



**FUSION
FOR
ENERGY**

Update from F4E

DE Fusion Business Forum

Berlin, 3 July 2024

Leonardo Biagioni

Head of Projects



ITER and the Development of EU Fusion



- ▶ **F4E is EU Joint Undertaking based in Spain (Barcelona), with offices in France (Cadarache), Germany (Garching) and Japan**
- ▶ Staff: ~450 highly competent team of engineers, project managers, commercial and administration
- ▶ Budget: €6.8 billion 2021-2027
- ▶ **Main role is to provide the European contribution to ITER and BA as the European “Domestic Agency”, but also involved in other projects to develop and industrialise fusion**

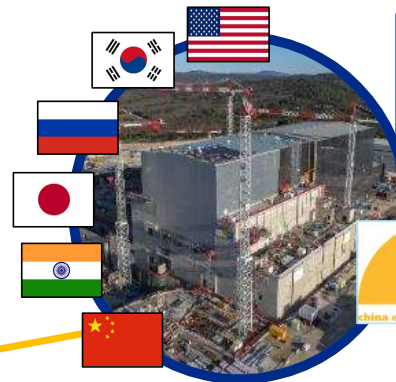


Four Projects on the European Fusion Roadmap



Broader Approach
Three projects with Japan
IFERC|IFMIF-EVEDA|JT60SA

JT60SA, largest tokamak until ITER – starting operations in December 2023



ITER
F4E is responsible of Europe's contribution to ITER as the EU "Domestic Agency"



Ciemat

IFMIF-DONES
Early phase of design & construction of Demo Orientated NEutron Source



DEMO
Early design studies by EuroFusion DEMOnstration Fusion Reactor F4E to lead future construction

Objective 1



Deliver the European contributions to ITER and the Broader Approach within the agreed budget and schedule **making best use of the industrial and research potential and capabilities** of all F4E members, in line with competition rules.

Objective 2



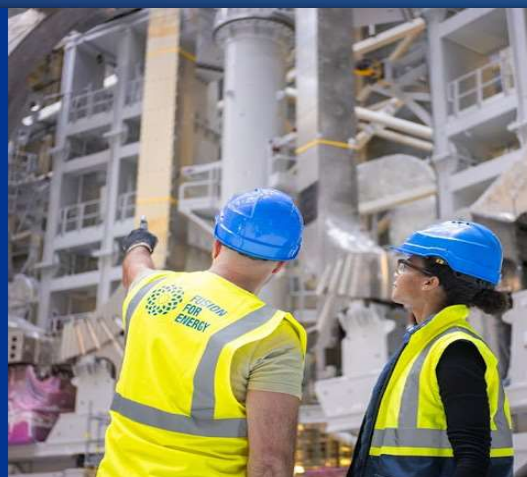
Broaden the European industrial base for fusion technology for the long-term development of fusion as future energy source and to ensure a **strong and competitive European industrial participation** in the future fusion market.

Objective 3



Foster European **innovation and competitiveness** in key emerging **technologies** to further the development of the Innovation Union and its impact at the international level.

Fusion for Energy (F4E) – Strategic Vision



We develop talent and knowledge for the future fusion power plants in Europe



F4E Strategic Vision: Looking to the future

We focus on the construction and operation of ITER and other fusion projects



We help create a competitive European Fusion Industry

Fusion Already Benefits European Economy



Value of contracts signed since 2007 is almost € 7 billion, involving more than 700 companies and research centres



▶ High-Tech Jobs

Approx. 40,000 job years created 2008-2017
(83,000 more by 2030)



▶ Industrial expertise

Over 700 companies, over 2100 subcontractors in 24 countries



▶ Economic growth

Investment in fusion brings a net economic benefit of 5-6%



▶ Innovation

400+ new technologies, tools and processes
20+ spin-offs, start-ups, joint-ventures



▶ Competitiveness

Companies are expanding into new markets from ITER work

2023-2024 Timeline



New F4E Director

May-23



In May 2023 Marc Lachaise took up duties as
F4E Director



2023-2024 Timeline

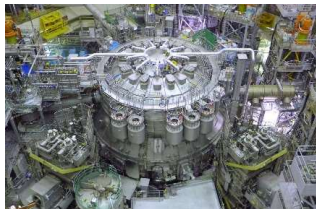


New F4E Director

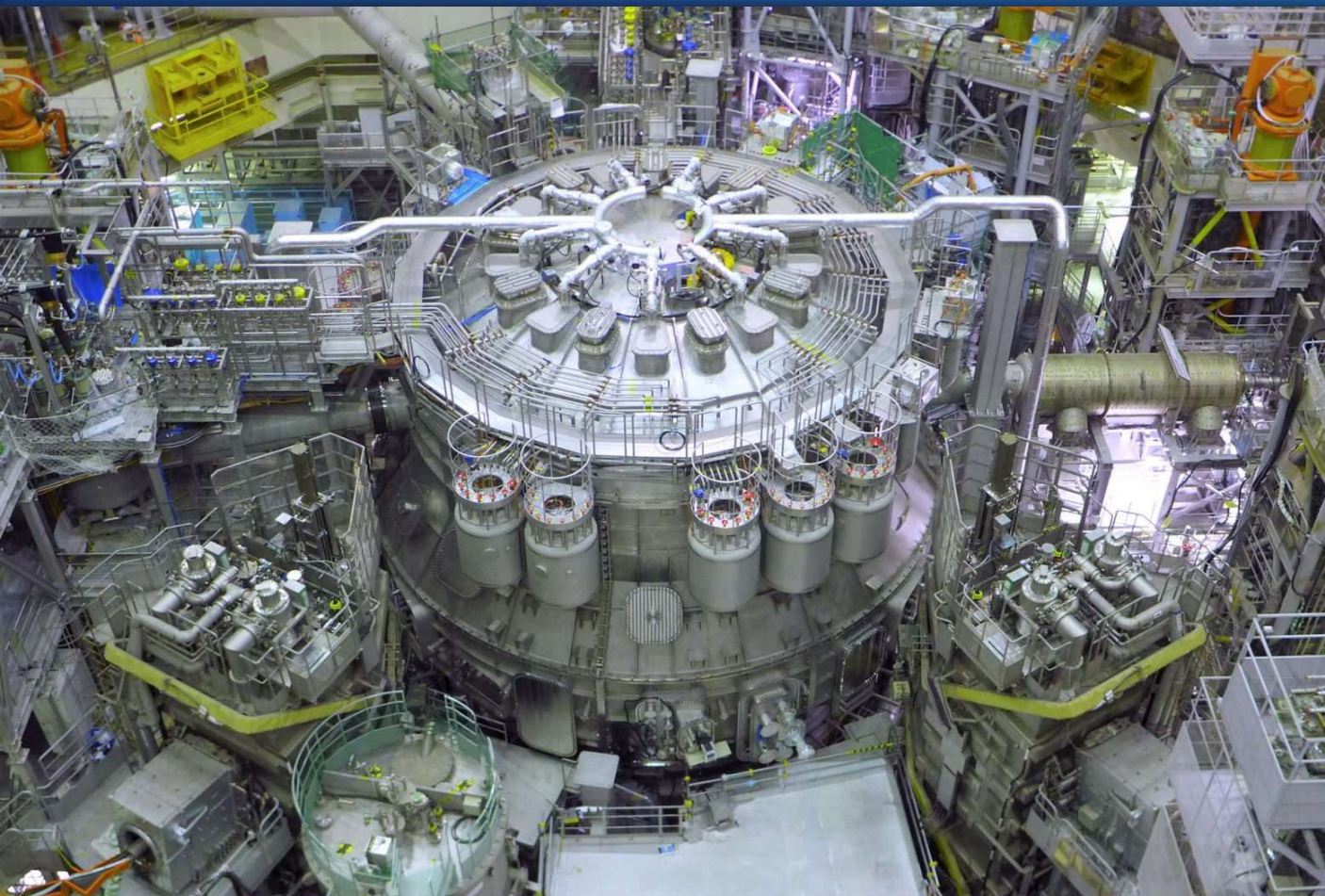
Start of JT-60SA
operations

May-23

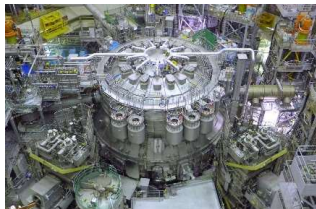
Oct-23



In October 2023 first plasma was achieved in the JT-60SA Tokamak in Japan



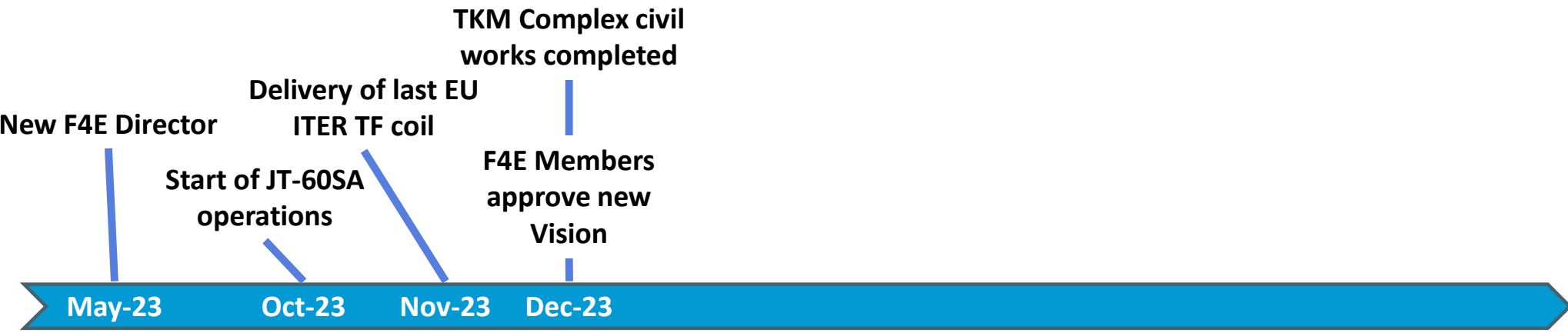
2023-2024 Timeline



In November 2023 we delivered the final Toroidal Field Coil to ITER



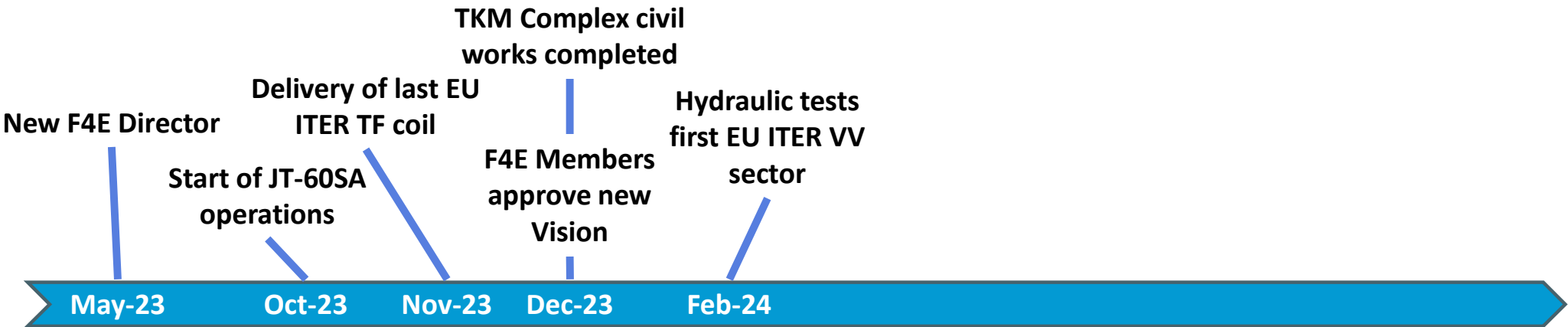
2023-2024 Timeline



In December 2023 we celebrated the Completion of the TB03 Civil Engineering Buildings Contract



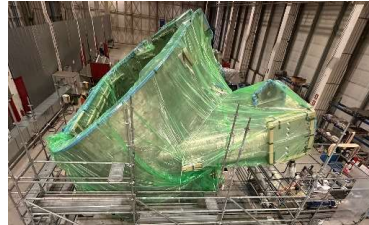
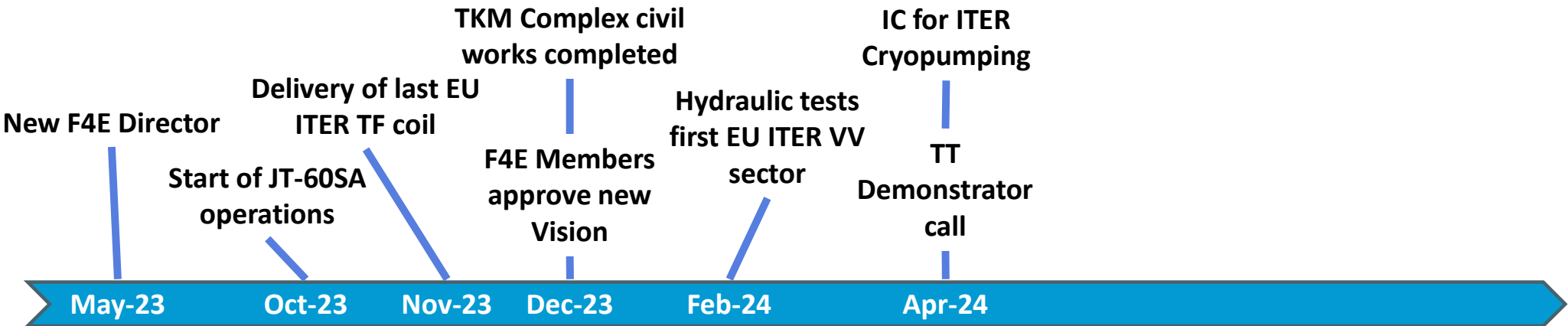
2023-2024 Timeline



In February 2024 the Hydraulic Factory Acceptance Tests for Vacuum Vessel Sector 5 were completed



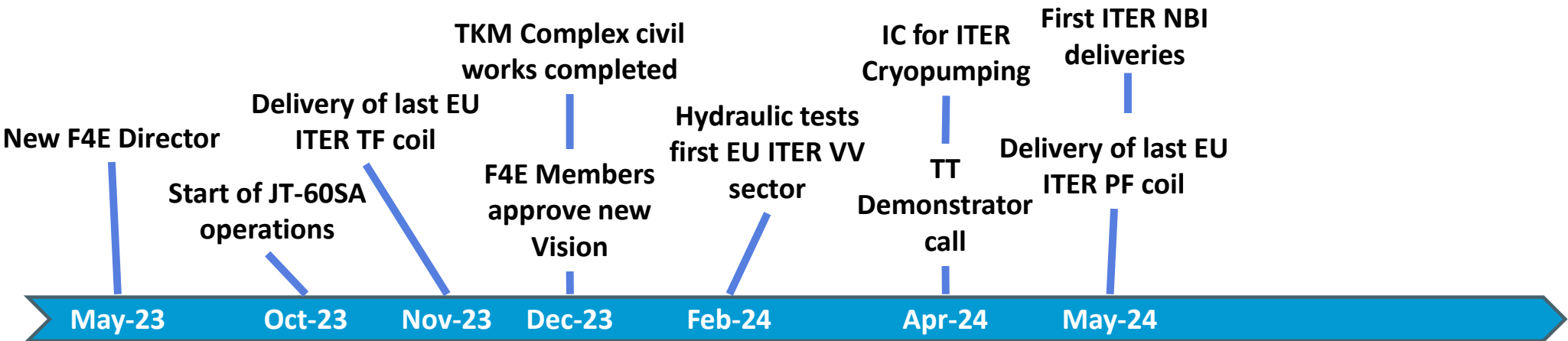
2023-2024 Timeline



In April 2024 we delivered Instrumentation & Control Cabinets to ITER for the Cryopump System



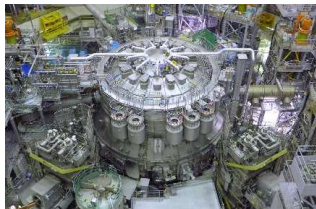
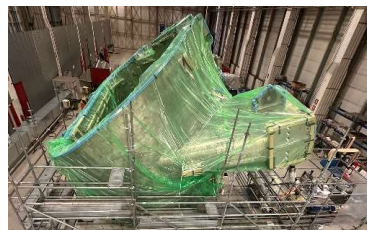
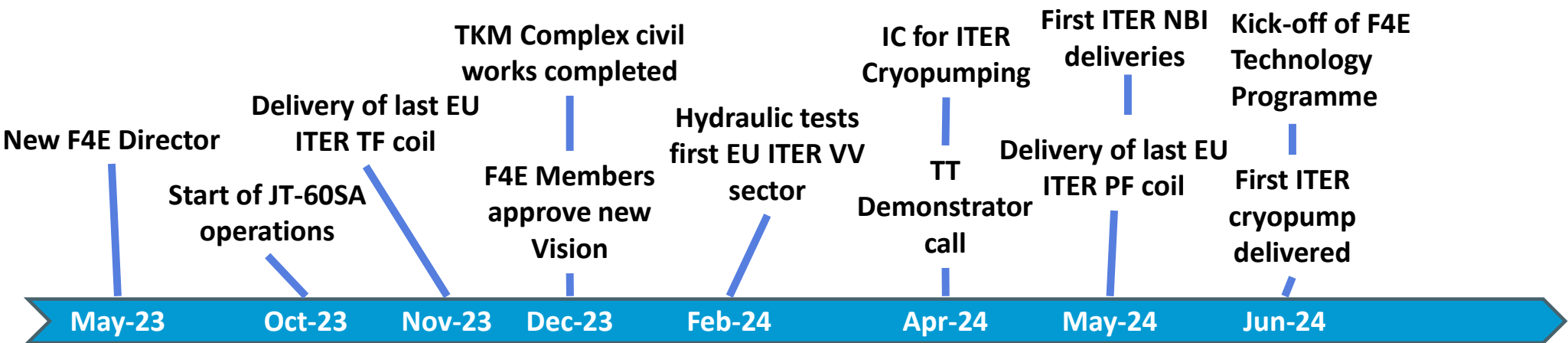
2023-2024 Timeline



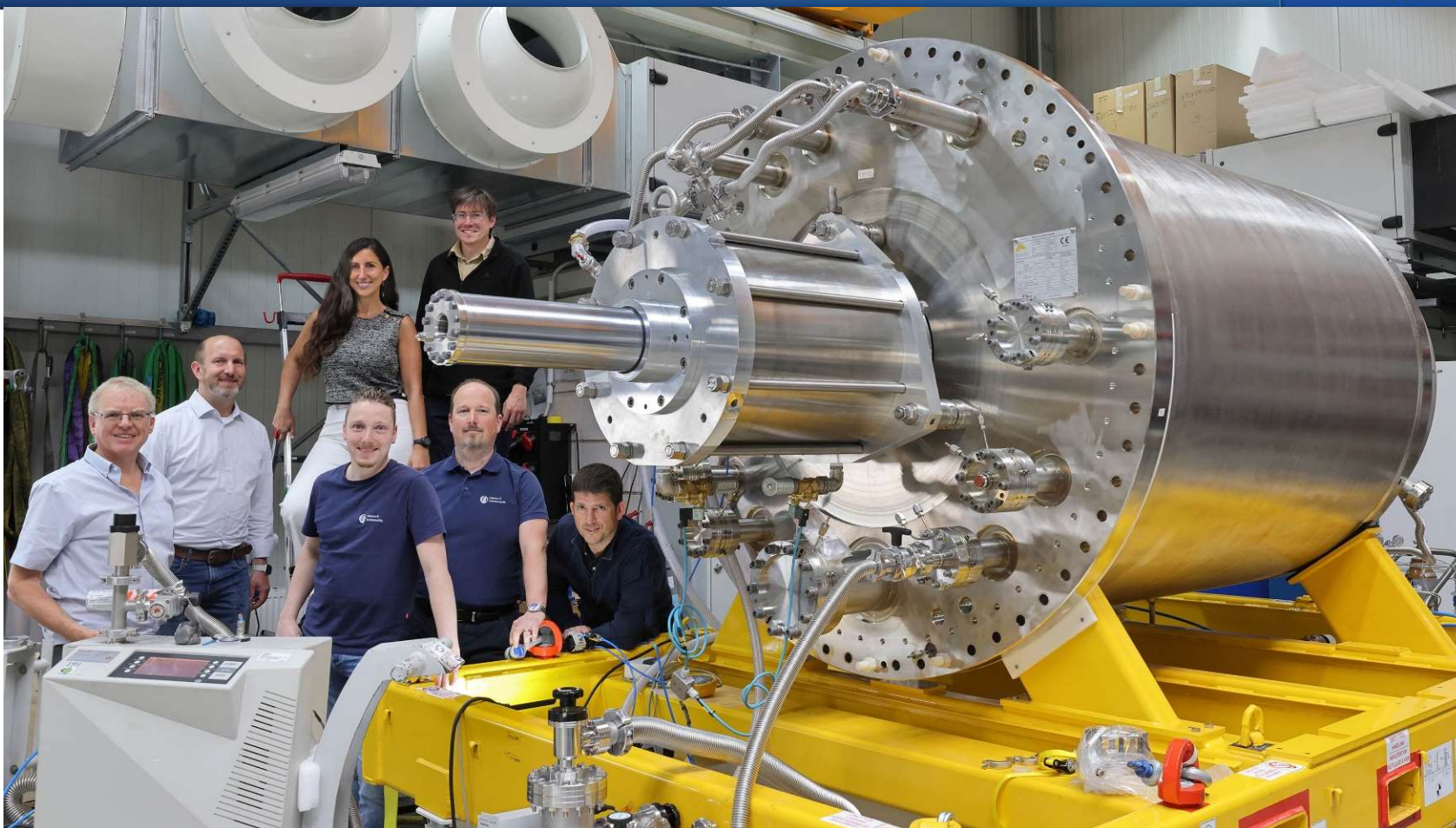
In May 2024 we delivered the Final Poloidal Field Coil (PF3) to ITER



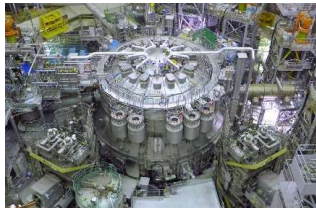
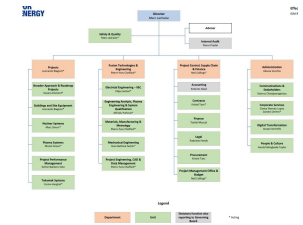
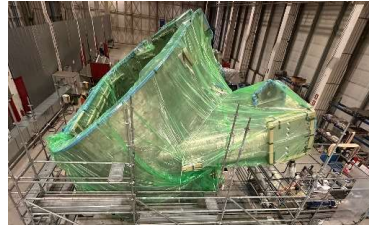
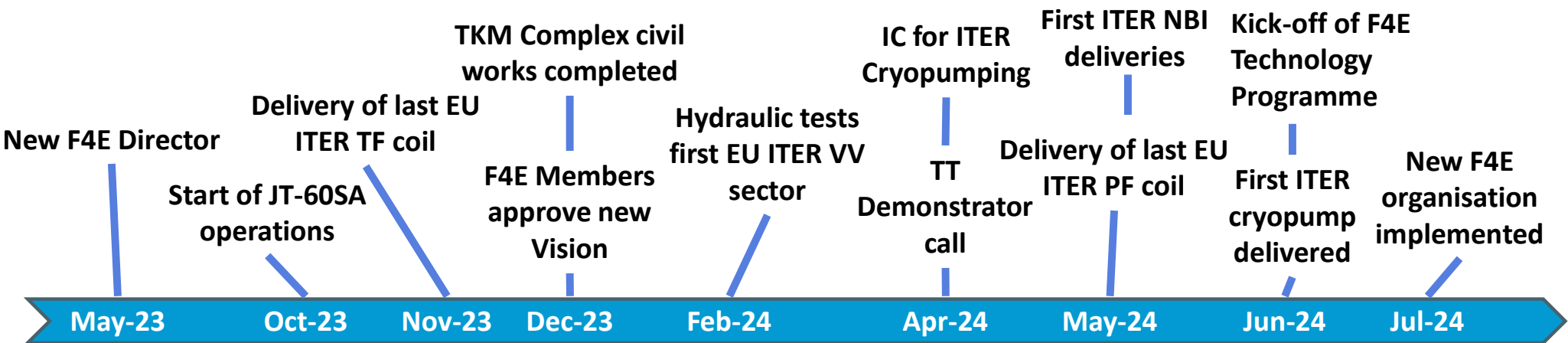
2023-2024 Timeline



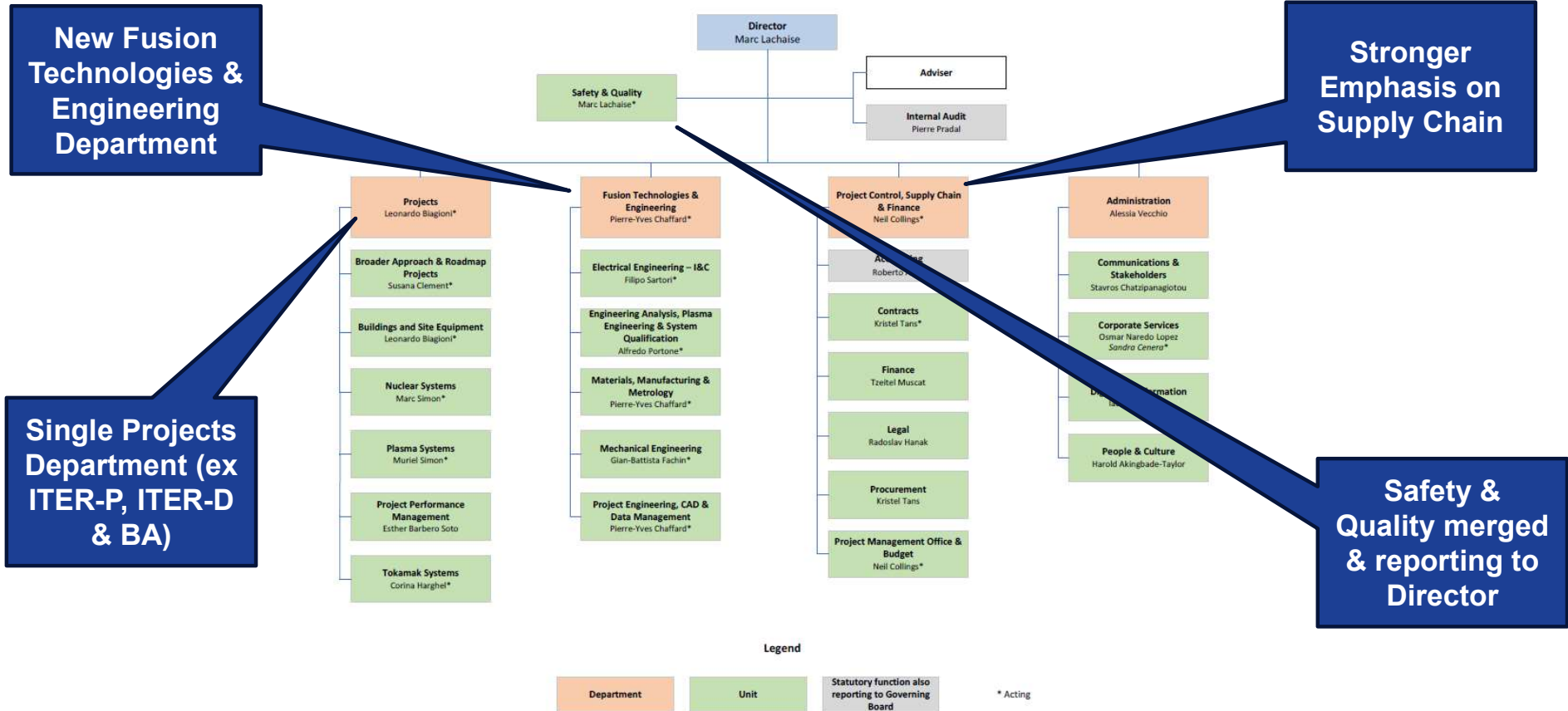
In June 2024 First Cryopump delivered to ITER



2023-2024 Timeline



On 1 July 2024 the New F4E Organisation started



More to come in 2024-2025 Market Surveys

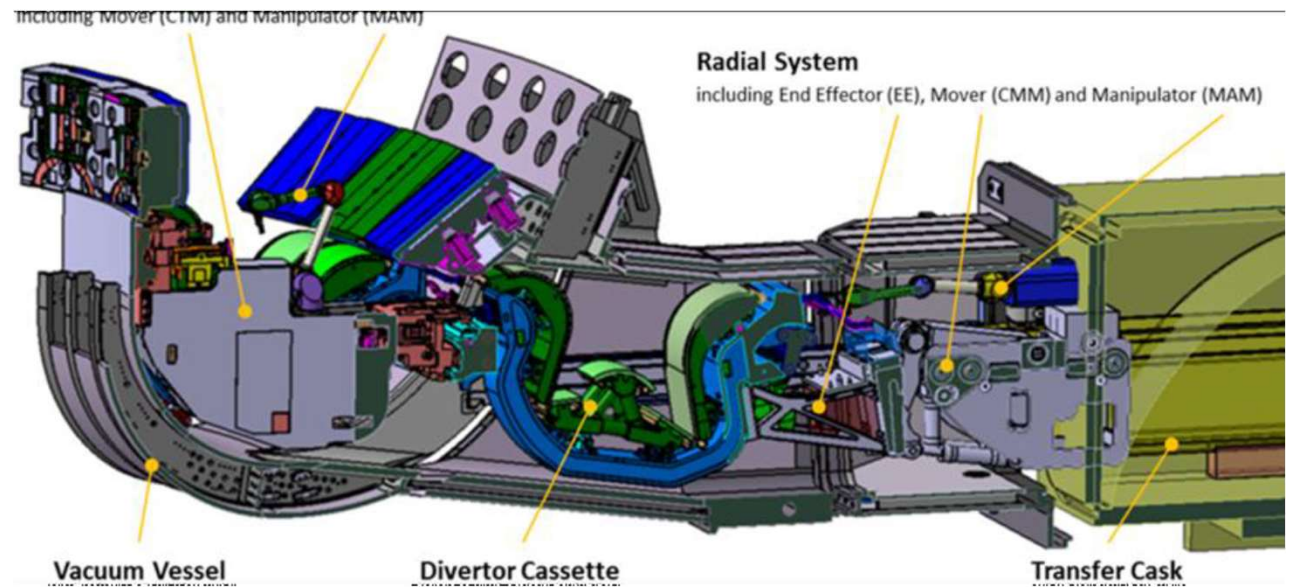


	PROGRAM	ANSWERS	STATUS	MARKET ANALYSIS OFFICER
F4E - ITER Org	HOT CELL FACILITY	n.a.	IMMINENT	Mehdi/ Benjamin
F4E	TDP- Technology Development Program - Tritium Detector	4	Open	Benjamin
F4E	Collective Thomson Scattering	4	Open	Mehdi
F4E	CRYOPLANT AND FUEL CYCLE - Cryopumps	3	Open	Mehdi
F4E	CRYOPLANT AND FUEL CYCLE - LN2 Cryolines	4	Open	Mehdi
F4E	CRYOPLANT AND FUEL CYCLE - Design support of the REMS	n.a.	Coming soon	Mehdi
F4E	TBM - Final Design and Manufacturing of Water Cooling System and Coolant Purification System of WCLL TBS	3	Open	Benjamin
F4E	TBM - Final Design and Manufacturing of Tritium Extraction Systems, Tritium Accountancy Systems, Gloveboxes in Tritium Process Room	5	Open	Benjamin
F4E	IN VESSEL - Tungsten tiles	27	Open	Mehdi
F4E	CRYOPLANT AND FUEL CYCLE - Isotope Separation System	14	Open	Mehdi
F4E	CRYOPLANT AND FUEL CYCLE - Water Detritiation System	11	Open	Mehdi
F4E	HEATING & CURRENT DRIVE - NB Magnetic Shielding	13	Open	Mehdi
ITER Org	Design, Manuf., Testing, Qualification, and Delivery of the VVPSS Valves	n.a.	Open	n.a.
F4E	Broader Approach	21	Closed	Benjamin

Upcoming Opportunities – Remote Handling



- OMF-1609 Design & manufacturing of Tools for Machine Assembly (Q3 2024, cat **D**)



Upcoming Opportunities – Tritium Breeding



- **Final Design and Supply of Ancillary Systems (3 systems out of 5)**

1st System - **Final Design and Manufacturing of Tritium Extraction Systems (TES), Tritium Accountancy Systems (TAS), Gloveboxes in Tritium Room.** cat **C**

=> Market Survey closed

2nd System – **Water Cooling System, Coolant Purification System**

=>Market Survey ongoing, target Q2 2024- cat **D**

3rd System – **PbLi (Pebble Bed Lead Lithium Loop)-** cat **B**

=> Market Survey Q3/4 2024

Upcoming Opportunities – JT60 SA



OPE-1405: Integration and testing of Actively Cooled Divertors of JT-60SA, estimated contract value: cat **D**,
Market Survey under preparation, planned launch Q4 2024

OPE-1407: LIPAc Injector Upgrade, estimated contract value cat **A**, Imminent

OPE-1XXX: JT60SA Pellet Injectors (re-issue): Market Survey to be decided, dissemination to target companies and ILO network will be performed. Value **A**, planned **Q3 2024** (Competitive with Negotiation)

OMF-1661: Framework Contract for a Logistic Provider for Broader Approach to be relaunched Imminent cat **A**

OFC-1xxx FWC Spare parts and maintenance Cryoplant Q3/4 2024 cat **B**

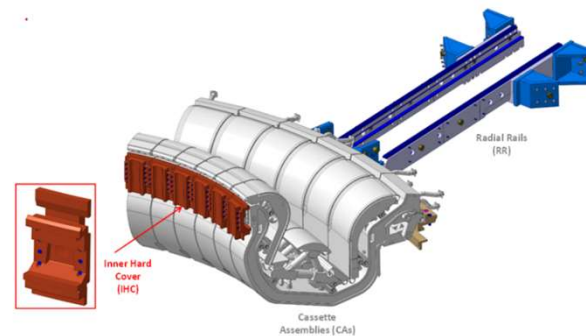
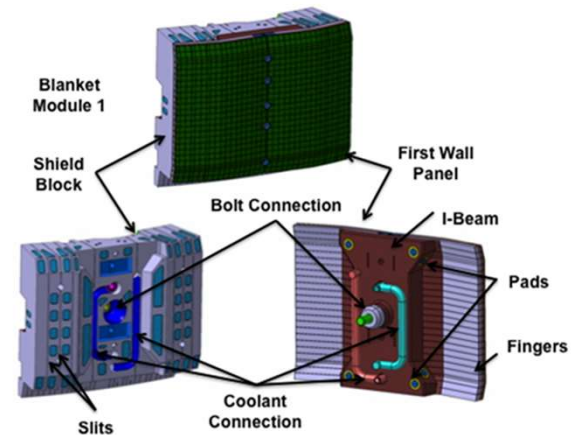
DONES: SRF Coupler, Design of the cavity, Supply of a superconductive Cavity => start of procurement strategy, pending GB confirmation. Q3/4 2024

Upcoming Opportunities – In Vessel



- **Tungsten tiles for First Wall.** Market Survey under conclusion. Cat **D**

- **Divertor rails.** Cat **C**
(decision in Q3 with new schedule)
=> Contract Signature Q2-3 2025



Upcoming Opportunities – Cryo & Vacuum



• **OPE-1592 CRYOLINES** (cat **A**). Target CFT October 2024 (contract signature August 2025). Market Survey ongoing.

• **OPE-17XY Leak Detection (ex-OPE-0982)**: Cat. **B** or **C**. Market Survey Q3-4 2024; CFT Q3-4 2025.

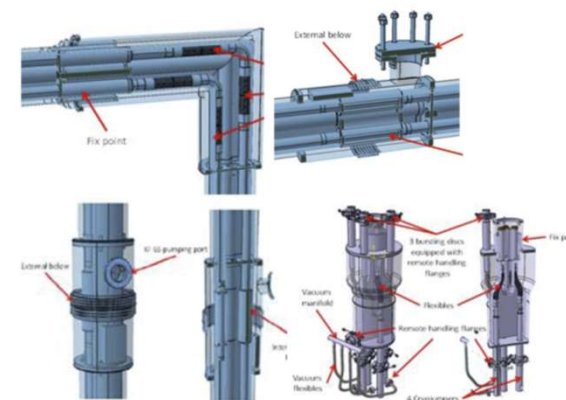
• **NB Cryopumps** (2 X 3 units, cat **D**)

- 500 cryopanel ; >650 thermal shield panels

- Tight tolerances

⇒ Target CFT Q4 2025 (contract signature Q4 2026)

⇒ Market Survey ongoing.



Upcoming Opportunities – Fuel Cycle



• Isotope Separation System (cat D)

- Cryogenic distillation of >650 thermal shield panels

=> Market Survey ongoing

=> Target PA and CFT: Q1 2026

• Water Detritiation System (cat D)

- Reception and Purification System: Target CFT Q1 2026

- Distillation columns: Target CFT Q1 2026

=> Market survey Ongoing

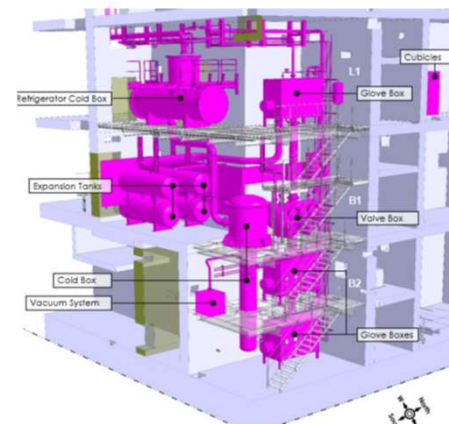
=> Target PA: Q2 2025

• REMS (Radiological and Environmental Monitoring System)

Qualification & Procurement (Cat. D)

=> Target CFT Q4 2025

=> (Magnetic tests ongoing at Cadarache)



Upcoming Opportunities – Heating and Current Drive



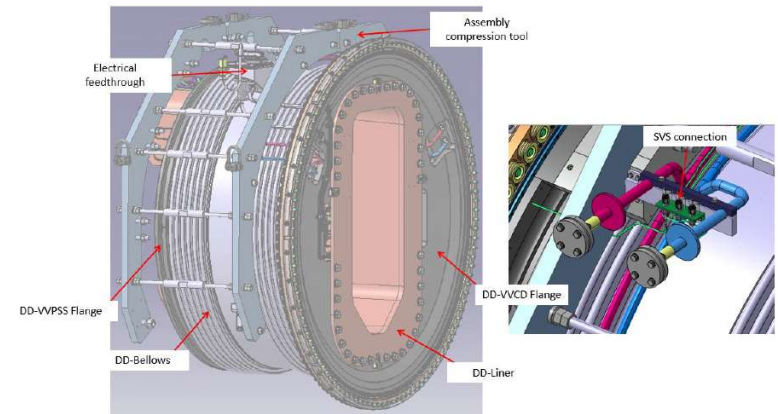
•OPE-1578: Drift Duct. Cat. C. (2 units).

Deadline Request to participate extended till 14th July 2024.

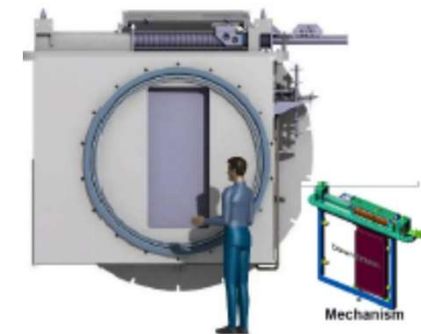
•OPE-1203: Design, Manufacture, Test and Delivery of Assembly Tools for HNB (stage 2).

•OPE-1XXY: Absolute Valve and Fast Shutter. Cat. C. (2 units each)

- Market Survey closed.
- IO CFT for Feasibility Study ongoing (EOI stage now).



Fast Shutter

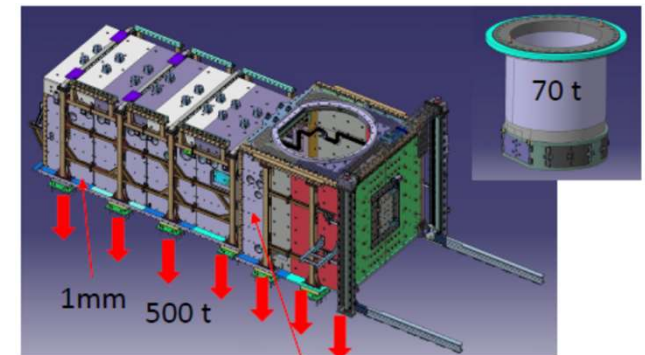
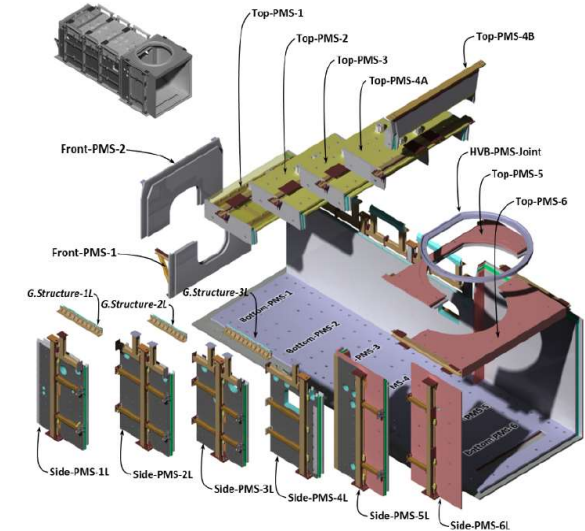


• OPE-1XXY: Passive Magnetic Shielding (PMS)

Cat. **D.** (2 units)

- Steel Plate Material S235 (EN 10025-2) (2 x 400 tons)
- Active Compensation Correction Coils (ACCC) Total 2 x 8 units.
- Market Survey under conclusion.

=> Target CFT: Q4 2024-Q1 2025.



Upcoming Opportunities – Diagnostics



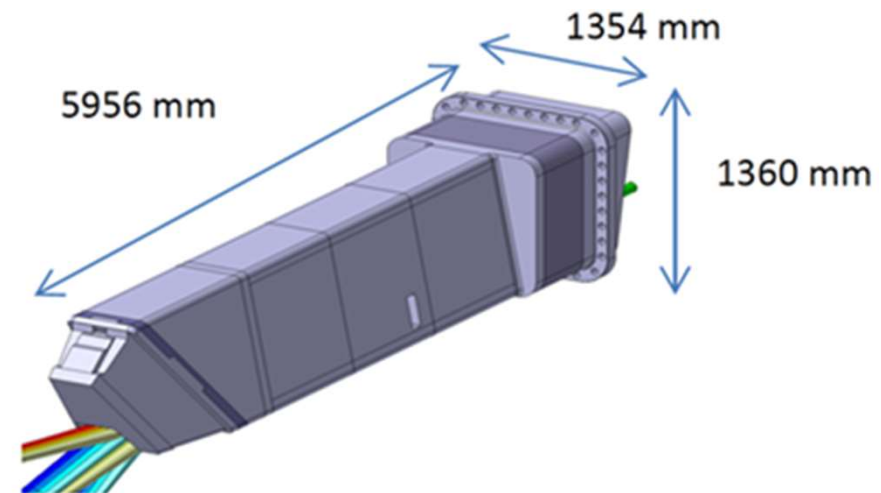
- OFC-1183: Cat. **D**. 6 Diag PORTS

Manufacturing and Assembly + Testing

Facility. Market Survey ongoing. Target CFT:

Q2-3 2025.

- Worldwide **CTS** market survey (related to OMF-1126) under conclusion.



Upcoming Opportunities – Buildings



- **Hot Cell Facility (HCF) Cat D.**

⇒ Market survey published.

- **TB24 Diesel Generators: Cat D** 2x 3.5 MW in 6.6 kV (Non-PIC) + tank + civil engineering (container style).

⇒ postponed, expected signature in **2027-2028**.



Upcoming Opportunities – Buildings



- **OMF-1674 Nuclear Data Analysis Support** (ex-OMF-0882): CFT IMMINENT. Cat **A**.
- **Seismic, Dynamic and Structural** Analyses of ITER Buildings and Mechanical Components Support. (ex-OMF-1023) Cat **A**. Target CFT: Q3 2024.
- **Destructive and ND Testing of Material and Mock-ups:** (ex-OMF-1082). Cat. **B**. Target CFT: Q3-4 2024.
- **I&C Integration Services** (ex-OMF-0989). Target CFT Q4 2024. Cat **D**.



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Thank you for your attention

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