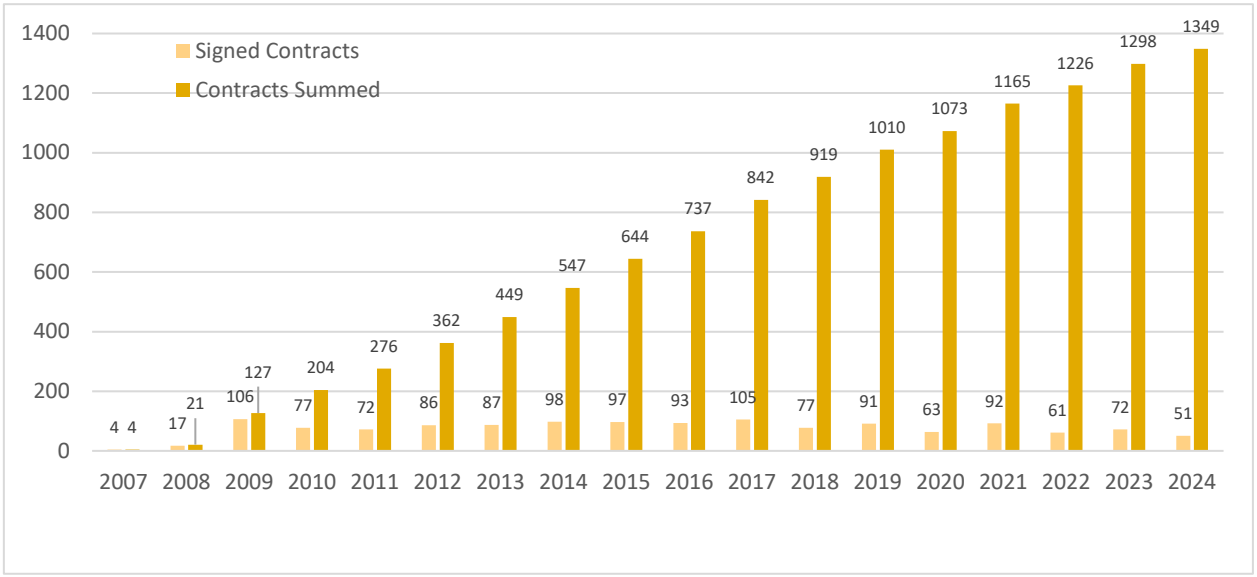


Figure 91: Annual and cumulative number of operational and administrative contracts and grants signed by F4E (in-year values).

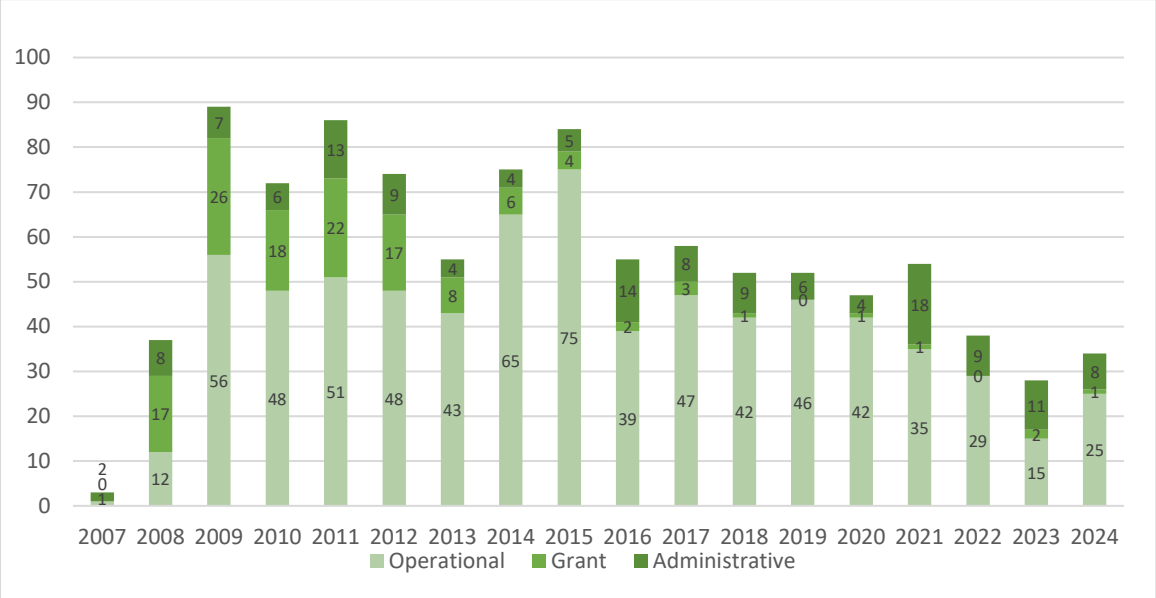


Figure 92: Operational and Administrative Procurement and Grant procedures launched.

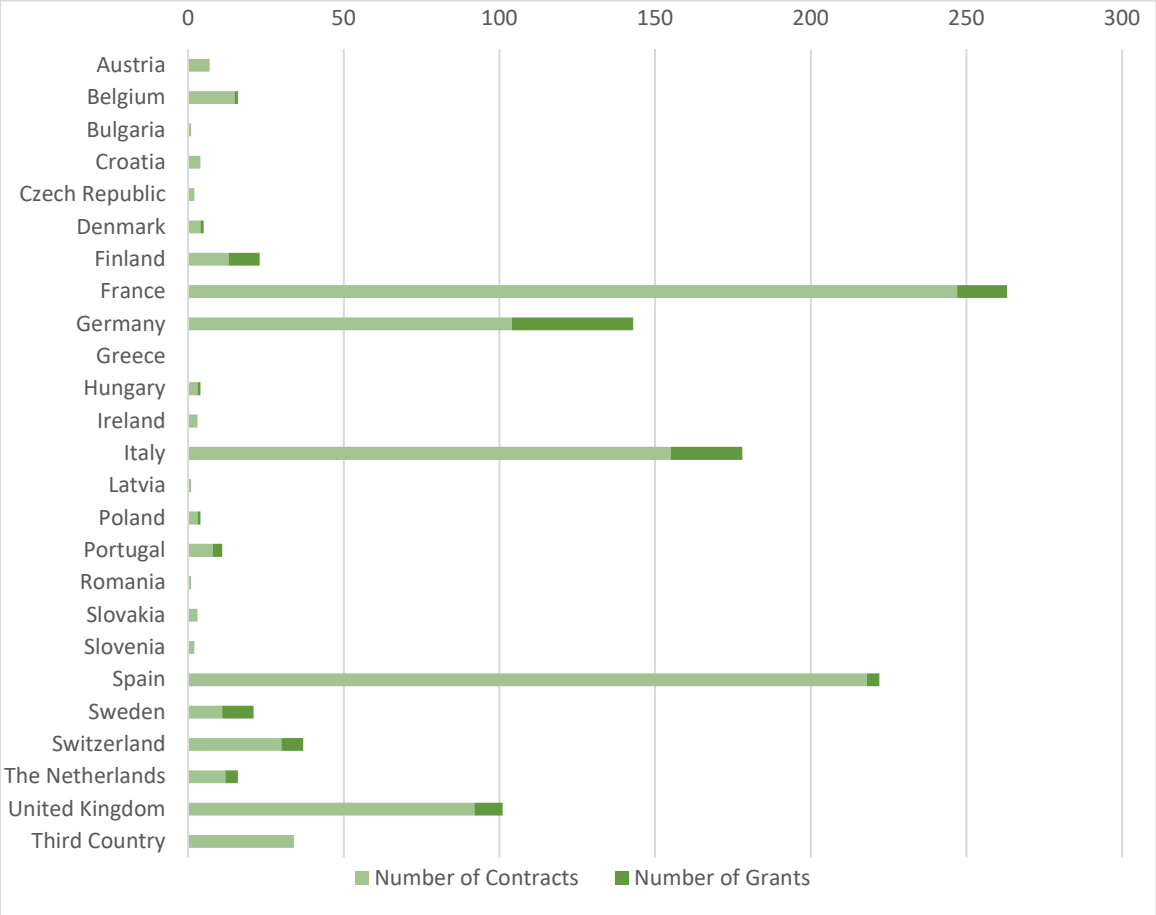
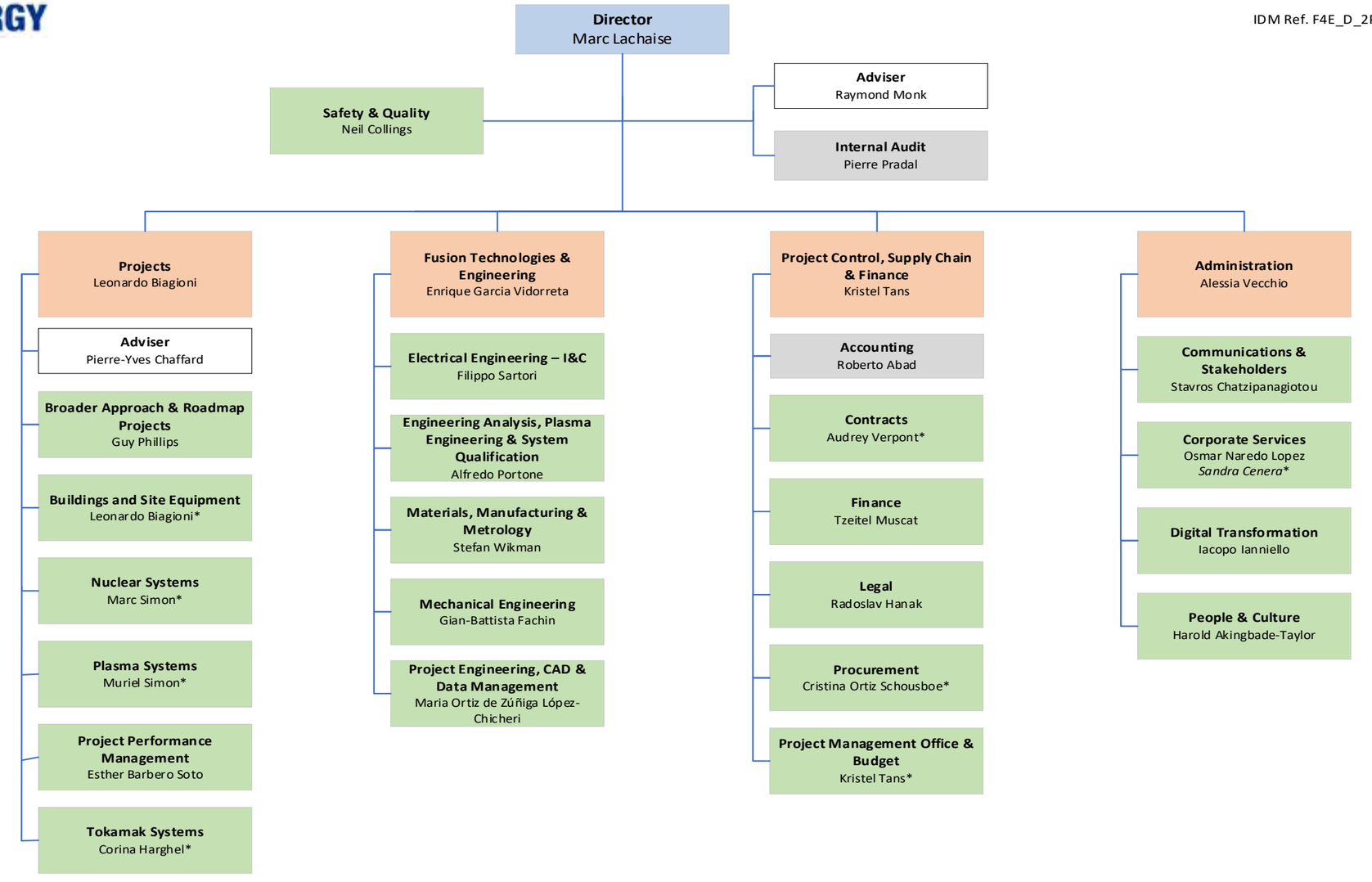


Figure 93: Geographical distribution of awarded contracts and grants (Number in the period 2007-2024). Please note that the contribution of UK and CH since 2021 is included in "Third Country".

Annex IV Organisational chart

Organisational Chart
Effective from 31 December 2024
IDM Ref. F4E_D_2PCCXS



Legend

Department	Unit	Statutory function also reporting to Governing Board	* Acting

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

Annex V a. Establishment Plan

	Amended Authorised Posts (EP 2024)		Actually filled as of 31/12/2024	
	FO	TA	FO	TA
AD 16	0	0	0	0
AD 15	0	0	0	0
AD 14	4	4	2	1
AD 13	6	7	3	3
AD 12	9	26	10	28
AD 11	1	28	0	25
AD 10	8	53	9	56
AD 9	1	42	1	29
AD 8	0	29	0	29
AD 7	2	16	1	12
AD 6	0	20	1	31
AD 5	0	0	0	0
AD Total	**31**	**225**	**27**	**214**
AST 11	2	0	1	0
AST 10	1	0	1	0
AST 9	3	1	4	0
AST 8	1	1	0	2
AST 7	1	10	0	7
AST 6	2	8	1	6
AST 5	2	8	2	6
AST 4	0	3	1	3
AST 3	0	6	0	8
AST 2	0	0	0	0
AST 1	0	0	0	0
AST Total	**12**	**37**	**10**	**32**
TOTAL	**43**	**262**	**37**	**246**
Total FO/TA	**305**		**283**	

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

Job type	Sub-category	Year 2024 (%)	Year 2023 (%)
Administrative Support and Coordination	Administrative support	13.70 %	13.49 %
	Coordination	1.71 %	1.50 %
	Total	15.42 %	14.99 %
Operational	Top level operational coordination	5.14 %	6.00 %
	Programme management and implementation	65.52 %	65.10 %
	Evaluation and impact assessment	1.07 %	1.07 %
	General operational activities	3.00 %	3.00 %
	Total	74.73 %	75.16 %
Neutral	Finance, Control	9.85 %	9.85 %
	Linguistics	0.00 %	0.00 %
	Total	9.85 %	9.85 %

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****]***
Adviser / Senior Expert	FO/TA	AD13-14	Administrative/Operations
Head of Department (level 2, taking the Director as level 1)	FO/TA	From AD12 to 14	Administrative/Operations
Head of Unit/Project Team Manager (level 3)	FO/TA	From AD9 to AD14	Administrative/Operations
Group Leader (level 4)	FO/TA	From AD5 to AD12	Operations/Neutral
Officer	FO/TA	From AD5 to AD12	Administrative/Operations/Neutral
Assistant	FO/TA	From AST1 to AST9	Administrative/Operations/Neutral
Senior Assistant	FO/TA	AST10-11	Administrative/Operations/Neutral
Head of Administration	TA	AD12 (external)	Administrative
Head of Human Resources	TA	AD11 (external)	Administrative
Head of Finance	FO	AD10	Neutral
Head of ICT	TA	AD 9 to 14 (internal)	Administrative
Secretary/Clerk	CA	II	Administrative/Operations/Neutral
Data Protection Officer	FO	AD11	Administrative
Accounting Officer	FO	AD7	Neutral
Internal Auditor	TA	AD9	Administrative
Assistant to the Director	CA	III	Operations

Annex V d. Flexitime Scheme in 2024

Category/ Grade	Overtime (days)	Recuperation (days)	Overtime not recuperated (days)
AD	**1397.26**	**293.06**	**1104.21**
10	328.20	77.42	250.78
11	212.52	32.58	179.94
12	245.39	17.67	227.72
13	69.73	3.17	66.56
14	16.91	0.00	16.91
6	151.95	40.06	111.89
7	90.66	27.75	62.91
8	133.18	55.67	77.51
9	148.73	38.75	109.98
AST	**174.52**	**60.38**	**114.15**
11	10.06	1.00	9.06
3	27.31	6.50	20.81
4	12.94	8.67	4.27
5	16.01	9.58	6.43
6	25.19	11.50	13.69
7	24.69	12.50	12.19
8	34.14	4.75	29.39
9	24.19	5.88	18.31
GFII	**26.98**	**10.48**	**16.50**
5	12.87	5.33	7.54
6	1.80	1.50	0.30
7	12.31	3.65	8.66
GFIII	**103.00**	**43.35**	**59.64**
10	21.78	10.21	11.57
11	44.61	15.15	29.46
12	29.28	14.67	14.61
9	7.33	3.33	4.00
GFIV	**215.23**	**101.74**	**113.49**
14	37.17	13.91	23.26
15	42.21	18.17	24.04
16	93.24	45.67	47.57
17	42.62	24.00	18.62
Average	**68.46**	**18.18**	**50.28**

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 2024 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 2024	Original Budget/Budgeted forecast WP24	Final Budget/Budgeted forecast WP24	Execution	Variation Original [2] %	Variation Final [3] %
1	Magnets	5.3	1,608,267	250,028	250,028	-84%	0%
2,3,4,10 [1]	Main Vessel	115.7	110,183,418	138,514,583	136,778,666	24%	-1%
5	Remote Handling	43.9	8,145,139	9,700,938	9,558,289	17%	-1%
6	Cryoplant and Fuel Cycle	35.1	3,818,495	4,669,148	3,808,841	0%	-18%
7	Plasma Engineering Operations						
8	Heating and Current Drive	79.2	25,452,484	29,536,378	30,282,097	19%	3%
9	Diagnostics	47.6	6,487,229	6,940,916	7,553,604	16%	9%
11	Site and Buildings and Power Supplies	58.9	137,594,954	146,774,210	151,352,884	10%	3%
12	Cash Contributions	2.3	211,979,980	275,652,131	273,143,494	29%	-1%
13	Supporting Activities	25.7	30,391,390	32,636,149	30,336,959	0%	-7%
14	Broader Approach	47.7	50,651,225	24,090,705	22,806,945	-55%	-5%
15	Dones	4.6	2,020,000	2,342,912	2,429,245	20%	4%
16	Technology Development Programme	0.9					
	Sub-total Budget WP	**467**	**588,332,581**	**671,108,098**	**668,301,052**	**14%**	**0%**

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			5,009,115
Reserve stemming from appropriations corresponding to external assigned revenue from ITER IO as per Article 12.4.b FR		49,022,219	54,743,617
Reserve stemming from appropriations corresponding to external assigned revenue from ITER Host State as per Article 12.4.b FR			3,937,166
Reserve stemming from appropriations corresponding to internal assigned revenue as per Article 12.4.a FR			1,942,449
Reserve stemming from appropriations corresponding to other assigned revenue as per Article 12.4.b FR			52,150
Total Budget	**588,332,581**	**720,130,317**	**733,985,549**

[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 2024 Work Programme is reflected in its amendments approved by the Governing Board in July and December 2024. The KPI of the execution of the budgeted forecast allocated to the 2024 Work Programme in its last amendment is 99.6%.

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

- **Cryoplant and Fuel Cycle**: The signature for an amendment related to commissioning activities of Liquid Nitrogen Plant and Auxiliary System is postponed to 2025.

Annex VII Contribution, grant and service level agreements. Financial Framework Partnership Agreements[7]

On going Grants signed before 31.12.2024

Grant Agreements Reference	Date of Signature	Commitment Value (Euros)	of which committed in 2024	Duration (In months)
F4E-FPA-327 (PMS-DG)-07	20/02/2020	€2,240,971	€140,030	68
F4E-FPA-364-06	22/10/2018	€1,514,047	€28,739	80
F4E-FPA-384 (DG)-05	30/07/2018	€2,802,996	€141,466	82
F4E-GRT-1146-01	25/07/2021	€2,278,348	€0	48
F4E-GRT-1446-01	06/10/2023	€2,997,528	€46,027	64
F4E-GRT-1530-01	13/12/2023	€75,670	€0	19
F4E-GRT-553	09/07/2014	€2,562,993	€0	88
F4E-GRT-0901-01	09/03/2018	€2,025,630	€717	82
Total		€16,498,183		

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

Annex VIII – Annual Accounts

FUSION FOR ENERGY

FINAL ANNUAL ACCOUNTS

Financial statements
&
Budget implementation

17th financial year – 2024

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 European 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 2024 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, 28th May 2025

[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 June 2024 IO presented a proposal for a new project baseline, prioritizing start of substantial research operations including Deuterium fusion operation in 2035 followed by full magnetic energy and plasma current operation. The proposal was further evaluated by IO (including schedule and cost implications) and discussed again at the ITER Council in November 2024. The ITER Council supported the use of Baseline 2024 by the IO, together with the Domestic Agencies, as a working plan for progress monitoring and operational management this year.

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 letter[3] 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

The United Kingdom ceased being a F4E Member in January 2020 following its withdrawal from Euratom. In September 2023, the UK confirmed that it will take forward its own fusion energy strategy instead of associating with the Euratom programme.

Switzerland ceased being a F4E member in December 2020, when a cooperation agreement in the field of controlled nuclear fusion expired. In December 2024, it was announced by the European Commission that negotiations had been completed on an agreement to allow Switzerland to become a F4E Member from 2026.

c) Main achievements during 2024

Throughout 2024 F4E updated its technical baseline, schedule and costs to reflect the new ITER baseline assumptions and new baseline impact on F4E in-kind deliveries as well as cash contribution to the IO.

During 2024 F4E has further progressed in the work and continued the delivery of some of the major components to ITER to continue the assembly activities.
Notably in 2024 in a major milestone, F4E delivered the first European Vacuum Vessel sector to IO (GB16/IC58). In another major development Factory Acceptance Test for last European Toroidal Coil has successfully passed (GB54/IC67), completing European Toroidal Coil deliveries.
As far as buildings are concerned, F4E completed the Construction of Cryoplant Coldbox Building (52) (GB21) and made available Busbar Bridge for installation of systems (GB58/IC91.1).
F4E also delivered the First Torus & Cryostat to IO (GB33).

Both design and manufacturing activities have progressed in Europe in laboratories and industry.
In 2024 F4E achieved an Annual M-SPI:

$$Annual\ M-SPI = \frac{Number\ of\ milestones\ with\ Status = Completed}{Number\ of\ milestones\ with\ reference\ date\ \leq Current\ month} = 0.84$$

The achievements during the year are detailed in the 2024 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 EUR 246 million (2008 value) per the latest estimate. This EAC increase is expected to materialize as additional expenditure in the years 2025-2026. This inflationary effect in raw material prices, both in existing contracts and tenders received in 2024 indicated stabilization of the impact of international situation.

e) 2024 Accounts

The 2024 financial statements of F4E and its reports on budget implementation for 2024 have been prepared in conformity with:

- The Council Decision establishing F4E,
- The Financial Regulation (FR) applicable to the general budget of the European Union[4],
- The F4E FR[5],
- The « Inventory directive » (EC n° 643/2005),
- The European Commission's consolidation manual for the 2024 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 2024 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.
In line with Article 70.6 of the FR applicable to the general budget of the EU, PKF Littlejohn LLP has been appointed as independent external auditor to verify that the 2024 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.

[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.

Section I. 2024 Financial Statements[6]

2. Balance Sheet

As at 31 December 2024 — EUR thousands

	Note	2024	2023
CURRENT ASSETS			
Cash and cash equivalents	6.2.1.	22	25
Receivables	6.2.2.	330 181	192 080
Pre-financing	6.2.3.	29 771	19 879
		359 974	**211 984**
NON-CURRENT ASSETS			
Pre-financing	6.2.3.	78 777	77 745
Property, plant and equipment	6.2.4.	566	388
Intangible assets	6.2.4.	93	73
		79 437	**78 206**
TOTAL ASSETS		**439 411**	**290 190**
CURRENT LIABILITIES			
Accounts payable	6.2.5.	240 255	126 337
Accrued charges and deferred income	6.2.6.	129 933	122 750
		370 188	**249 087**
NON-CURRENT LIABILITIES			
Non-Current provisions	6.2.7.	201 201	206 903
		201 201	**206 903**
TOTAL LIABILITIES		**571 389**	**455 991**
NET ASSETS		**-131 978**	**-165 801**
NET ASSETS/EQUITY			
Accumulated surplus/deficit		-165 801	6 905
Economic result of the year - Profit (+)/Loss (-)		33 823	-172 706
NET ASSETS	6.2.8.	**-131 978**	**-165 801**

Fig. 1 Balance Sheet

[6] Due to rounding, some (sub) totals may not correspond with the sum of the separate figures.

3. Statement of Financial Performance

As at 31 December 2024 EUR thousands

	Note	2024	2023
NON-EXCHANGE REVENUES			
Revenue from Euratom		554 581	404 387
Revenue from other contributors (Member States)		68 200	120 700
Other non exchange revenue		8 741	182
		631 522	**525 268**
EXCHANGE REVENUES			
Reserve Fund		5 791	22 272
Other revenues		664	199
		6 455	**22 471**
TOTAL REVENUE	6.3.1.	**637 978**	**547 740**
OPERATIONAL EXPENSES	6.3.2.		
Expenses with third parties		525 446	623 371
		525 446	**623 371**
OTHER EXPENSES	6.3.3.		
Staff costs		61 172	59 504
Provisions - additions and adjustments		235	21 344
Property, plant and equipment related expenses		1 755	1 986
Other expenses		15 546	14 242
		78 709	**97 075**
TOTAL EXPENSES		**604 155**	**720 446**
SURPLUS (+) / DEFICIT (-) OF THE YEAR		**33 823**	**-172 706**

Fig. 2 Statement of Financial Performance

4. Cash Flow Statement (indirect method)

As at 31 December 2024 — EUR thousands

	2024	2023
Surplus/(deficit) from ordinary activities	**33 823**	**-172 706**
Operating activities		
Amortization (intangible fixed assets) +	46	33
Depreciation (tangible fixed assets) +	44	-520
Increase/(decrease) in Provisions for risks and liabilities	-5 702	21 267
Increase/(decrease) in Value reduction for doubtful debts	0	0
(Increase)/decrease in Stock	0	0
(Increase)/decrease in Long term Pre-financing	-1 033	-10 436
(Increase)/decrease in Short term Pre-financing	-9 891	-6 486
(Increase)/decrease in Long term Receivables	0	0
(Increase)/decrease in Short term Receivables	-138 102	118 824
Increase/(decrease) in Other Long term liabilities	0	0
Increase/(decrease) in Short term Liabilities	121 101	49 486
	285	**-538**
Investing activities		
Increase of tangible and intangible fixed assets (-)	-496	-285
Proceeds from tangible and intangible fixed assets (+)	208	823
	-288	**538**
Net increase/(decrease) in cash and cash equivalents	**-3**	**0**
Cash and cash equivalents at the beginning of the period	25	25
Cash and cash equivalents at the end of the period	**22**	**25**

Fig. 3 Cash Flow Statement

5. Statement of Changes in Net Assets

As at 31 December 2024 — EUR thousands

Net assets	Accumulated Surplus (+) / Deficit (-)	Economic result of the year	Net assets (Total)
Balance as of 31 December 2023	**6 905**	**-172 706**	**-165 801**
Balance as of 1 January 2024	**6 905**	**-172 706**	**-165 801**
Fair value movements	0	0	0
Allocation of the Economic Result of Previous Year	-172 706	172 706	0
Economic result of the year	0	33 823	33 823
Balance as of 31 December 2024	**-165 801**	**33 823**	**-131 978**

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 of a balance sheet designed to establish the financial position of F4E at 31 December, a statement of financial performance, showing all income and expenditure for the financial year, a statement of changes in net assets and a cashflow statement.

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

EUR

Description	31.12.2024	31.12.2023
Bank accounts:		
Current accounts	0.00	0.00
Imprest accounts/Cash in hand	22 284.61	25 000.00
Short-term deposits	0.00	0.00
TOTAL	**22 284.61**	**25 000.00**
EC Central treasury:	43 819 188.01	20 147 122.03

Fig. 5 Central treasury and Cash Equivalents

The cash position at the end of 2024 is composed of two imprest accounts (petty cash).

No bank interests have been generated in 2024.

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 8 772 276.48** referring mainly to the recoverable VAT from France.

Sundry receivables: **EUR 43 878 105.57** composed mainly of the funds belonging to F4E but managed by the EC Central treasury (see also above point 6.2.1.).

Deferrals: **EUR 276 997 943.82** corresponding to the deferred charges related to the 2025 cash contribution to IO (EUR 273.1 million), deferred charges for insurance premiums (EUR 1.8 million) and other deferred administrative expenses paid in advance (EUR 2.0 million).

Accrued income: **EUR 532 994.82** referring to the income from the ITER Reserve fund.

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	31.12.2024	31.12.2023
Pre-financing given to third parties (non-current)	78 777 465.40	77 744 567.36
Pre-financing given to third parties (current)	54 664 028.09	49 166 474.12
Accrued charges on Pre-financing given to third parties	-24 893 415.54	-29 287 145.75
TOTAL	**108 548 077.95**	**97 623 895.73**

Fig. 6 Pre-Financing

It is estimated that EUR 78.7 million of the pre-financing open at 31/12/2024 will be cleared with eligible amounts after 2025.

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 that 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 31/12/2024, 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 2024 :

EUR

ASSETS		Intangible fixed assets			Tangible fixed assets							Fixed assets
2024		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
Gross carrying amounts 01.01.2024	+	**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**
Additions	+		65 840.69	**65 840.69**		79 622.38	249 963.29	70 206.95	30 482.85		**430 275.47**	**496 116.16**
Disposals	-		0.00	**0.00**		-10 214.00	-53 502.60	-96 002.29	-48 458.59		**-208 177.48**	**-208 177.48**
Transfer between headings	+/-			**0.00**							**0.00**	**0.00**
Other changes :	+/-			**0.00**							**0.00**	**0.00**
Gross carrying amounts 31.12.2024		**0.00**	**3 003 863.46**	**3 003 863.46**	**0.00**	**975 262.77**	**3 439 519.50**	**690 614.79**	**521 719.68**	**0.00**	**5 627 116.74**	**8 630 980.20**
Accumulated amortization and impairment 01.01.2024	-	**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**
Depreciation	-		-45 624.69	**-45 624.69**		-46 167.38	-136 759.29	-25 043.95	-43 188.85		**-251 159.47**	**-296 784.16**
Write-back of depreciation	+			**0.00**							**0.00**	**0.00**
Disposals	+		0.00	**0.00**		10 214.00	51 994.60	95 867.29	48 825.59		**206 901.48**	**206 901.48**
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**							**0.00**	**0.00**
Accumulated amortization and impairment 31.12.2024		**0.00**	**-2 910 448.46**	**-2 910 448.46**	**0.00**	**-847 232.77**	**-3 095 646.50**	**-625 987.79**	**-492 428.68**	**0.00**	**-5 061 295.74**	**-7 971 744.20**
Net carrying amounts 31.12.2024		**0.00**	**93 415.00**	**93 415.00**	**0.00**	**128 030.00**	**343 873.00**	**64 627.00**	**29 291.00**	**0.00**	**565 821.00**	**659 236.00**
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 238 477 070.05** and are composed of the balance of the 2025 cash contribution to IO (EUR 238.1 million) and suppliers' invoices received but not paid at year end and reimbursements to staff.

Pre-financing received from Euratom totalled **EUR 1 778 392.18** refers to the balance of the budget outturn account 2024, to be reimbursed to the EC in 2025 (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 129 932 615.03** includes:

- EUR 91 696 735.27 for services rendered in 2024 on operational activities and not invoiced at 31/12/2024,
- EUR 6 445 035.58 for services rendered in 2024 on administrative expenditures and not invoiced at 31/12/2024,
- EUR 2 035 843.29 for F4E staff's untaken leave as at the end of December 2024. 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 29 755 000.890 as deferred income, for the revenue received from IO for the Reserve fund for which the works have not been performed at 31/12/2024.

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 2024 EUR

Description	Amounts at 31.12.2023	Amounts used	Amounts cancelled	Transfer to current	Addition and value adjustments	Amounts at 31.12.2024
Decommissioning fund	196 931 843.06	0.00	0.00	0.00	-5 937 478.51	190 994 364.55
Additional contribution to Japan/QST	9 971 564.40	0.00	0.00	0.00	235 209.38	10 206 773.78
Total	**206 903 407.46**	**0.00**	**0.00**	**0.00**	**-5 702 269.13**	**201 201 138.33**

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.

According to the Overall Project Cost approved by the ITER Council[7], the IO members will plan to provide their contributions to the costs of decommissioning by regular annual payments during the course of the ITER operation into a dedicated fund through the IO budget.

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 :

- use of the IO Baseline 2024 proposal of June 2024 as a working baseline (going beyond 2042 – current legal date of F4E closure),
- the percentage of completion, discharge of obligations to ITER is 69.28 % as of 31.12.2024 (according to the F4E Monthly Dashboard),
- the cost contributions will be done in equal annual instalments during the Operation Phase,
- EU HICP annual inflation rate from 2001 to 2024,
- an annual inflation rate of 2.0 % provided by Eurostat to reflect future prices,
- the contributions in future prices are discounted on average 2.6 % per year (ECB – 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 2024,
- an annual inflation rate of 2.0 % provided by Eurostat to reflect future prices,

[7] Updated Overall Project Cost (OPC) – ITER_D_C59Y8B v1.2 presented to IC-35 (20-21 November 2024)

- the contributions in future prices are discounted on average 2.0 % per year (ECB – zero coupon rate).

6.2.8. Net Assets

F4E net assets are increased by the positive financial performance of the year (EUR 33.8 million) totalling **EUR -131 978 296.34** as of 31 December 2024.

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 637 977 687.57** (EUR 547 739 621.38 in 2023), include mainly the 2024:

- Euratom contribution: EUR 554 581 107.84
- ITER Host State contribution: EUR 60 000 000.00
- Membership contributions: EUR 8 200 000.00
- Revenue from ITER: EUR 5 791 245.89
- Exceptional adjustment of the Provision for the Decommissioning: EUR 5 937 478.51

6.3.2. Operational Expenses – EUR 525 446 064.03 (EUR 623 370 650.55 in 2023)

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 78 708 755.81 (EUR 97 075 159.61 in 2023)

- Staff expenses: **EUR 61 172 211.49** (EUR 59 503 941.06 in 2023)
  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 235 209.38** 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 1 755 164.23** refers to the yearly depreciation of fixed assets and the cost for building rent, maintenance and security.

- Other administrative expenses: the amount of **EUR 15 546 170.71** includes mainly the following items:

EUR

	2024	2023	Variation
IT costs – operational/support	5 340 637.10	4 406 172.34	934 464.76
IT costs - development	1 310 431.98	1 182 960.89	127 471.09
Missions	2 290 868.10	2 242 585.73	48 282.37
Office supplies & maintenance	1 263 763.13	1 266 832.05	-3 068.92
Legal expenses	939 471.42	1 277 092.20	-337 620.78
Training	903 459.66	779 519.16	123 940.50
Communications & publications	702 769.11	284 429.89	418 339.22
Interim staff	617 855.70	544 642.76	73 212.94
Service level agreement with EU Paymaster Office/DG HR	461 120.26	453 731.60	7 388.66
Experts and related expenditure	370 765.98	573 488.02	-202 722.04
Recruitment	285 286.75	100 395.45	184 891.30
Car and transport expenses	19 328.01	42 476.64	-23 148.63
Interest expense on late payment	3 654.35	27 634.34	-23 979.99

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	31.12.2024	31.12.2023
Performance guarantees	128 288 890.83	139 629 524.98

Fig. 11 Performance guarantees

6.4.2. Contingent Liabilities and Significant Legal Commitment

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.

No case is reported at 31.12.2024.

Other – Future obligations[8]

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 2024, and expressed in EUR 2008 (used as basis to ensure a comprehensive financial monitoring).

Cost Estimate at 31/12/24 (MEUR-2008 value)	Actual Commitment (1)	Estimate to Complete (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	65.21	0.00	65.21
BA Phase 2	59.08	333.56	392.64
IFMIF/DONES Construction	1.90	145.79	147.69
ITER Construction	8 367.92	6 954.73	15 322.65
ITER Operation	0.00	1 715.37	1 715.37
ITER Support >= 2043	0.00	463.16	463.16
TOTAL	**8 494.12**	**9 612.60**	**18 106.72**

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 Operation Phase that will be incurred in the same timeframe.

[8] Due to rounding, some (sub) totals may not correspond with the sum of the separate figures.

The costs after 2042 (statutory date of F4E closure) are the costs towards the Decommissioning Phase and the Deactivation Phase.

EaC as of December 2024 indicates EUR ~3 billion[2008] increase compared to December 2023.
The main driver of the increase is the reflection of new ITER baseline in IO and F4E EaC at EUR ~2.6 billion[2008]. Out of EUR 2.6 billion[2008] EaC increase due to ITER re-baselining, EUR 2.1 billion[2008] is attributed to increase of Cash Contribution to IO and EUR 0.5 billion[2008] is driven by the impact of re-baselining on F4E in-kind contribution to ITER and including cost of staff from 2036 to 2042 due to re-baselining factors.
Additionally, EaC has increased by EUR 0.4 billion[2008], driven by extension of Technology Development Programme and re-estimate of Remote Handling Programme.

The following key assumptions have been made in the compilation of the EaC :

- The new 2024 ITER baseline was used in preparation of EaC. The amounts of cash contribution are based on IO documents presented in MAC in October 2024.The schedule used to space F4E EaC in time is based on new IO schedule baseline.
- F4E's Internal running costs (administration costs) are allocated to the construction phase until 2034, and to the Operation Phase from 2035 until 2042. 2035 is in line with Start of Research Operations (SRO) date of the new ITER project baseline schedule and 2042 represents the legal date of F4E closure.
- EaC for In-kind F4E scope was adjusted in line with the new ITER project baseline, driving evolution of scope and necessary schedule optimisations. It is to be noted that the bulk of scope evolutions are reflected in IO EaC and not F4E EaC, and may still in some cases, end up allocated to F4E in the form of future PCRs. Propagation of the new baseline requirements changes through PCRs will continue as time progresses.
- The budget that will finally be allocated to F4E for the current Multi-Annual Financial Framework period (2021-27) is consistent to the decision made by the by the European Council[9], with the associated ITER Host State (France) contribution and subsequent annual budget cuts for 2023, 2024 and 2025. No compensation for cuts to annual budget for 2023, 2024 and 2025 is assumed to be received in current MFF.
- The budget that will be allocated to F4E for the next period after 2027 is treated as undecided. However, the EaC for the period post 2027 is an indication of the amount of funding required.
- F4E cash contribution to the cost of decommissioning and deactivation is assumed to be equal to the costs of 2016 ITER project baseline in constant money as per IO documentation.
- 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.

[9] COUNCIL DECISION (Euratom) 2021/281 of 22 February 2021

- 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.
- Hot Cell Complex EaC has not been updated based on new ITER baseline. 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. Therefore, at this point F4E considers the risk of Hot Cell Complex cost increase due to increased scope to reside at the level of DG ENER. 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].
- Technology Development Programme estimates for years 2025 to 2034 is included.
  Technology Development Programme was launched in 2024 as one of the branches of the F4E Industrial Policy in line with the Governing Board's mandate.

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 13 588.62 million in 2024 value.

Cost Estimate at 31/12/24 (MEUR-2024 value)	Actual Commitment (1)	Estimate to Complete (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	94.14	0.00	94.14
BA Phase 2	84.71	488.85	573.56
IFMIF/DONES Construction	2.68	211.01	213.69
ITER Construction	11 987.53	9 898.11	21 885.64
ITER Operation	0.00	2 354.83	2 354.83
ITER Support >= 2043	0.00	635.81	635.81
TOTAL	**12 169.06**	**13 588.62**	**25 757.67**

Fig. 13 Cost Estimate in Commitment (in 2024 value)

In payments, the estimate to complete amounts to EUR 14 867.73 million in 2024 value.

Cost Estimate at 31/12/24 (MEUR-2024 value)	Actual Payment (1)	Estimate to be Paid (2)	Estimate at Completion (3)=(1)+(2)
BA Phase 1	91.95	2.19	94.14
BA Phase 2	55.87	517.69	573.56
IFMIF/DONES Construction	1.83	211.86	213.69
ITER Construction	10 740.29	11 145.35	21 885.64
ITER Operation	0.00	2 354.83	2 354.83
ITER Support >= 2043	0.00	635.81	635.81
TOTAL	**10 889.94**	**14 867.73**	**25 757.67**

Fig. 14 Cost Estimate in Payment (in 2024 value)

More details on the actual advancement of the works achieved at the end of the year are available in the F4E Annual report 2024.

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.

EUR

Description	31.12.2024	31.12.2023
Guarantees for pre-financing (nominal-on going)	132 330 872.23	126 842 865.16

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 2024, this service in-kind amounts to EUR 3 217 946.85.

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	2024	2023
Receivables with Member States	8 230 280.25	13 994 283.51
All receivables with third parties including accruals (excluding deferrals)	44 953 096.62	20 901 466.82
Cash and deposits	22 284.61	25 000.00
TOTAL	**53 205 661.48**	**34 920 750.33**

Financial liabilities	2024	2023
Current payables	238 477 070.05	124 840 507.11
Other payables	0.00	0.00
Accounts payable with EU entities	1 778 392.18	1 496 811.56
TOTAL	**240 255 462.23**	**126 337 318.67**

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 2024	< 1 year	1 - 5 years	> 5 years	Total
Payables with third parties	238 477 070.05	0.00	0.00	**238 477 070.05**
Payables with consolidated entities	1 778 392.18	0.00	0.00	**1 778 392.18**
Total liabilities	**240 255 462.23**	**0.00**	**0.00**	**240 255 462.23**

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 2024. 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	8 230 280.25
Upper medium grade	0.00
Lower medium grade	0.00
Non-investment grade	0.00
Receivable from IO	6 728.00
EC treasury	43 819 188.01

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 and 2 Management staff	AD14	3

Fig. 19 Related Party Disclosure

The transactions of F4E with key management personnel during financial year 2024 consist only of the payment of their remunerations, allowances and other entitlements in accordance with the EU Staff Regulations.

Section II. Budget Implementation 2024

7. Budget Implementation

7.1. Main Facts on the Implementation of the 2024 Budget of F4E

Commitments	**92% execution of the final available budget**	Final Budget: 811.83	Execution: 746.05	EUR million
	111% compared to the original budget	Original Budget: 670.27	Execution: 746.05	EUR million
	99% without additional revenue from ITER IO	Standard Budget: 749.09	Execution: 738.05	EUR million
	100% in individual commitments	Execution: 746.05	Ind. Commit.: 744.05	EUR million
Payments	**93% execution of the final available budget**	Final Budget: 693.70	Execution: 642.31	EUR million
	101% compared to the original budget	Original Budget: 636.66	Execution: 642.31	EUR million
	99% without additional revenue from ITER IO	Standard Budget: 643.72	Execution: 635.97	EUR million

Fig. 20 Budget Implementation 2024

The execution rate of F4E's final available budget for 2024 was 92% in commitments and 93% in payments. The execution of the original budget in commitments exceeding it by 11% is due to the recognition and use of commitment appropriations carried over from previous year.
Besides the Cash Contribution to IO, F4E executed the following significant commitments in 2024:

- Architect Engineer Services II, EUR 61.3 million
- In-Vessel Targets Pre Series production, EUR 57.1 million
- Contingencies for additional scope (TB21), EUR 22.6 million
- Cassette Body acceleration plan, EUR 21.1 million
- Vacuum Vessel incentive scheme, EUR 18.7 million
- Task Order for Mechanical and HVAC components for B11/B74 (TB21), EUR 12.5 million
- Cash contribution to JT-60, EUR 11.8 million
- Task Order for Cable & Cable trays in galleries (TB21), EUR 9.1 million
- Transportation of Vacuum Vessel's sectors, EUR 7.7 million

The main factors impacting F4E's ability to fully execute the 2024 Budget in payments, were linked to recognition and cashing of assigned revenue from IO, which will be needed in the future to pay F4E contractors for implementing Project Change Requests (PCRs) approved by IO.

The most significant Project Change Requests (PCR) from ITER still foreseen to be executed in commitments and to be paid to contractors are:

- Tokamak Complex Building construction cost associated to the PCR-662 including sky-shine (PCR 698 approved for EUR 57.3 million, with EUR 6.7 still to be committed),
- Updated strategy on the full tungsten divertor and effects on procurement in the staged approach (PCR 773 approved for EUR 26 million, not committed yet),
- Stress Test Assessments Implementation for PBSs 62 and 65 in the Tokamak Complex building (PCR 697 approved for EUR 9 million, with EUR 7 million to be committed),
- Additional spares for Blanket First Wall panels (PCR 1241 approved for EUR 8.2 million, with EUR 5 million still to be committed),
- Nuclear Shielding improvement in Tokamak Building for critical/SIC electronic protection (PCR 757 approved for EUR 2 million, with EUR 1 million still to be committed).

Following the conservative approach to using global commitments requested by Euratom based on commitment forecasts for the first quarter of 2025, F4E globally committed only EUR 2 million.

7.2. Evolution of the Budget

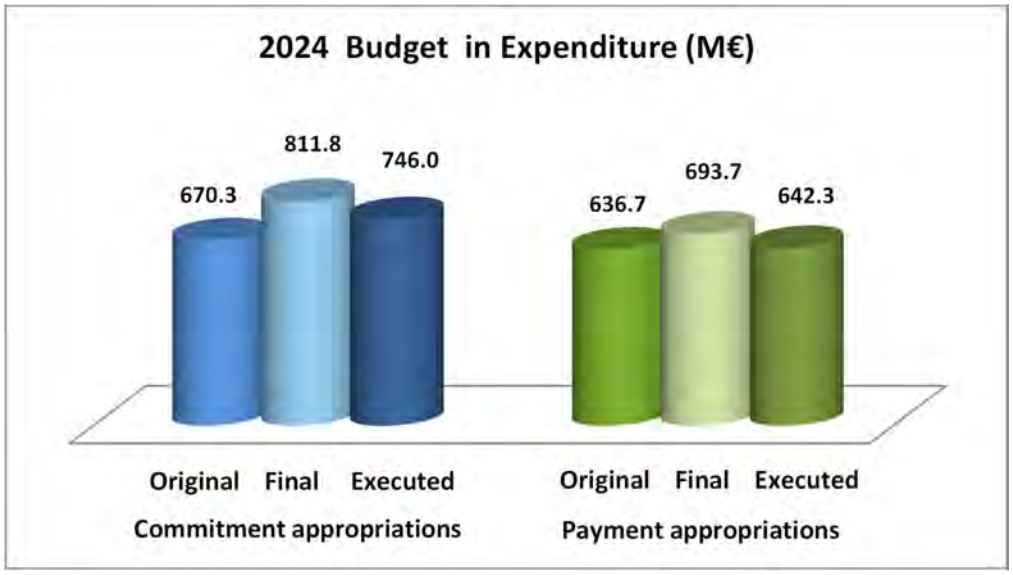


Fig. 21 Budget 2024 in Expenditure

F4E 2024 budget was originally adopted by F4E's Governing Board (GB) for EUR 670.3 million in commitment appropriations and EUR 636.7 million in payment appropriations.

It was modified via two amendments by F4E GB in July and December 2024.

The final available appropriations, including the carry-over from the previous year are EUR 811.8 million in commitment appropriations and EUR 693.7 million in payment appropriations.

7.3. Statement of Revenue

7.3.1. Commitment Appropriations

(EUR)

Statement of Revenue 2024 in Commitment Appropriations		Original Budget (1)	Amendment 1 (2)	Amendment 2 (3)	Amended Budget (4)= ∑ (1 to 3)	Available assigned revenue (5)	Carry over (6)	Regularisation (7)	Final Available Budget (8)= ∑ (4 to 7)
1	**PARTICIPATION FROM EUROPEAN UNION**								
110	EURATOM CONTRIBUTION TO OPERATIONAL EXPENDITURE	355 220 669.00			355 220 669.00				355 220 669.00
111	RECOVERY FROM PREVIOUS YEARS OPERATIONAL EXPENDITURE	150 000 000.00		5 192 675.38	155 192 675.38			8 538 402.46	163 731 077.84
120	EURATOM CONTRIBUTION TO ADMINISTRATIVE EXPENDITURE	72 781 757.00			72 781 757.00				72 781 757.00
121	RECOVERY FROM PREVIOUS YEARS ADMINISTRATIVE EXPENDITURE	957 743.00			957 743.00				957 743.00
	Title 1 - Total	**578 960 169.00**	**0.00**	**5 192 675.38**	**584 152 844.38**	**0.00**	**0.00**	**8 538 402.46**	**592 691 246.84**
2	**OTHER CONTRIBUTIONS**				0.00				0.00
210	MEMBERSHIP CONTRIBUTIONS	8 200 000.00			8 200 000.00				8 200 000.00
220	UNITED KINGDOM CONTRIBUTION				0.00				0.00
	Title 2 - Total	**8 200 000.00**	**0.00**	**0.00**	**8 200 000.00**	**0.00**	**0.00**	**0.00**	**8 200 000.00**
3	**ASSIGNED REVENUE ACCRUING FROM THE CONTRIBUTION OF ITER HOST STATE**				0.00				0.00
310	CONTRIBUTION FROM ITER HOST STATE	83 111 912.00	6 161 242.92		89 273 154.92		55 593 631.74		144 866 786.66
	Title 3 - Total	**83 111 912.00**	**6 161 242.92**	**0.00**	**89 273 154.92**	**0.00**	**55 593 631.74**	**0.00**	**144 866 786.66**
4	**MISCELLANEOUS REVENUE**				0.00				0.00
410	MISCELLANEOUS REVENUE	p.m.		329 351.22	329 351.22	2 702 282.78	245 212.87		3 276 846.87
	Title 4 - Total	**p.m.**	**0.00**	**329 351.22**	**329 351.22**	**2 702 282.78**	**245 212.87**	**0.00**	**3 276 846.87**
5	**OTHER ASSIGNED REVENUE TO SPECIFIC ITEM OF EXPENDITURE**				0.00				0.00
510	OTHER REVENUE	p.m.			0.00		52 150.00		52 150.00
520	REVENUE FROM ITER ORGANIZATION	p.m.			0.00	35 443 566.68	35 832 907.70	-8 538 402.46	62 738 071.92
	Title 5 - Total	**p.m.**	**0.00**	**0.00**	**0.00**	**35 443 566.68**	**35 885 057.70**	**-8 538 402.46**	**62 790 221.92**
	TOTAL REVENUE	**670 272 081.00**	**6 161 242.92**	**5 522 026.60**	**681 955 350.52**	**38 145 849.46**	**91 723 902.31**	**0.00**	**811 825 102.29**

Note: Column (6) Carry Over from previous year also includes decommitments of assigned revenue done during the year 2024

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 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 111: EUR +5.2 million** linked to the unused appropriations from previous years made available again,
- **Chapter 310: EUR +6.2 million**, linked to the adjustment following the final execution of 2023 budget,
- **Chapter 410: EUR +0.3 million** linked to recoveries and liquidated damages on F4E operational contracts.

Regarding the available assigned revenue, the increase of the budget in commitments was due to:

- **Chapter 410: EUR +2.7 million** due to operational recoveries cashed after the 2nd amendment of the budget,
- **Chapter 520: EUR +35.4 million** linked to forecasts of revenue for changes to be financed by IO.

The automatic carry-over of commitment appropriations from the 2023 budget, including the decommitments of commitments done in 2023 or before and regularisations, are the following:

- **Chapter 111: EUR +8.5 million** linked to regularisation from chapter 520 with the purpose to reconcile the transfer in expenditure approved with Budget Amendment 1,
- **Chapter 310: EUR +55.6 million** linked mainly to carry overs from 2023 and decommitments,
- **Chapter 410: EUR +0.25 million** linked to recoveries,
- **Chapter 510: EUR +0.05 million** linked to a minor operational decommitment,
- **Chapter 520: EUR +35.8 million** linked to carry overs form 2023 and their regularisation along with decommitments and opened commitment appropriations for revenue coming from IO.

7.3.2. Payment Appropriations

(EUR)

Statement of Revenue 2024 in Payment Appropriations		Original Budget (1)	Amendment 1 (2)	Amendment 2 (3)	Final Budget (4)= ∑ (1 to 3)	Available assigned revenue (5)	Carry over (6)	Regularisation (7)	Final Available Budget (8)=∑ (4 to 7)
1	**PARTICIPATION FROM EUROPEAN UNION**								
110	EURATOM CONTRIBUTION TO OPERATIONAL EXPENDITURE	428 091 497.00		54 300 000.00	482 391 497.00				482 391 497.00
111	RECOVERY FROM PREVIOUS YEARS OPERATIONAL EXPENDITURE	228 503.00			228 503.00			8 538 402.46	8 766 905.46
120	EURATOM CONTRIBUTION TO ADMINISTRATIVE EXPENDITURE	72 781 757.00			72 781 757.00		5 679 136.01		78 460 893.01
121	RECOVERY FROM PREVIOUS YEARS ADMINISTRATIVE EXPENDITURE	957 743.00			957 743.00				957 743.00
	Title 1 - Total	**502 059 500.00**	**0.00**	**54 300 000.00**	**556 359 500.00**	**0.00**	**5 679 136.01**	**8 538 402.46**	**570 577 038.47**
2	**OTHER CONTRIBUTIONS**								
210	MEMBERSHIP CONTRIBUTIONS	8 200 000.00			8 200 000.00				8 200 000.00
220	UNITED KINGDOM CONTRIBUTION	p.m.							
	Title 2 - Total	**8 200 000.00**	**0.00**	**0.00**	**8 200 000.00**	**0.00**	**0.00**	**0.00**	**8 200 000.00**
3	**ASSIGNED REVENUE ACCRUING FROM THE CONTRIBUTION OF ITER HOST STATE**								
310	CONTRIBUTION FROM ITER HOST STATE	126 400 000.00	-66 400 000.00		60 000 000.00		1 500 000.00		61 500 000.00
	Title 3 - Total	**126 400 000.00**	**-66 400 000.00**	**0.00**	**60 000 000.00**	**0.00**	**1 500 000.00**	**0.00**	**61 500 000.00**
4	**MISCELLANEOUS REVENUE**								
410	MISCELLANEOUS REVENUE	p.m.		329 351.22	329 351.22	2 702 282.78	27 208.44		3 058 842.44
	Title 4 - Total	**p.m.**	**0.00**	**329 351.22**	**329 351.22**	**2 702 282.78**	**27 208.44**	**0.00**	**3 058 842.44**
5	**OTHER ASSIGNED REVENUE TO SPECIFIC ITEM OF EXPENDITURE**								
510	OTHER REVENUE	p.m.			0.00		388 991.47		388 991.47
520	REVENUE FROM ITER ORGANIZATION	p.m.			0.00	33 714 489.01	24 801 517.80	-8 538 402.46	49 977 604.35
	Title 5 - Total	**p.m.**	**0.00**	**0.00**	**0.00**	**33 714 489.01**	**25 190 509.27**	**-8 538 402.46**	**50 366 595.82**
	TOTAL REVENUE	**636 659 500.00**	**-66 400 000.00**	**54 629 351.22**	**624 888 851.22**	**36 416 771.79**	**32 396 853.72**	**0.00**	**693 702 476.73**

Note: Column (6) Carry Over from previous year also includes decommitments of assigned revenue done during the year 2024

Fig. 23 Evolution of Statement of Revenue in Payment Appropriations

The breakdown of revenue by contributors in 2024 in payment appropriations is:

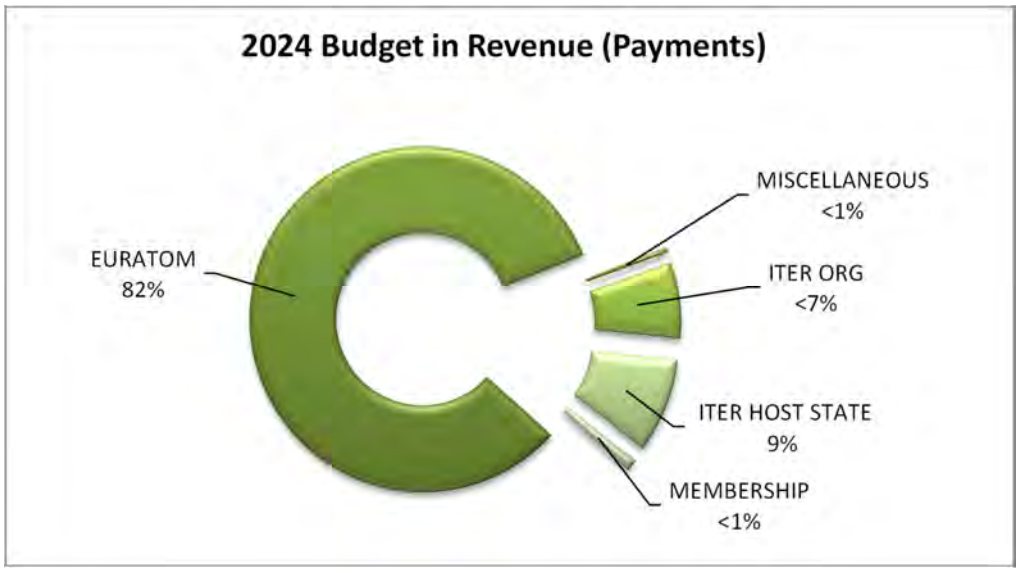


Fig. 24 Revenue Breakdown in Payment Appropriations

Main changes to the statement of revenue in payment appropriations in 2024:

The EURATOM contribution to F4E Operational expenditure has been increased by EUR 54.3 million via Budget Amendment 2 to cover the gap between higher forecasted operational payments and available budget due to decreased ITER Host State contribution via Budget Amendment 1 by EUR 66.4 million as communicated by the French High Representative for ITER Project in April 2024.

In detail, per budgetary chapter, the main changes are:

- **Chapter 110: EUR + 54.3 million** increase in Euratom contribution to F4E operational expenditure,
- **Chapter 111: EUR +8.5 million** linked to regularisation from chapter 520 with the purpose to reconcile the transfer in expenditure approved with Budget Amendment 1,
- **Chapter 310: EUR – 66.4 million** decrease in IHS contribution,
- **Chapter 410: EUR + 2.7 million** due to operational recoveries cashed after the 2nd amendment of the budget,
- **Chapter 520: EUR + 33.7 million** collected from IO as assigned revenue.

The automatic carry-overs of payment appropriations from the 2023 budget and regularisations were:

- **Chapter 120: EUR +5.7 million** from the automatic carry-over of administrative expenditure committed,
- **Chapter 310: EUR +1.5 million** including carry over from IHS contribution,
- **Chapter 510: EUR +0.4 million** related to the integration of the Upper Port 10 within the contribution from Japan Domestic Agency,
- **Chapter 520: EUR +24.8 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 2024 budget was aligned to the Single Programming Document 2024-2028, in particular the *Work Programme 2024* (WP) that serves as financing decision for the operational budget 2024.

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 2023 were automatically carried over to the budget 2024. No further carry-over was requested to the GB.

The final breakdown of the statement of expenditure in commitment appropriations is as follows:

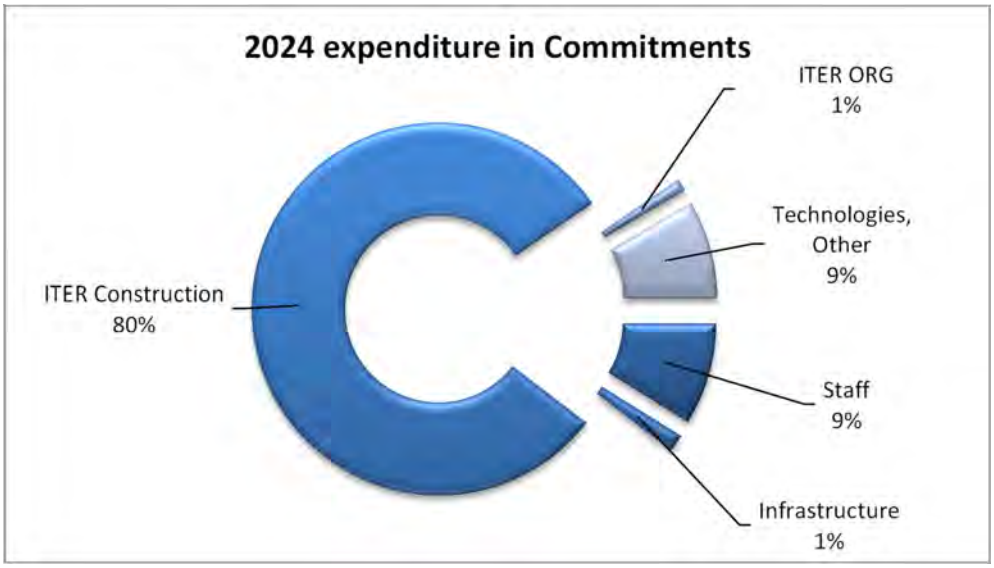


Fig. 25 Final breakdown of the Expenditure in Commitments

(EUR)

Heading of the 2024 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)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	Execution (10)	% (11)=(10)/(9)	
A1 STAFF EXPENDITURE												
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	**49 470 000.00**			-4 352 877.11	**45 117 122.89**				**45 117 122.89**	**45 117 122.89**	100.0%	-8.8%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	**12 910 000.00**			485 000.00	**13 395 000.00**				**13 395 000.00**	**13 395 000.00**	100.0%	3.8%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	**964 000.00**			-119 802.75	**844 197.25**				**844 197.25**	**844 197.25**	100.0%	-12.4%
A13 MISSION EXPENSES	**650 000.00**			530 232.75	**1 180 232.75**	1 956.52			**1 182 189.27**	**1 180 232.75**	99.8%	81.6%
A14 SOCIO-MEDICAL INFRASTRUCTURE	**592 000.00**			82 565.00	**674 565.00**				**674 565.00**	**674 565.00**	100.0%	13.9%
A15 TRAINING	**807 000.00**			130 000.00	**937 000.00**				**937 000.00**	**937 000.00**	100.0%	16.1%
A16 EXTERNAL SERVICES	**800 000.00**			-140 000.00	**660 000.00**				**660 000.00**	**660 000.00**	100.0%	-17.5%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	**5 000.00**			-2 000.00	**3 000.00**				**3 000.00**	**3 000.00**	100.0%	-40.0%
A18 SOCIAL WEALFARE	**60 000.00**			11 000.00	**71 000.00**				**71 000.00**	**71 000.00**	100.0%	18.3%
A19 OTHER STAFF RELATED EXPENDITURE	**4 293 000.00**			-722 291.92	**3 570 708.08**				**3 570 708.08**	**3 570 708.08**	100.0%	-16.8%
TITLE A1 - Total	**70 551 000.00**	**0.00**	**0.00**	**-4 098 174.03**	**66 452 825.97**	**1 956.52**	**0.00**	**0.00**	**66 454 782.49**	**66 452 825.97**	**100.0%**	**-5.8%**
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE												
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	**2 056 000.00**			-549 389.59	**1 506 610.41**	75 289.58			**1 581 899.99**	**1 506 611.41**	95.2%	-26.7%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	**5 235 000.00**			1 118 259.76	**6 353 259.76**				**6 353 259.76**	**6 353 259.76**	100.0%	21.4%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	**460 000.00**			-348 272.81	**111 727.19**				**111 727.19**	**111 727.19**	100.0%	-75.7%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	**2 113 500.00**			10 856.49	**2 124 356.49**				**2 124 356.49**	**2 124 356.49**	100.0%	0.5%
A25 POSTAGE / TELECOMMUNICATIONS	**639 000.00**			-119 300.00	**519 700.00**				**519 700.00**	**519 700.00**	100.0%	-18.7%
A26 MEETING EXPENSES	**576 000.00**			-158 402.00	**417 598.00**				**417 598.00**	**417 598.00**	100.0%	-27.5%
A27 RUNNING COSTS IN CONNECTION WITH OPERATIONAL ACTIVITIES					**0.00**		14 530.88		**14 530.88**		0.0%	-
A28 INFORMATION AND PUBLISHING	**40 000.00**			-30 000.00	**10 000.00**				**10 000.00**	**10 000.00**	100.0%	-75.0%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	**269 000.00**			-17 301.44	**251 698.56**				**251 698.56**	**251 698.56**	100.0%	-6.4%
TITLE A2 - Total	**11 388 500.00**	**0.00**	**0.00**	**-93 549.59**	**11 294 950.41**	**75 289.58**	**14 530.88**	**0.00**	**11 384 770.87**	**11 294 951.41**	**99.2%**	**-0.8%**
TITLE A1 & A2 - Total Administrative Expenditure	**81 939 500.00**	**0.00**	**0.00**	**-4 191 723.62**	**77 747 776.38**	**77 246.10**	**14 530.88**	**0.00**	**77 839 553.36**	**77 747 777.38**	**99.9%**	**-5.1%**

(EUR)

Heading of the 2024 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)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	Execution (10)	% (11)=(10)/(9)	
B3 OPERATIONAL EXPENDITURE												
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	**416 958 506.00**	9 415 543.56	16 481 322.60	8 560 765.73	**451 416 137.89**	2 826 710.55		8 538 402.46	**462 781 250.90**	**455 846 018.16**	98.5%	9.3%
B32 TECHNOLOGY FOR ITER AND DEMO	**10 012 547.00**	2 081 196.00	-4 593 743.00	-530 666.53	**6 969 333.47**				**6 969 333.47**	**6 969 333.47**	100.0%	-30.4%
B33 TECHNOLOGY FOR BROADER APPROACH	**49 583 165.00**	-18 744 660.00	-7 438 505.00	-1 268 592.08	**22 131 407.92**				**22 131 407.92**	**22 131 407.92**	100.0%	-55.4%
B34 TECHNOLOGY FOR DONES	**1 800 000.00**	2 221 000.00	-2 021 000.00	-37 017.36	**1 962 982.64**				**1 962 982.64**	**1 962 982.64**	100.0%	9.1%
B35 EXTERNAL SUPPORT ACTIVITIES	**20 259 068.00**	5 039 597.00	3 701 335.00	-129 678.81	**28 870 321.19**	11 995.40			**28 882 316.59**	**28 870 321.19**	100.0%	42.5%
B36 OTHER OPERATIONAL EXPENDITURE	**6 607 383.00**	-12 676.56	-607 383.00	-2 403 087.33	**3 584 236.11**	17 012.72			**3 601 248.83**	**3 596 912.67**	99.9%	-45.6%
Title B3 - Total	**505 220 669.00**	**0.00**	**5 522 026.60**	**4 191 723.62**	**514 934 419.22**	**2 855 718.67**	**0.00**	**8 538 402.46**	**526 328 540.35**	**519 376 976.05**	**98.7%**	**2.8%**
B4 EARMARKED EXPENDITURE												
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	**83 111 912.00**	6 161 242.92			**89 273 154.92**	**1 394 668.78**	54 198 962.96		**144 866 786.66**	**140 929 620.84**	97.3%	69.6%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	**p.m.**				**0.00**	**35 443 566.68**	35 832 907.70	-8 538 402.46	**62 738 071.92**	**7 994 454.86**	12.7%	-
B43 OTHER EARMARKED EXPENDITURE	**p.m.**				**0.00**	52 150.00			**52 150.00**	**0.00**	0.0%	-
Title B4 - Total	**83 111 912.00**	**6 161 242.92**	**0.00**	**0.00**	**89 273 154.92**	**36 890 385.46**	**90 031 870.66**	**-8 538 402.46**	**207 657 008.58**	**148 924 075.70**	**71.7%**	**79.2%**
Titles B3 & B4 - Subtotal	**588 332 581.00**	**6 161 242.92**	**5 522 026.60**	**4 191 723.62**	**604 207 574.14**	**39 746 104.13**	**90 031 870.66**	**0.00**	**733 985 548.93**	**668 301 051.75**	**91.1%**	**13.6%**
Total BUDGET in Commitment appropriations	**670 272 081.00**	**6 161 242.92**	**5 522 026.60**	**0.00**	**681 955 350.52**	**39 823 350.23**	**90 046 401.54**	**0.00**	**811 825 102.29**	**746 048 829.13**	**91.9%**	**11.3%**

Fig. 26 Evolution of the Expenditure in Commitments in 2024

Note: the figures for the budget Title 4 refer to the available appropriations for the 2024 budget only, whereas the details of the 2024 implementation by funds source provided in Fig. 38, 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 is 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 - 4 191 723.62.

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 (-6%)

- **Chapter A12 Expenditure relating to staff recruitment** **(-) 12%**
  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 staff hired compared to what was foreseen,
- **Chapter A13 Mission expenses** **(+) 82%**
  The number of missions has been higher than forecasted, due to cost of travel of administrative missions and fees to the travel agency being higher than budgeted,
- **Chapter A14 Social-Medical Infrastructure** **(+) 14%**
  The variation is due to the increased cost of the different medical services (Annual Check-up, Psychologist on site) being higher than budgeted,
- **Chapter A15 Training** **(+) 16%**
  The variation is due to decentralised training needs for the Administration and ITER delivery departments,
- **Chapter A16 External Services** **(-) 18%**
  This variation is due to a lower use of Interim staff,
- **Chapter A17 Receptions/events and representation** **(-) 40%**
  F4E is traditionally making a very limited use of this budget chapter,
- **Chapter A18 Social Welfare** **(+) 18%**
  This increase is linked to the number of social events for F4E staff and the indexation of costs for all activities,
- **Chapter A19 Other Staff related Expenditure** **(-) 17%**
  Decrease in cost for International school direct billing.

Title 2 – Infrastructure and operating expenditure (-5%)

- **Chapter A21 Rental of Buildings and Associated costs** **(-) 27%**
  Decrease in electricity costs (lower than expected); maintenance (cleaning); maintenance (UPS) and different common expenses,

- **Chapter A22 Information, Communication Technology and Date processing** **(+) 21%**
  Increase of ICT costs (new firewall, increase of purchase orders for ICT upgrades),
- **Chapter A23 Movable property and associated cost** **(-) 76%**
  Reduction mainly due to the postponed refurbishment of F4E's offices,
- **Chapter A25 Postage / Telecommunications** **(-) 19%**
  Savings have been done from reduction of ICT costs linked to telephony services,
- **Chapter A26 Meeting Expenses** **(-) 28%**
  Decrease is due to more virtual and less physical meetings and also expenses related to the annual assessment which was not done in 2024,
- **Chapter A28 Information and publishing** **(-) 75%**
  The increase of the teleworking has affected the production of publications, replaced sometimes by electronic publications/electronic information.

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 (+3%)

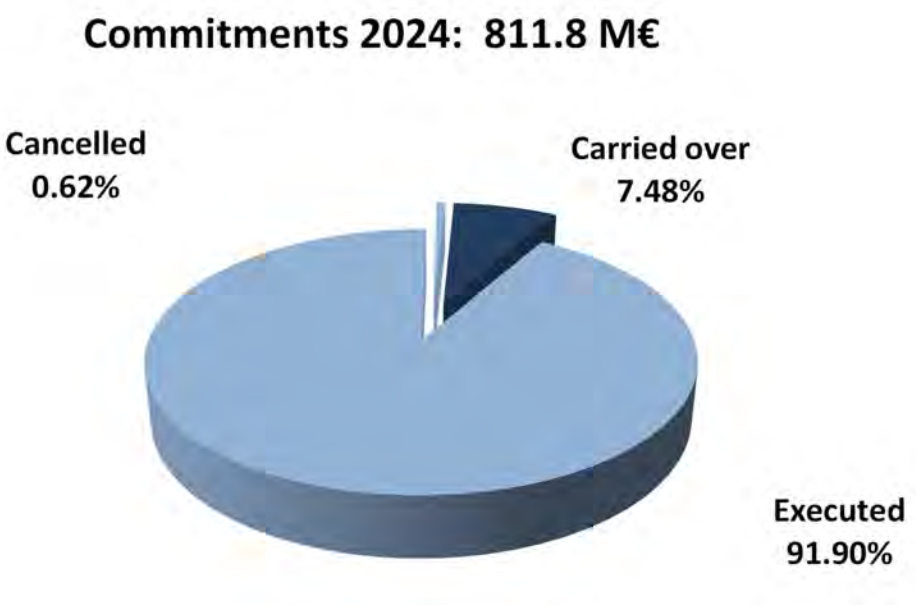
- **Chapter B32 Technology for ITER and Demo** **(-) 30%**
  The decrease is related to the delay in the signature of the Eurofer Procurement (TBM Box Qualification) because the negotiation with the potential supplier were still ongoing. The negotiations had to address technical and commercial complex aspects.
- **Chapter B33 Technology for Broader Approach** **(-) 55%**
  The decrease is related to the postponement to 2025 of (i) the contract for the supply of JT-60SA actively cooled Divertor HHF and NHF elements, and (ii) the contract for the development of solid state amplifiers Stage 3 and option 1. It is also related to the decreased cash contribution foreseen for the extraction and the repair of the Central Solenoid due to delay in the decision making regarding the repair.
- **Chapter B35 External Support Activities** **(+) 43%**
  The increase is related to the transfer of budget from programme teams to engineering unit to fund the new IRIS Cost Centre (Technical and data management), with a first task order in 2024.
- **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** **(+) 70%**
  Substantial increase due to the carry overs from previous years.

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



MEUR	Budget	Cancelled	Carried over	Executed
Commitment 2024	811.8	5.1	60.7	746.0

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 2024

The F4E open commitments amount to EUR 1 226.8 million at the closure of the 2024 budget, representing a decrease of EUR 32 million compared to the end of 2023.

Remarks:

- EUR 7.2 million out of the EUR 7.3 million committed globally in 2023 were implemented in 2024 as the on-going procurement procedures have been concluded. The remainder was decommitted.
- F4E made use of global commitment in 2024 for a total amount of EUR 2 million, for implementation in individual commitment in 2025. They are included in the total of the F4E obligations/open commitments at the end of 2024.

(EUR)

2024 budget Heading	Open Commitments				
	From previous years (1)	From 2024 budget (2)	Total (3)=(1)+(2)	To be de-committed (4)	Net Total (5)=(3)-(4)
TITLE 1 - STAFF EXPENDITURE	257 505.06	2 223 788.86	2 481 293.92	257 505.06	**2 223 788.86**
TITLE 2 - INFRASTRUCTURE AND OPERATING EXPENDITURE	78 550.64	4 118 961.90	4 197 512.54	78 550.64	**4 118 961.90**
Total TITLE 1 & 2	**336 055.70**	**6 342 750.76**	**6 678 806.46**	336 055.70	**6 342 750.76**
B31 -ITER CONSTRUCTION INCLUDING SITE PREPARATION	449 245 980.34	343 548 807.56	792 794 787.90	0.00	**792 794 787.90**
B32 - TECHNOLOGY FOR ITER AND DEMO	4 586 059.76	6 598 169.11	11 184 228.87	0.00	**11 184 228.87**
B33 - TECHNOLOGY FOR BROADER APPROACH	21 557 052.55	7 477 487.60	29 034 540.15	0.00	**29 034 540.15**
B34 - TECHNOLOGY FOR DONES	0.00	362 982.64	362 982.64		**362 982.64**
B35 - EXTERNAL SUPPORT ACTIVITIES	12 355 081.34	23 498 197.71	35 853 279.05	0.00	**35 853 279.05**
B36 - OTHER OPERATIONAL EXPENDITURE	238 563.90	1 544 651.55	1 783 215.45	0.00	**1 783 215.45**
Total TITLE 3	**487 982 737.89**	**383 030 296.17**	**871 013 034.06**	**0.00**	871 013 034.06
B41 - ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	191 200 957.07	140 929 620.84	332 130 577.91	0.00	**332 130 577.91**
B42 - ACTIVITIES LINKED TO ITER ORGANIZATION	13 208 454.71	4 072 195.40	17 280 650.11	0.00	**17 280 650.11**
B43 - OTHER EARMARKED EXPENDITURE	0.00	0.00	0.00	0.00	**0.00**
Total TITLE 4	**204 409 411.78**	**145 001 816.24**	**349 411 228.02**	**0.00**	349 411 228.02
Total TITLE 3 & 4	**692 392 149.67**	**528 032 112.41**	**1 220 424 262.08**	**0.00**	1 220 424 262.08
Total	**692 728 205.37**	**534 374 863.17**	**1 227 103 068.54**	**336 055.70**	1 226 767 012.84

Fig. 28 Open Commitments Carried Forward from 2024 to 2025

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 budgets[10]. The situation for unused appropriations at 31/12/2024 is as follows:

[10] 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".

(EUR)

Operational Commitment Appropriations		Title 3	Title 4	Total
Under execution (since 2008)	**+**	306 693 988.33	278 877 250.47	585 571 238.80
De-commitments (since 2008)	**+**	1 191 990 887.40	228 761 748.77	1 420 752 636.17
Carry-over (since 2008)	**-**	2 725 259.99	278 877 250.47	281 602 510.46
Made available again (since 2008)	**-**	920 825 337.77	169 141 867.89	1 089 967 205.66
Amount available for future budgets	**=**	**575 134 277.97**	**59 619 880.88**	**634 754 158.85**

Fig. 29 Status of Unused Commitment Appropriations

In 2024, the amount available to be called in future budgets decreased from EUR 748.3 million to EUR 634.8 million.

7.4.2. Expenditure in Payment Appropriations

The statement of expenditure was modified during 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.

(EUR)

Heading of the 2024 Budget Payment Expenditure	Evolution of the statement of expenditure									Implementation			
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	On B2024 commitments (10)	On B2023 commitments (11)	Execution (12)=(10)+(11)	% (13)=(12)/(9)
A1 STAFF EXPENDITURE													
A10 SALARIES AND ALLOWANCES FOR ESTABLISHMENT PLAN POSTS	**49 470 000.00**			-4 352 877.11	**45 117 122.89**		90 000.01		**45 207 122.90**	45 037 122.89	48 400.52	**45 085 523.41**	99.7%
A11 SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	**12 910 000.00**			485 000.00	**13 395 000.00**		157 003.39		**13 552 003.39**	13 140 979.83	109 879.69	**13 250 859.52**	97.8%
A12 EXPENDITURE RELATING TO STAFF RECRUITMENT	**964 000.00**			-119 802.75	**844 197.25**		37 327.34		**881 524.59**	552 386.65	26 172.07	**578 558.72**	65.6%
A13 MISSION EXPENSES	**650 000.00**			530 232.75	**1 180 232.75**	1 956.52	77 505.61		**1 259 694.88**	791 390.16	52 627.40	**844 017.56**	67.0%
A14 SOCIO-MEDICAL INFRASTRUCTURE	**592 000.00**			82 565.00	**674 565.00**		161 787.83		**836 352.83**	450 591.36	85 113.57	**535 704.93**	64.1%
A15 TRAINING	**807 000.00**			130 000.00	**937 000.00**		605 940.32		**1 542 940.32**	303 397.90	492 455.55	**795 853.45**	51.6%
A16 EXTERNAL SERVICES	**800 000.00**			-140 000.00	**660 000.00**		106 576.61		**766 576.61**	479 325.06	79 736.13	**559 061.19**	72.9%
A17 RECEPTIONS/EVENTS AND REPRESENTATION	**5 000.00**			-2 000.00	**3 000.00**		1 348.46		**4 348.46**	1 185.20	0.00	**1 185.20**	27.3%
A18 SOCIAL WEALFARE	**60 000.00**			11 000.00	**71 000.00**		10 664.10		**81 664.10**	12 552.52	2 149.00	**14 701.52**	18.0%
A19 OTHER STAFF RELATED EXPENDITURE	**4 293 000.00**			-722 291.92	**3 570 708.08**		743 900.31		**4 314 608.39**	3 460 105.54	703 490.52	**4 163 596.06**	96.5%
TITLE A1 - Total	**70 551 000.00**	**0.00**	**0.00**	**-4 098 174.03**	**66 452 825.97**	**1 956.52**	**1 992 053.98**	**0.00**	**68 446 836.47**	**64 229 037.11**	**1 600 024.45**	**65 829 061.56**	**96.2%**
A2 INFRASTRUCTURE AND OPERATING EXPENDITURE													
A21 RENTAL OF BUILDINGS AND ASSOCIATED COSTS	**2 056 000.00**			-549 389.59	**1 506 610.41**	75 288.58	559 499.61		**2 141 398.60**	1 126 840.91	350 936.12	**1 477 777.03**	69.0%
A22 INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	**5 235 000.00**			1 118 259.76	**6 353 259.76**		1 871 633.46		**8 224 893.22**	3 964 087.73	1 663 732.58	**5 627 820.31**	68.4%
A23 MOVABLE PROPERTY AND ASSOCIATED COSTS	**460 000.00**			-348 272.81	**111 727.19**		143 894.24		**255 621.43**	88 328.80	103 233.12	**191 561.92**	74.9%
A24 CURRENT ADMINISTRATIVE EXPENDITURE	**2 113 500.00**			10 856.49	**2 124 356.49**		602 880.98		**2 727 237.47**	1 329 739.41	523 882.90	**1 853 622.31**	68.0%
A25 POSTAGE / TELECOMMUNICATIONS	**639 000.00**			-119 300.00	**519 700.00**		191 343.12		**711 043.12**	259 152.77	133 535.12	**392 687.89**	55.2%
A26 MEETING EXPENSES	**576 000.00**			-158 402.00	**417 598.00**		240 563.63		**658 161.63**	248 956.41	163 908.73	**412 865.14**	62.7%
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	**40 000.00**			-30 000.00	**10 000.00**		4 193.41		**14 193.41**	2 675.46	1 738.39	**4 413.85**	31.1%
A29 OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	**269 000.00**			-17 301.44	**251 698.56**		73 074.58		**324 773.14**	156 208.02	49 602.77	**205 810.79**	63.4%
TITLE A2 - Total	**11 388 500.00**	**0.00**	**0.00**	**-93 549.59**	**11 294 950.41**	**89 819.46**	**3 687 083.03**	**0.00**	**15 071 852.90**	**7 175 989.51**	**2 990 569.73**	**10 166 559.24**	**67.5%**
TITLE A1 & A2 - Total Administrative Expenditure	**81 939 500.00**	**0.00**	**0.00**	**-4 191 723.62**	**77 747 776.38**	**91 775.98**	**5 679 137.01**	**0.00**	**83 518 689.37**	**71 405 026.62**	**4 590 594.18**	**75 995 620.80**	**91.0%**

(EUR)

Heading of the 2024 Budget Payment Expenditure	Evolution of the statement of expenditure									Implementation			
	Original Budget (1)	Amending budget 1 (2)	Amending budget 2 (3)	Transfers adopted by F4E Director (4)	Final budget (5)=Σ(1 to 4)	Additional Revenue (6)	Carried over (7)	Regularisation (8)	Final Appropriations (9)=Σ(5 to 8)	On B2024 commitments (10)	On B2023 commitments (11)	Execution (12)=(10)+(11)	% (13)=(12)/(9)
B3 OPERATIONAL EXPENDITURE													
B31 ITER CONSTRUCTION INCLUDING SITE PREPARATION	**344 320 000.00**		79 629 351.22	8 731 761.92	**432 681 113.14**	2 608 706.12		8 538 402.46	**443 828 221.72**	443 828 221.72		**443 828 221.72**	100.0%
B32 TECHNOLOGY FOR ITER AND DEMO	**6 500 000.00**		-2 800 000.00	-1 040 703.68	**2 659 296.32**				**2 659 296.32**	2 659 296.32		**2 659 296.32**	100.0%
B33 TECHNOLOGY FOR BROADER APPROACH	**50 500 000.00**		-27 200 000.00	262 574.09	**23 562 574.09**				**23 562 574.09**	23 562 574.09		**23 562 574.09**	100.0%
B34 TECHNOLOGY FOR DONES	**2 000 000.00**			-400 000.00	**1 600 000.00**				**1 600 000.00**	1 600 000.00		**1 600 000.00**	100.0%
B35 EXTERNAL SUPPORT ACTIVITIES	**20 000 000.00**		5 000 000.00	-2 300 147.12	**22 699 852.88**	11 995.40			**22 711 848.28**	22 699 852.88		**22 699 852.88**	99.9%
B36 OTHER OPERATIONAL EXPENDITURE	**5 000 000.00**			-1 061 761.59	**3 938 238.41**	4 336.16	12 676.56		**3 955 251.13**	3 942 574.57	12 676.56	**3 955 251.13**	100.0%
Title B3 - Total	**428 320 000.00**	**0.00**	**54 629 351.22**	**4 191 723.62**	**487 141 074.84**	**2 625 037.68**	**12 676.56**	**8 538 402.46**	**498 317 191.54**	**498 292 519.58**	**12 676.56**	**498 305 196.14**	**100.0%**
B4 EARMARKED EXPENDITURE													
B41 ITER CONSTRUCTION - ITER HOST STATE CONTRIBUTION	**126 400 000.00**	-66 400 000.00			**60 000 000.00**		1 500 000.00		**61 500 000.00**	61 333 174.81		**61 333 174.81**	99.7%
B42 ACTIVITIES LINKED TO ITER ORGANIZATION	**p.m.**				**0.00**	33 714 489.01	24 801 517.80	-8 538 402.46	**49 977 604.35**	6 342 698.62		**6 342 698.62**	12.7%
B43 OTHER EARMARKED EXPENDITURE	**p.m.**				**0.00**		388 991.47		**388 991.47**	336 841.47		**336 841.47**	86.6%
Title B4 - Total	**126 400 000.00**	**-66 400 000.00**	**0.00**	**0.00**	**60 000 000.00**	**33 714 489.01**	**26 690 509.27**	**-8 538 402.46**	**111 866 595.82**	**68 012 714.90**	**0.00**	**68 012 714.90**	**60.8%**
Titles B3 & B4 - Subtotal	**554 720 000.00**	**-66 400 000.00**	**54 629 351.22**	**4 191 723.62**	**547 141 074.84**	**36 339 526.69**	**26 703 185.83**	**0.00**	**610 183 787.36**	**566 305 234.48**	**12 676.56**	**566 317 911.04**	**92.8%**
Total BUDGET in Payment appropriations	**636 659 500.00**	**-66 400 000.00**	**54 629 351.22**	**0.00**	**624 888 851.22**	**36 431 302.67**	**32 382 322.84**	**0.00**	**693 702 476.73**	**637 710 261.10**	**4 603 270.74**	**642 313 531.84**	**92.6%**

Fig. 30 Evolution of the Expenditure in Payment Appropriations

7.4.2.1. Administrative Expenditure

As mentioned previously, the administrative expenditure is 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 2024 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 5 679 137.01,
- 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 6 434 526.74) as represented on Fig.32.

7.4.2.2. Operational Expenditure in payments

The Budget for operational expenditure has been increased by EUR 54.3 million via Budget Amendment 2 with additional funding received from EURATOM to cover the gap between higher forecasted operational payments and available budget due to decreased appropriations under Title 4 by EUR 66.4 million following the cut in the ITER Host State contribution via Budget Amendment 1.

Title 3 – Operational expenditure

- **Chapter B31 ITER Construction including site preparation** **(+) 29%**
  This increase on this ITER budget line financed by Euratom is to a large extent proportionate to the decrease in payment appropriations for ITER financed by the ITER host state as explained in the introductory paragraph above,
- **Chapter B32 Technology for ITER and Demo** **(-) 59%**
  The decrease is mainly related to changes in the actual carrying out of the activities, technical and schedule related, that affected the procurement implementation compared to the original planning, and some payments were moved from 2024 to 2025,
- **Chapter B33 Technology for Broader Approach** **(-) 53%**
  The decrease is related to the change of requirements on the supply of JT-60SA actively cooled divertor elements and the postponement of the Cash Contribution for the Central Solenoid repair to 2025. 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** **(-20)%**
  The decrease is related to the cancellation of the contract for the RFQ Couplers (taken out of F4E scope), as well as the fact that all the other service/support contracts for DONES were committed under chapter B35,
- **Chapter B35 External Support Activities** **(+)13%**
  The increase is related to additional external support needs in most of the F4E's Programme Teams.

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Title 4 – Earmarked expenditure

The budget from the IHS, allocated to the domain of ITER construction in full, was reduced by EUR 66.4 million following the budgetary constraints of the ITER Host State. 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

MEUR	Budget	Cancelled	Carried over	Executed
Payment 2024	693.7	1.1	50.2	642.3

Fig. 31 Final Implementation in PA

92.6% of the available budget has been implemented.

7.4.2.4. Cancelled Payment Appropriations

(EUR)

2024 budget Heading	Unused Appropriations (1)	Carry over to 2025 (2)	Cancelled appropriation (3)=(1)-(2)
TITLE 1 - STAFF EXPENDITURE	2 617 774.91	2 225 745.38	392 029.53
TITLE 2 - OPERATING EXPENDITURE	4 905 293.66	4 208 781.36	696 512.30
Total TITLE 1 & 2 Payment	7 523 068.57	6 434 526.74	1 088 541.83
TITLE 3 - OPERATIONAL EXPENDITURE	11 995.40	11 995.40	0.00
TITLE 4 - EARMARKED EXPENDITURE	43 853 880.92	43 853 880.92	0.00
Total TITLE 3 & 4 Payment	43 865 876.32	43 865 876.32	0.00
Total BUDGET in Payment	51 388 944.89	50 300 403.06	1 088 541.83

Fig. 32 Cancelled Payment Appropriations

The payment appropriations not used by the 31/12/2024 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 2023 Budget

7.4.3.1. Final Implementation of the Administrative Expenditure 2023

The definitive execution of the administrative budget 2023 is determined at the end of 2024, 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 2023 administrative budget is therefore as follows:

(EUR)	Title 1	Title 2	Total
Final 2023 Administrative Budget	62 266 177.16	9 788 993.42	72 055 170.58

Fig. 33 Final Implementation of the Administrative Expenditure 2023

7.4.3.2. Global Commitments from 2023

A global commitment for Remote Handling of EUR 7.5 million was made in 2023.
EUR 7.4 million were executed in 2024 and the rest was decommitted.
Therefore, no global commitments approved in 2023 remained open at the end of 2024.

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 2024 F4E continued to collect revenue for additional tasks requested and financed by IO.

The new commitment appropriations opened in 2024 represented a total amount of EUR 35.7 million. The payments recovered from IO represented a total amount of EUR 33.7 million.

The regularisation of EUR 8.5 million both in commitment and payment appropriations from the assigned revenue from IO (chapter B42) to the appropriations of Euratom (chapter B31) represented a budgetary correction for past expenditures consuming Euratom budget line 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 2024

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		2024	2023
REVENUE			
Euratom contribution	+	556 359 500.00	405 883 574.42
ITER Host state contributions	+	60 000 000.00	113 400 000.00
Membership contributions	+	8 474 100.00	7 069 300.00
ITER Organization	+	33 714 489.01	26 979 145.20
Other budgeted revenue	+	3 031 634.00	837 148.61
Other non budgeted revenue	+	399 545.22	79 383.48
TOTAL REVENUE (a)		**661 979 268.23**	**554 248 551.71**
EXPENDITURE			
Title I:Staff			
Payments	-	64 229 037.11	60 666 152.71
Appropriations carried over to the following year	-	2 212 457.72	1 992 053.98
Title II: Infrastructure Expenditure			
Payments	-	7 175 989.51	6 798 423.69
Appropriations carried over to the following year	-	4 208 781.36	3 701 613.91
Title III: Operational Expenditure			
Payments	-	498 305 196.14	389 729 474.07
Appropriations carried over to the following year	-	11 995.40	12 676.56
Title IV Earmarked revenue			
Payments	-	68 012 714.90	134 911 682.19
Appropriations carried over to the following year	-	43 853 880.92	26 690 509.27
Total Payments (b)		*637 722 937.66*	*592 105 732.66*
Appropriations carried over to the following year (c)		*50 287 115.40*	*32 396 853.72*
TOTAL EXPENDITURE (d)=(b)+(c)		**688 010 053.06**	**624 502 586.38**
OUTTURN FOR THE FINANCIAL YEAR (a-d)		**-26 030 784.83**	**-70 254 034.67**
Cancellation of unused payment appropriations carried over from previous year	+	1 088 541.83	1 307 602.47
Adjustment for carry-over from the previous year of appropriations available at 31.12 arising from assigned revenue	+	26 717 717.71	70 439 373.81
Exchange differences for the year (gain +/loss -)	+/-	2 917.47	3 869.95
BALANCE OF THE OUTTURN ACCOUNT FOR THE FINANCIAL YEAR		**1 778 392.18**	**1 496 811.56**
Of which Administrative expenditure		1 104 746.98	1 328 726.25
Of which Operational expenditure		673 645.20	168 085.31
Administrative outturn:			
Exchange differences for the year		2 917.47	3 869.95
Cancelled appropriation on title 1 and 2 from current year		0.00	0.00
Cancelled appropriation on title 1 and 2 from previous year		1 088 541.83	1 307 602.47
Non budgeted revenue from liquidated damages and Court decisions		13 287.68	17 253.83
Operational outturn:			
Cancelled payment appropriations on title 3 from 2023		0.00	120 998.78
Uncashed membership contribution from the year		-66 300.00	-230 700.00
Cashed membership contributions from previous year		340 400.00	
Uncashed budgeted amount of the Euratom Contribution		0.00	
Non budgeted revenue from liquidated damages and Court decisions		399 545.20	277 786.53

Fig. 34 Budget Outturn 2024

For the 2024 financial year, the balance of the budget outturn amounts to EUR 1 778 392.18.

8. Annexes

8.1. Commitment Appropriations for assigned revenue from IO opened in 2024

(EUR)

Local Key	Forecast of Revenue - User Reference	Accepted Amount
F4E.137	2024 - PCR 773 (IV)	26 051 110.00
F4E.132	HIT CARDS FROM 2020 ONWARDS IN ROD EPB19-092/ EPB21-113/ EPB22-132. AGREED EPB	2 500 000.00
F4E.157	ITA: IO/24/TA/4500000218 CHANGES TO HEATING NEUTRAL BEAM POWER SUPPLY (HNB PS) FROM LESSONS LEARNT AT THE NEUTRAL BEAM TEST FACILITY (NBTF)	1 767 000.00
F4E.140	FORECAST OF REVENUE FOR PCR-1482_TRANSMISSION TO EUDA AND KODA OF UPDATED VERSION OF VV DRAWINGS	1 659 771.00
F4E.158	ITA-TO-1: ITA C62TD02FE - TOKAMAK SUPPORT STRUCTURE RESIDUAL MARGINS PRELIMINARY CALCULATION STUDY TO ADDRESS ASN PRESCRIPTIONS INB NO. 174-07 & INB NO.174-09	810 839.91
F4E.142	PCR 1341_NB_CHANGE OF 22KV DISCONNECTORS TO CIRCUIT BREAKERS FOR PBS53 HNB AND DNB HIGH VOLTAGE POWER SUPPLIES AND SCOPE TRANSFER FROM INDA TO EUDA	719 109.00
F4E.155	(MOU) AGREEMENT TO PERFORM THE ¿PRELIMINARY DESIGN OF THE NEW RF HEATING BUILDINGS/BRIDGES AND INFRASTRUCTURES (CIVIL WORKS)(B.NEXT)	642 878.80
F4E.133	ITA - TASK AGREEMENT NR: IO/23/TA/4500000195 HIT INTEGRATION CYCLES FOR THE B11 AND B14.	610 043.16
F4E.150	SB PCR-670	541 627.30
F4E.146	PCR 1019_COVERING THE FOLLOWING VARIATION: DACC#40190	446 725.00
F4E.149	IV - PCR-1604	395 000.00
F4E.159	ITA-TO-2: ITA C62TD03FE TOKAMAK SUPPORT STRUCTURE RESIDUAL MARGINS PRELIMINARY CALCULATION STUDY TO ADDRESS ASN PRESCRIPTIONS INB NO. 174-07 & INB NO.174-09 / DNO#121	367 396.03
F4E.33	FOR PCR 824 AE 2018	319 109.00
F4E.154	AGREEMENT TO PERFORM THE ¿PRELIMINARY DESIGN OF THE BUILDING LIQUID AND GAS SYSTEMS FOR THE NEW RF HEATING BUILDINGS (B.NEXT)	293 482.80
F4E.160	DI-30 - 2018/028 - NOTIFICATION - B71 CONTROL BUILDING, PRELIMINARILY DESIGN OF THE NON PIC PART	265 739.03
F4E.135	DI-113 NOTICE TO SUSPEND POTENTIALLY ABORTIVE WORKS IN THE CONTEXT OF PENDING REBASELINING EXERCISE	200 000.00
F4E.41	PCR 1241	172 672.00
F4E.147	DI 120 / OS#747 / 2024/009 - NOTIFICATION	165 000.00
F4E.141	INCREASED PCR-764 ALLOCATION OF THE CSB INSTALLATION AND STEEL TRANSITION PIECE PROCUREMENT TO BIPS PT	163 836.60
F4E.148	PCR 1075 AGAINST F4E.11 DUE TO REGULARISATION	124 990.12
F4E.136	DI-114 INSTRUCTION TO IMPLEMENT ¿MAJOR¿ IMPACT ITEMS AT TOKAMAK COMPLEX LEVELS B2, B2M, L3 AND L4	110 000.00
F4E.144	DI-118 INSTRUCTION TO IMPLEMENT ¿MAJOR¿ IMPACT ITEMS AT TOKAMAK COMPLEX NB CELL FROM THE POST-MRR CHANGES AND OUT OF MRR FAP ITEMS IMPACTING BUILDING SERVICES_ITER IO 2024/003	110 000.00
F4E.138	FOR DI-115	100 000.00
F4E.152	DI-122 / F4E-2009-OPE-058 OS#755 ENGAGE / NOTIFICATION 2024-012	68 000.00
F4E.143	DI-119 ¿MAJOR¿ IMPACT ITEMS AT TOKAMAK COMPLEX L3 LEVEL UPC FROM THE POST-MRR CHANGES AND OUT OF MRR FAP ITEMS IMPACTING BUILDING SERVICES_ITER IO 2024/006 - NOTIFICATION	65 000.00
F4E.151	DI-121 / NOTIFICATION 2024/010 / F4E-2009-OPE-058-OS#749	40 000.00
F4E.134	DI-112 INSTRUCTION FOR EUDA (VIA TB12 CONTRACTOR) TO PERFORM ENABLING WORKS (FORMING NEW SERVICES PENETRATIONS) WITHIN B71N	35 000.00
F4E.145	DI-117 INSTRUCTION TO IMPLEMENT DESIGN REWORK TO B11-NB CELL CONFIGURATION PROPOSED IN ONGOING PCR 001561_ITER IO 2024/002	30 000.00
F4E.156	DI-124 (2024/015 - NOTIFICATION)- AE OS#768 (PROCESS #257996)	20 000.00
F4E.153	BS (MOU: "NEW BUILDINGS PRELIMINARY DESIGN")	6 728.00
F4E.28	PCR 1411 DIAGNOSTICS TEAM 2022	1 536.50

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 2021-2027				Outstanding amount
				Paid 2021	Paid 2022	Paid 2023	Paid 2024	
<= 2007	115 445 438.21	113 121 009.41	2 324 428.80	-	-	-	-	- 0.00
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	-	713 578.02	217 580.36
2011	363 551 283.25	224 611 776.68	138 573 486.04	227 422.68	65 267.85	-	-	73 330.00
2012	1 032 616 349.67	227 971 230.12	760 625 795.92	14 418 968.18	14 456 930.11	4 599 940.47	3 517 482.03	7 026 002.84
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	12 574 719.37	3 977 688.81
2014	565 804 453.53	-	475 247 089.02	19 482 123.37	18 381 869.43	10 531 721.11	7 036 363.48	35 125 287.12
2015	336 301 470.64	-	323 703 676.59	3 947 737.56	2 866 937.05	593 039.16	867 049.69	4 323 030.59
2016	410 868 067.49	-	406 090 760.75	1 423 809.18	367 707.81	733 739.57	1 207 287.87	1 044 762.31
2017	478 354 186.88	-	433 038 187.24	19 067 695.60	9 512 936.62	5 842 281.59	973 741.75	9 919 344.08
2018	624 884 894.55	-	475 932 307.52	35 594 872.67	6 161 810.79	5 607 430.34	22 780 603.23	78 807 870.00
2019	648 545 394.77	-	438 734 899.59	72 880 000.06	72 301 641.32	27 636 673.09	23 664 403.12	13 327 777.59
2020	757 179 456.29	-	328 530 151.47	220 317 475.14	87 562 170.73	52 123 263.56	21 539 605.28	47 106 790.11
2021	899 102 661.10	-	-	278 124 868.81	242 964 503.48	99 341 228.12	44 312 079.31	234 359 981.38
2022	600 269 698.88		-		221 585 641.86	192 065 372.07	69 035 456.01	117 583 228.94
2023	480 982 075.42		-			123 864 499.06	217 826 602.54	139 290 973.82
2024	666 301 051.75						140 268 939.34	526 032 112.41
Total	**9 559 048 552.75**	**1 296 337 592.04**	**4 576 194 073.17**	**684 985 312.71**	**692 148 245.45**	**524 641 156.26**	**566 317 911.04**	**1 218 424 262.08**

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, 1 394 commitment positions are open in ABAC on the 31/12/24, representing 4% less compared to the end of 2023.
- Global commitment of EUR 2 million approved at the end of 2023 is not included in the table above.
- Indicatively, the cumulative operational expenses at 31/12/24 are estimated to EUR 8 284.9 million in current value.

8.3. Reconciliation Between Budgetary and Accrual Based Accounts

	sign +/-	Amount (EUR)
Economic result (+ for surplus and - for deficit)	**+/-**	**33 822 867.73**
Adjustment for accrual items (items not in the budgetary result but included in the economic result)		
Adjustments for Accrual Cut-off (reversal 31.12.N-1)	**+/-**	5 146 590.25
Adjustments for Accrual Cut-off (cut- off 31.12.N)	**+/-**	-122 704 908.07
Unpaid invoices at year end but booked in charges (class 6)	**+**	238 407 770.05
Depreciation of intangible and tangible assets	**+**	298 060.16
Provisions (impact of the year)	**+/-**	-5 702 269.13
Recovery Orders issued in 2024 in class 7 and not yet cashed	**-**	-592 358.08
Prefinancing given in previous year and cleared in the year	**+**	28 902 839.16
Prefinancing received in previous year and cleared in the year	**-**	0.00
Payments made from carry over of payment appropriations	**+**	4 590 594.18
Other : 2024 corrections/credit notes on transactions booked in charges in previous years	**+/-**	-1 258 255.03
Adjustment for budgetary items (item included in the budgetary result but not in the economic result)		
Asset acquisitions (less unpaid amounts)	**-**	-496 116.16
New pre-financing paid in the year 2024 and remaining open as at 31.12.2024	**-**	-35 467 398.97
New pre-financing received in the year 2024 and remaining open as at 31.12.2024	**+**	1 778 392.18
Budgetary recovery orders issued before 2024 and cashed in the year	**+**	1 020 684.05
Budgetary recovery orders issued in 2024 on balance sheet accounts (not 7 or 6 accounts) and cashed	**+**	25 707.80
Payment appropriations carried over to 2025	**-**	-50 287 115.40
Cancellation of unused carried over payment appropppriations from previous year	**+**	1 088 541.83
Adjustment for carry-over from the previous year of appropriations available at 31.12 arising from assigned revenue	**+**	26 717 717.71
Other : Invoices paid in 2024 but booked in charges in previous years	**+/-**	-123 512 952.08
Total		1 778 392.18
Budgetary result (+ for surplus)	**+/-**	**1 778 392.18**
Including amount of exchange rate differences		2 917.47
Delta not explained		0.00

Fig. 37 Reconciliation between budgetary and accrual based accounts

8.4. 2024 Budget Implementation – Details by Fund Source

Fund Source: C1 - Credits of the year (EUR)

			Commitment			Payment		
Official Budget Item	Budget Line Description	Fund Source	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	45 117 122.89	45 117 122.89	100.00%	45 117 122.89	45 037 122.89	99.82%
A11	SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	C1	13 395 000.00	13 395 000.00	100.00%	13 395 000.00	13 140 979.83	98.10%
A12	EXPENDITURE RELATING TO STAFF RECRUITMENT	C1	844 197.25	844 197.25	100.00%	844 197.25	552 386.65	65.43%
A13	MISSION EXPENSES	C1	1 180 232.75	1 180 232.75	100.00%	1 180 232.75	791 390.16	67.05%
A14	SOCIO-MEDICAL INFRASTRUCTURE	C1	674 565.00	674 565.00	100.00%	674 565.00	450 591.36	66.80%
A15	TRAINING	C1	937 000.00	937 000.00	100.00%	937 000.00	303 397.90	32.38%
A16	EXTERNAL SERVICES	C1	660 000.00	660 000.00	100.00%	660 000.00	479 325.06	72.63%
A17	RECEPTIONS, EVENTS AND REPRESENTATION	C1	3 000.00	3 000.00	100.00%	3 000.00	1 185.20	39.51%
A18	SOCIAL WEALFARE	C1	71 000.00	71 000.00	100.00%	71 000.00	12 552.52	17.68%
A19	OTHER STAFF RELATED EXPENDITURE	C1	3 570 708.08	3 570 708.08	100.00%	3 570 708.08	3 460 105.54	96.90%
Total Title 1			**66 452 825.97**	**66 452 825.97**	**100.00%**	**66 452 825.97**	**64 229 037.11**	**96.65%**

Fund Source: C1 - Credits of the year (EUR)

			Commitment			Payment		
Official Budget Item	Budget Line Description	Fund Source	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	1 506 610.41	1 506 610.41	100.00%	1 506 610.41	1 126 839.91	74.79%
A22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	C1	6 353 259.76	6 353 259.76	100.00%	6 353 259.76	3 964 087.73	62.39%
A23	MOVABLE PROPERTY AND ASSOCIATED COSTS	C1	111 727.19	111 727.19	100.00%	111 727.19	88 328.80	79.06%
A24	CURRENT ADMINISTRATIVE EXPENDITURE	C1	2 124 356.49	2 124 356.49	100.00%	2 124 356.49	1 329 739.41	62.59%
A25	POSTAGE / TELECOMMUNICATIONS	C1	519 700.00	519 700.00	100.00%	519 700.00	259 152.77	49.87%
A26	MEETING EXPENSES	C1	417 598.00	417 598.00	100.00%	417 598.00	248 956.41	59.62%
A28	INFORMATION AND PUBLISHING	C1	10 000.00	10 000.00	100.00%	10 000.00	2 675.46	26.75%
A29	OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	C1	251 698.56	251 698.56	100.00%	251 698.56	156 208.02	62.06%
Total Title 2			**11 294 950.41**	**11 294 950.41**	**100.00%**	**11 294 950.41**	**7 175 988.51**	**63.53%**

Fund Source: C1 - Credits of the year (EUR)

			Commitment			Payment		
Official Budget Item	Budget Line Description	Fund Source	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	459 954 540.35	454 945 424.94	98.91%	441 219 515.60	441 219 515.60	100.00%
B32	TECHNOLOGY FOR ITER AND DEMO	C1	6 969 333.47	6 969 333.47	100.00%	2 659 296.32	2 659 296.32	100.00%
B33	TECHNOLOGY FOR BROADER APPROACH	C1	22 131 407.92	22 131 407.92	100.00%	23 562 574.09	23 562 574.09	100.00%
B34	TECHNOLOGY FOR DONES	C1	1 962 982.64	1 962 982.64	100.00%	1 600 000.00	1 600 000.00	100.00%
B35	EXTERNAL SUPPORT ACTIVITIES	C1	28 870 321.19	28 870 321.19	100.00%	22 699 852.88	22 699 852.88	100.00%
B36	OTHER OPERATIONAL EXPENDITURE	C1	3 584 236.11	3 584 236.11	100.00%	3 938 238.41	3 938 238.41	100.00%
Total Title 3			**523 472 821.68**	**518 463 706.27**	**99.04%**	**495 679 477.30**	**495 679 477.30**	**100.00%**
Total C1			**601 220 598.06**	**596 211 482.65**	**99.17%**	**573 427 253.68**	**567 084 502.92**	**98.89%**

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)
A13	MISSION EXPENSES	C4	1 956.52	0.00	0.00%	1 956.52	0.00	0.00%
Total Title 1			**1 956.52**	**0.00**	**0.00%**	**1 956.52**	**0.00**	**0.00%**
A21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	C4	75 288.58	0.00	0.00%	75 288.58	0.00	0.00%
Total Title 2			**75 288.58**	**0.00**	**0.00%**	**75 288.58**	**0.00**	**0.00%**
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C4	2 608 706.12	682 588.79	26.17%	2 608 706.12	2 608 706.12	100.00%
B35	EXTERNAL SUPPORT ACTIVITIES	C4	11 995.40	0.00	0.00%	11 995.40	0.00	0.00%
B36	OTHER OPERATIONAL EXPENDITURE	C4	4 336.16	0.00	0.00%	4 336.16	4 336.16	100.00%
Total Title 3			**2 625 037.68**	**682 588.79**	**26.00%**	**2 625 037.68**	**2 613 042.28**	**99.54%**
Total C4			**2 702 282.78**	**682 588.79**	**25.26%**	**2 702 282.78**	**2 613 042.28**	**96.70%**

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)
A21	RENTAL OF BUILDINGS AND ASSOCIATED COSTS	C5	1.00	1.00	100.00%	1.00	1.00	100.00%
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C5	218 004.43	218 004.43	100.00%	0.00	0.00	-
B36	OTHER OPERATIONAL EXPENDITURE	C5	12 676.56	12 676.56	100.00%	12 676.56	12 676.56	100.00%
Total C5			**230 681.99**	**230 681.99**	**100.00%**	**12 677.56**	**12 677.56**	**100.00%**

Fund Source: C8 - Carried over credits from previous years (EUR)

			Commitment			Payment		
Official Budget Item	Budget Line Description	Fund Source	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	90 000.01	90 000.01	100.00%	90 000.01	48 400.52	53.78%
A11	SALARIES AND ALLOWANCES FOR EXTERNAL PERSONNEL	C8	157 003.39	157 003.39	100.00%	157 003.39	109 879.69	69.99%
A12	EXPENDITURE RELATING TO STAFF RECRUITMENT	C8	37 327.34	26 172.07	70.12%	37 327.34	26 172.07	70.12%
A13	MISSION EXPENSES	C8	77 505.61	76 356.95	98.52%	77 505.61	52 627.40	67.90%
A14	SOCIO-MEDICAL INFRASTRUCTURE	C8	161 787.83	111 774.82	69.09%	161 787.83	85 113.57	52.61%
A15	TRAINING	C8	605 940.32	594 557.82	98.12%	605 940.32	492 455.55	81.27%
A16	EXTERNAL SERVICES	C9	106 576.61	79 736.13	74.82%	106 576.61	79 736.13	74.82%
A17	RECEPTIONS, EVENTS AND REPRESENTATION	C8	1 348.46	1 348.46	100.00%	1 348.46	0.00	0.00%
A18	SOCIAL WEALFARE	C8	10 664.10	2 149.00	20.15%	10 664.10	2 149.00	20.15%
A19	OTHER STAFF RELATED EXPENDITURE	C8	743 900.31	718 430.86	96.58%	743 900.31	703 490.52	94.57%
Total Title 1			**1 992 053.98**	**1 857 529.51**	**93.25%**	**1 992 053.98**	**1 600 024.45**	**80.32%**

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	559 498.61	350 936.12	62.72%	559 498.61	350 936.12	62.72%
A22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	C8	1 871 633.46	1 666 953.02	89.06%	1 871 633.46	1 663 732.58	88.89%
A23	MOVABLE PROPERTY AND ASSOCIATED COSTS	C8	143 894.24	112 865.25	78.44%	143 894.24	103 233.12	71.74%
A24	CURRENT ADMINISTRATIVE EXPENDITURE	C8	602 880.98	534 226.49	88.61%	602 880.98	523 882.90	86.90%
A25	POSTAGE / TELECOMMUNICATIONS	C8	191 343.12	133 535.12	69.79%	191 343.12	133 535.12	69.79%
A26	MEETING EXPENSES	C8	240 563.63	193 336.38	80.37%	240 563.63	163 908.73	68.14%
A28	INFORMATION AND PUBLISHING	C8	4 193.41	4 193.41	100.00%	4 193.41	1 738.39	41.46%
A29	OTHER INFRASTRUCTURE AND OPERATING EXPENDITURE	C8	73 074.58	73 074.58	100.00%	73 074.58	49 602.77	67.88%
Total Title 2			**3 687 082.03**	**3 069 120.37**	**83.24%**	**3 687 082.03**	**2 990 569.73**	**81.11%**
B31	ITER CONSTRUCTION INCLUDING SITE PREPARATION	C8	837 175 788.92	780 776 991.46	93.26%	Payment appropriations under C1 Fund source		
B32	TECHNOLOGY FOR ITER AND DEMO	C8	6 882 879.72	6 874 191.72	99.87%			
B33	TECHNOLOGY FOR BROADER APPROACH	C8	31 821 765.89	30 465 706.32	95.74%			
B35	EXTERNAL SUPPORT ACTIVITIES	C8	30 959 414.12	29 670 460.74	95.84%			
B36	OTHER OPERATIONAL EXPENDITURE	C8	3 159 842.04	2 141 553.91	67.77%			
Total Title 3			**909 999 690.69**	**849 928 904.15**	**93.40%**			
Total C8			**915 678 826.70**	**854 855 554.03**	**93.36%**	**5 679 136.01**	**4 590 594.18**	**80.83%**

Fund Source: C9 - Carried over credits from previous years (EUR)

A22	INFORMATION, COMMUNICATION TECHNOLOGY AND DATA PROCESSING	C9	15 545.43	0.00	0.00%	0.00	0.00	-
Total Title 2			**15 545.43**	**0.00**	**0.00%**	**0.00**	**0.00**	**-**
Total C9			**15 545.43**	**0.00**	**0.00%**	**0.00**	**0.00**	**-**

Fund Source: R0 - Assigned revenues (EUR)

			Commitment			Payment		
Official Budget Item	**Budget Line Description**	**Fund Source**	**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	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	397 400 918.54	393 463 752.72	99.01%	61 500 000.00	61 333 174.81	99.73%
B42	ACTIVITIES LINKED TO ITER ORGANIZATION	R0	78 366 965.79	23 623 348.73	30.14%	49 977 604.35	6 342 698.62	12.69%
B43	OTHER EARMARKED EXPENDITURE	R0	388 991.47	336 841.47	86.59%	388 991.47	336 841.47	86.59%
Total Title 4			**476 156 875.80**	**417 423 942.92**	**87.67%**	**111 866 595.82**	**68 012 714.90**	**60.80%**
Total R0			**476 171 406.68**	**417 423 942.92**	**87.66%**	**111 881 126.70**	**68 012 714.90**	**60.79%**

Fig. 38 Budget Implementation – Details by Fund Source

8.5. 2024 Establishment Plan

Function group and grade	2024 Budget			
	Authorised under the EU Budget		Filled as 31/12/2024	
	Permanent posts	Temporary Posts	Permanent posts	Temporary Posts
AD 16				
AD 15				
AD 14	4	4	2	1
AD 13	6	7	3	3
AD 12	9	26	10	28
AD 11	1	28		25
AD 10	8	53	9	56
AD 9	1	42	1	29
AD 8		29		29
AD 7	2	16	1	12
AD 6		20	1	31
AD 5				
AD total	**31**	**225**	**27**	**214**
AST 11	2		1	
AST 10	1		1	
AST 9	3	1	4	
AST 8	1	1		2
AST 7	1	10		7
AST 6	2	8	1	6
AST 5	2	8	2	6
AST 4		3	1	3
AST 3		6		8
AST 2				
AST 1				
AST total	**12**	**37**	**10**	**32**
AST/SC total	**0**	**0**	**0**	**0**
TOTAL	**43**	**262**	**37**	**246**
GRAND TOTAL	**305**		**283**	

Fig. 39 Budget 2024 - 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