



**FUSION
FOR
ENERGY**

BRINGING
THE **POWER**
OF THE **SUN**
TO **EARTH**

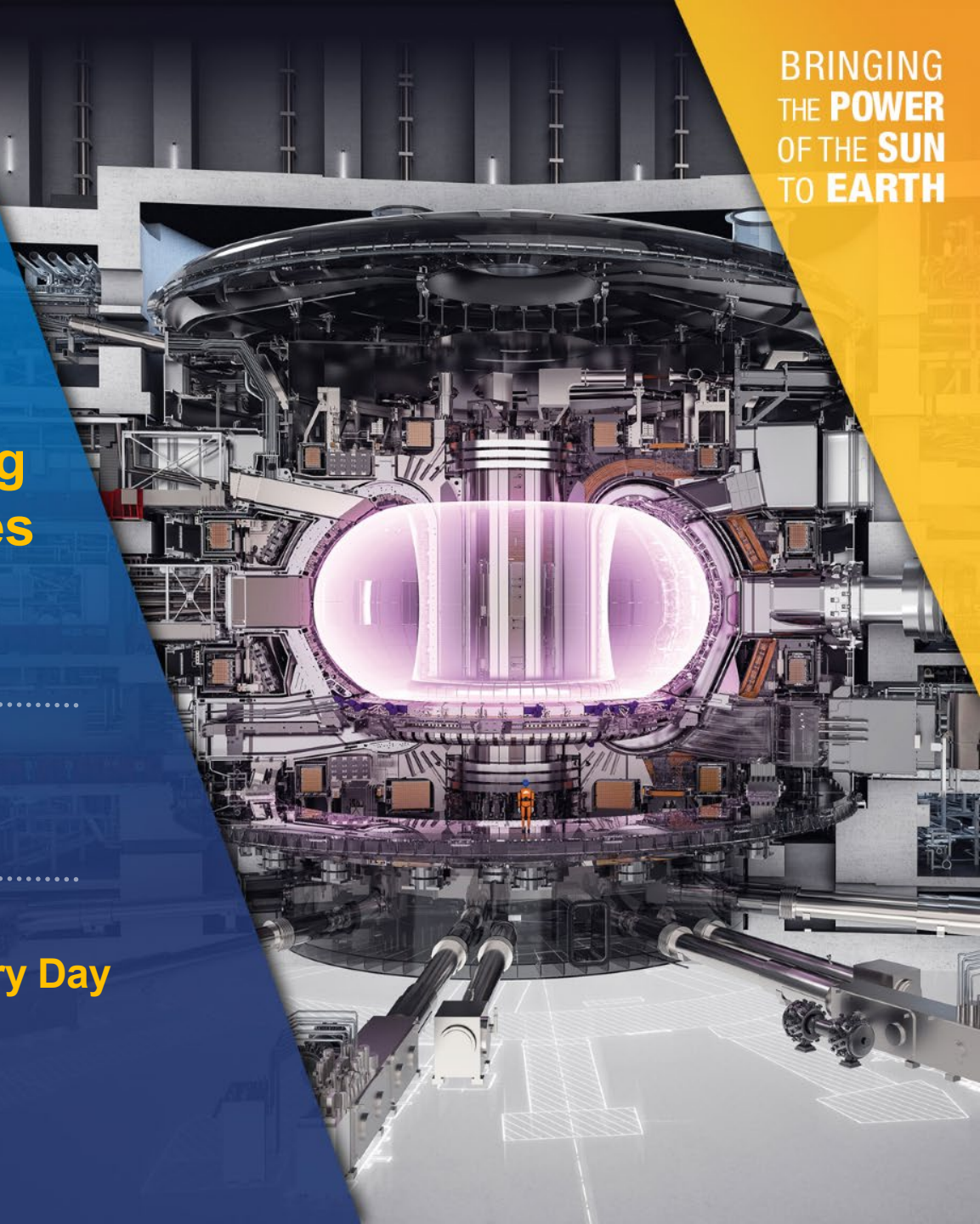
ITER: F4E Forthcoming Business Opportunities

Mehdi DAVAL – F4E

Big Science Partner & Industry Day

12th January 2024 Kraków

Instytut Fizyki Jądrowej

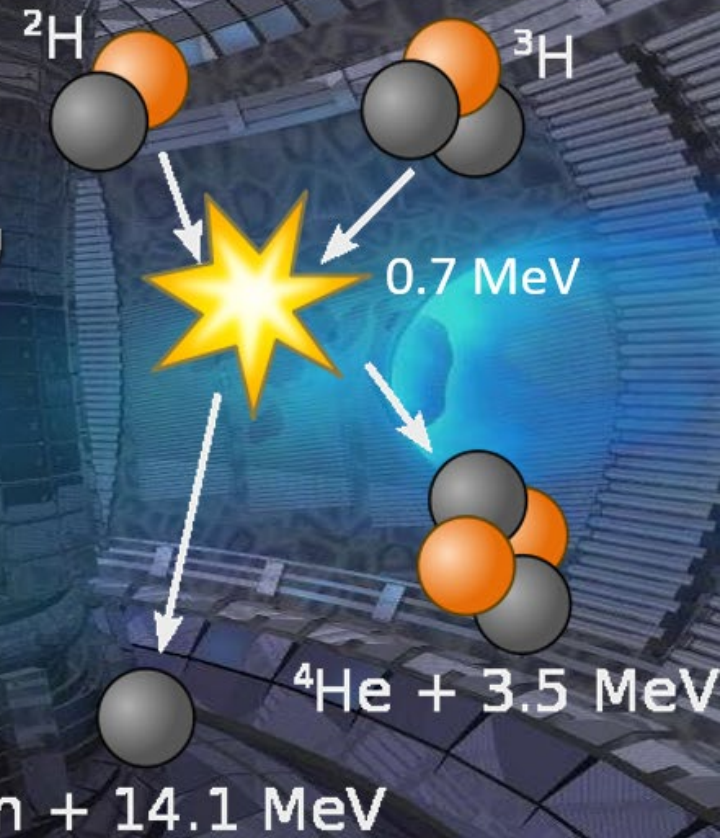


- **ITER at a glance**
- How to access ITER opportunities (IO and F4E)
- Upcoming ITER opportunities (F4E)

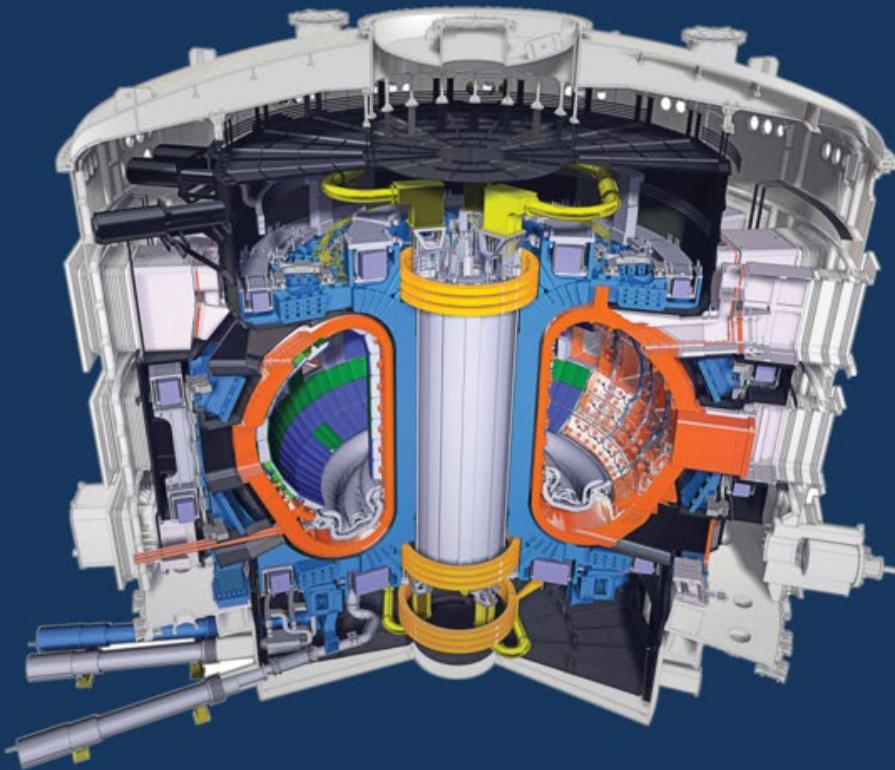
Fusion on Earth

- A plasma of Deuterium + Tritium (hydrogen isotopes) is heated to more than 150 million °C.
- The hot plasma is shaped and confined by strong magnetic fields.
- Helium nuclei sustain burning plasma.
- Neutrons transfer their energy to the Blanket.
- In a fusion power plant, conventional steam generator, turbine and alternator will transform the heat into electricity.

1 gram of fusion fuels = 8 tons of oil



The ITER Tokamak



Vacuum Vessel: ~ 8 000 t.
TF Coils: ~ 18 x 360 t.
Central solenoid: ~ 1 000 t.
Etc.
Total ~ 23 000 t.

$R=6.2$ m, $a=2.0$ m,
 $I_p=15$ MA, $B_T=5.3$ T,
23,000 tonnes



**3,5 times the weight of
the Eiffel Tower!**

High Vacuum + Nuclear + Cryogenics = (Very) High precision

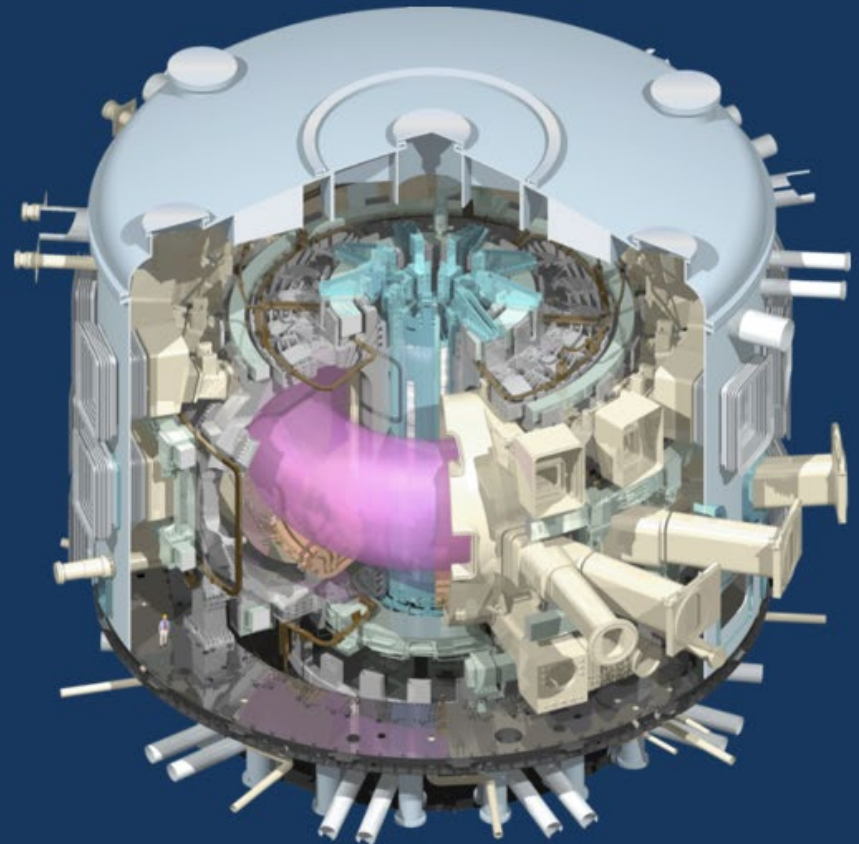
ITER mission

To demonstrate the scientific and technological feasibility of fusion power for peaceful purposes

ITER is the only magnetic fusion device under construction aimed to produce a burning plasma.

Input (heating power): 50 MW

Output (fusion power): 500 MW



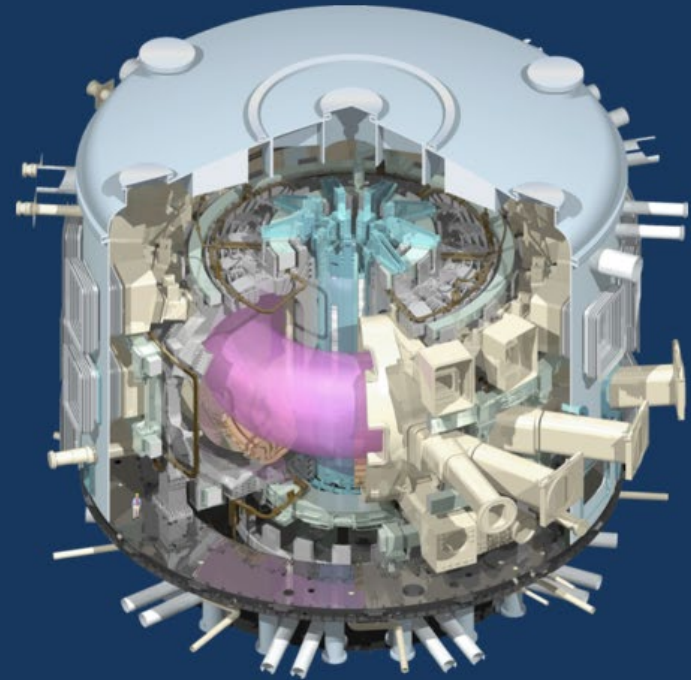
How does it work?

Run a strong electrical current in the DT gas to create a plasma.

Continue heating by way of electromagnetic waves.

Inject high-energy neutral particles.

By combining these different heating techniques, you reach the requested temperature for fusion reactions to occur.

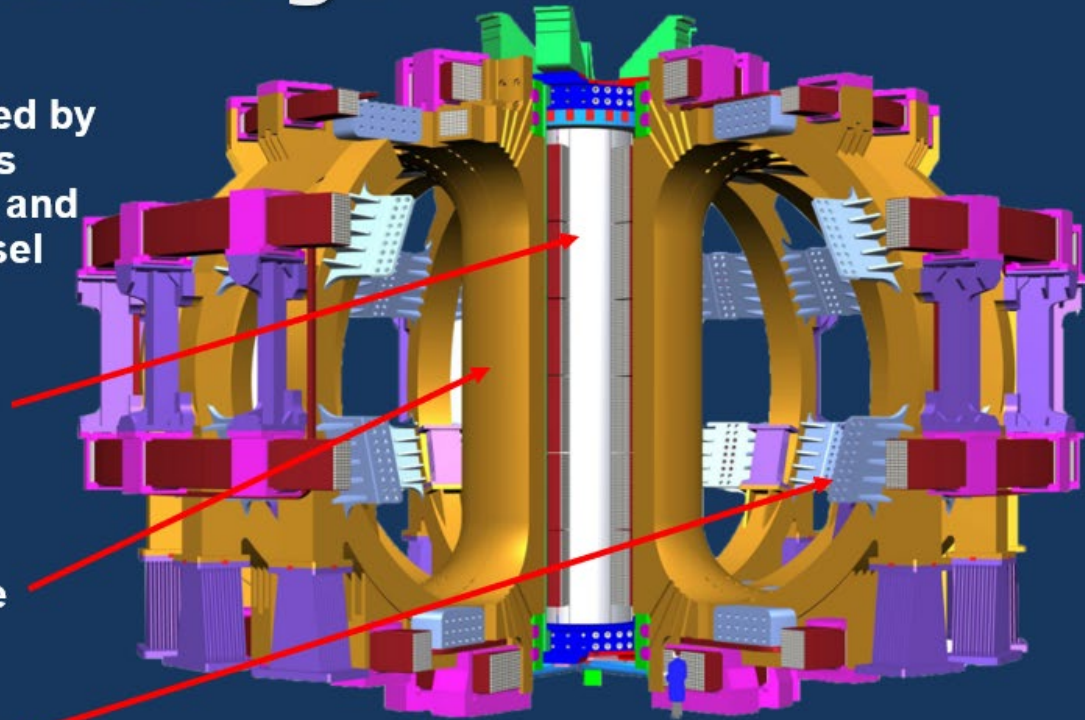


But what can contain something that is 10 times hotter than the core of the Sun?

A large magnetic cage

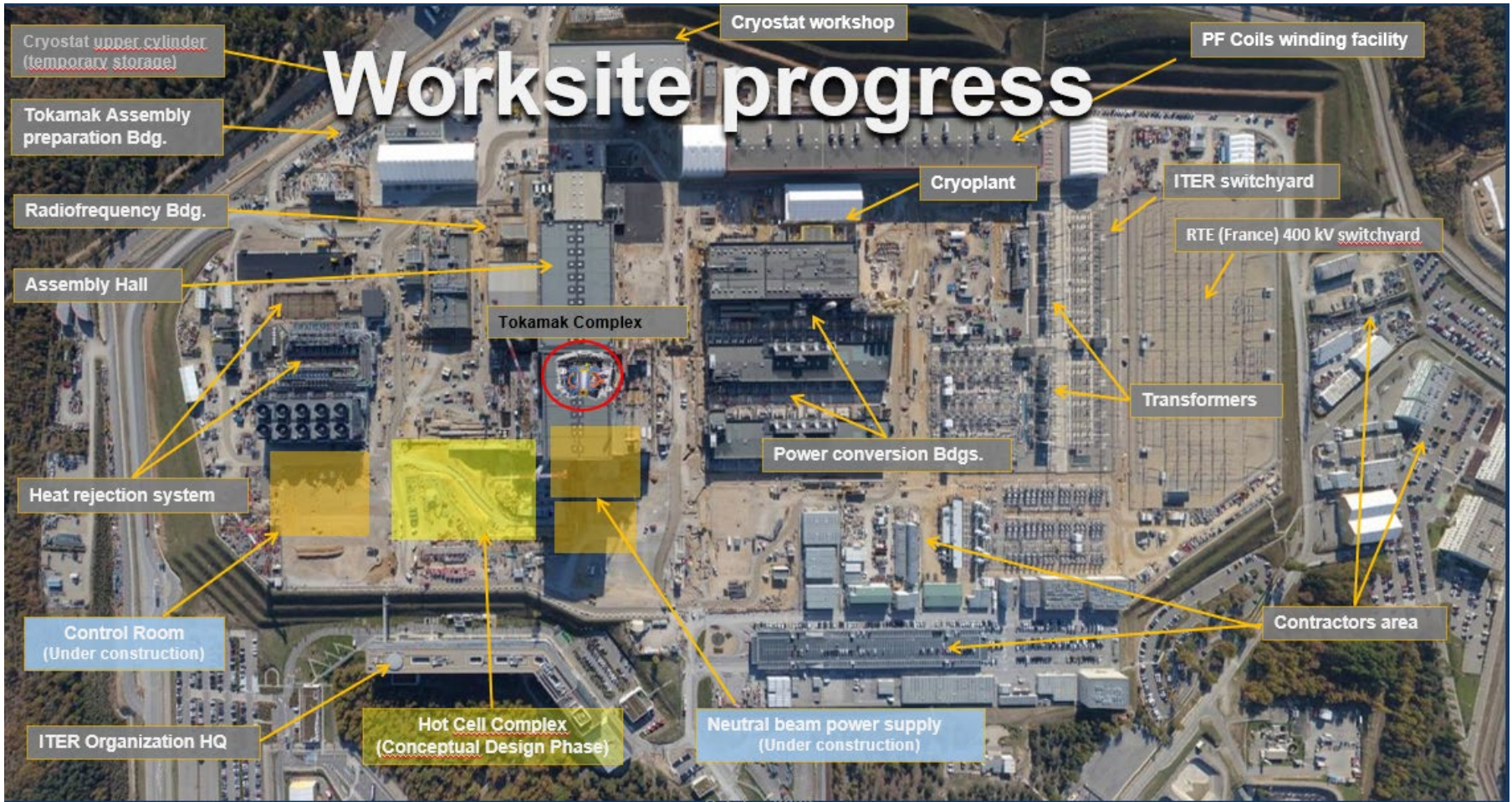
An intense magnetic field, generated by powerful superconducting magnets shape and confine the hot plasma, and keep it away from the vacuum vessel wall.

- 1 central solenoid, 13 m high, 1,000 tons, powerful enough to lift an aircraft-carrier out of the water
- 18 Toroidal Field Coils, 17-metre high, 360 tons each.
- 6 Poloidal Field Coils, 8 to 24 m. in diameter, 200 to 400 tons.



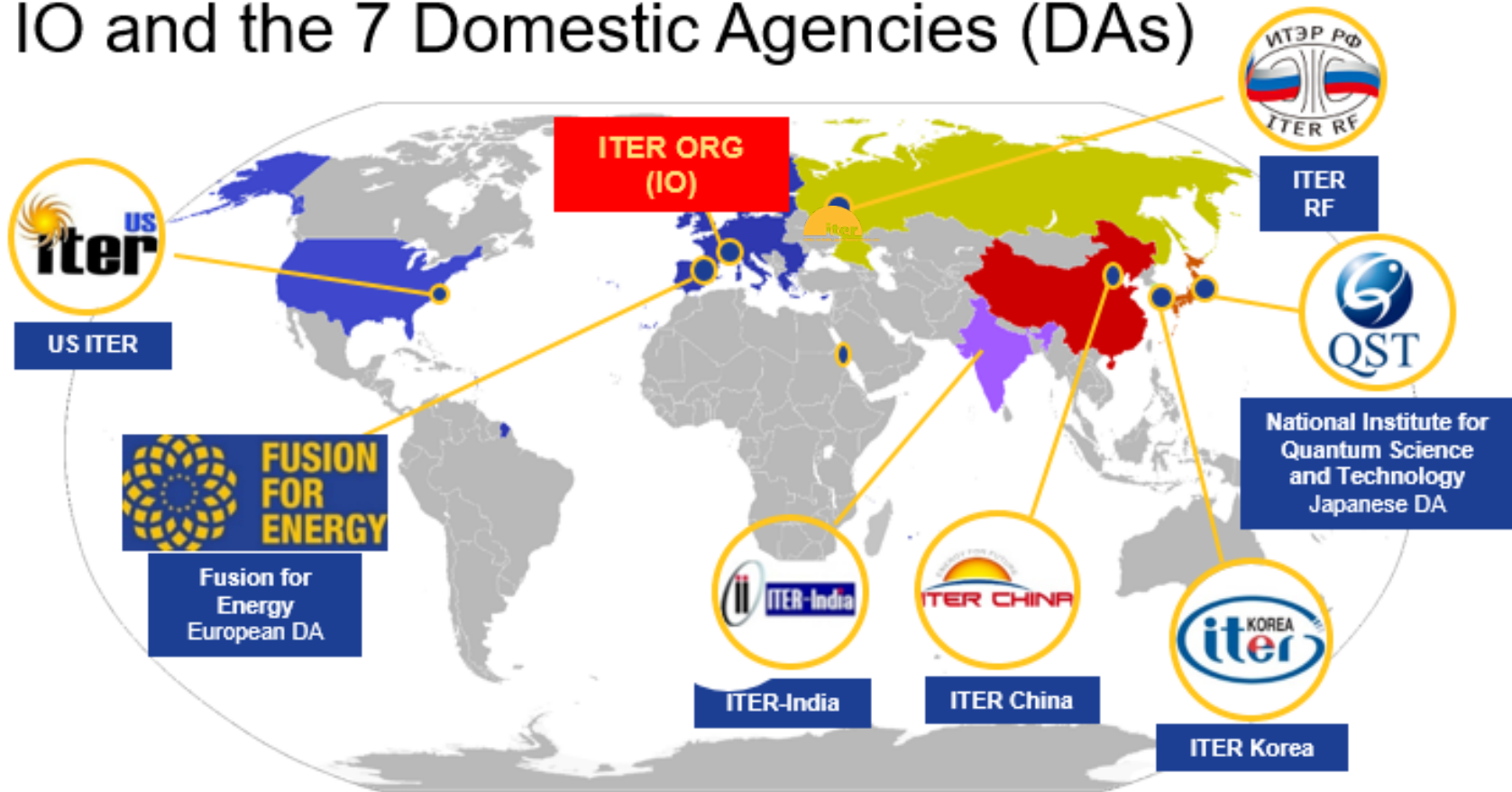
ITER at a glance

Worksite progress



- ITER at a glance
- **How to access ITER opportunities (IO and F4E)**
- Upcoming ITER opportunities (F4E)

IO and the 7 Domestic Agencies (DAs)



ITER ORGANISATION (IO)

International Public Procurement Rules

Competition, fair treatment, transparency
Ultimate authority with ITER Council

Geographical scope: **all ITER parties**

Threshold for publication: **144 k€ (services)**

Publication: website and through DAs
<http://www.iter.org/proc/overview>

Contact: ITER-Procurement@iter.org

Tendering: Mandatory registration on IPROC
www.iter.org/proc/overview

Procurement procedures: open call, restricted call, negotiation, competitive dialogue, etc.

Support to locate staff and facilities near ITER site is provided through **Agence ITER France** and *Welcome Around ITER* partnership <http://welcome-around-iter.com>

FUSION FOR ENERGY (F4E)

EU General Financial Regulation

(based on Public Procurement Directive 2014/24/EU)
Competition, fair treatment, transparency, proportionality, non-discrimination
Ultimate authority with European Parliament

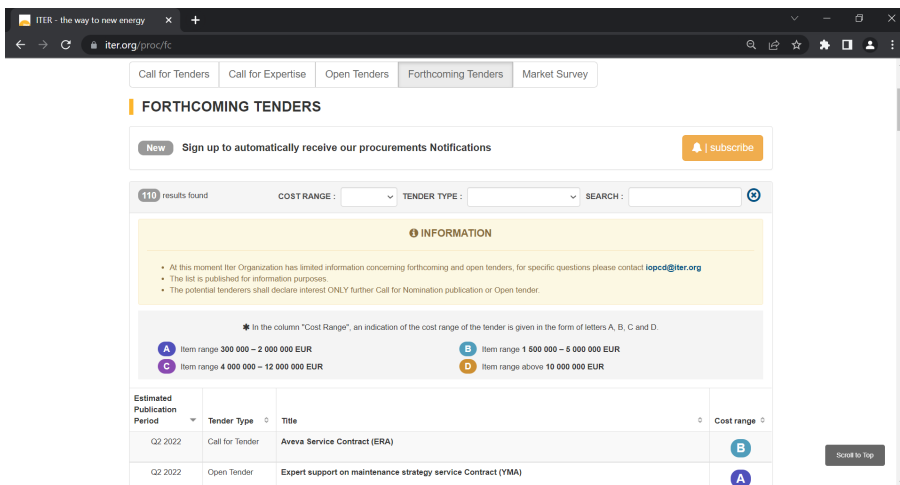
Geographical scope: **EU (sometimes Worldwide)**

Threshold for publication: **144 k€ (services)**

Publication: website and TED
<https://industryportal.f4e.europa.eu>

Contact: mehdi.daval@f4e.europa.eu

Tendering: Mandatory upload of tenders on EU Supply
<https://eu.eu-supply.com/login.asp?B=>



Call for Tenders | Call for Expertise | Open Tenders | **Forthcoming Tenders** | Market Survey

FORTHCOMING TENDERS

New Sign up to automatically receive our procurements Notifications [subscribe](#)

110 results found COST RANGE: TENDER TYPE: SEARCH:

INFORMATION

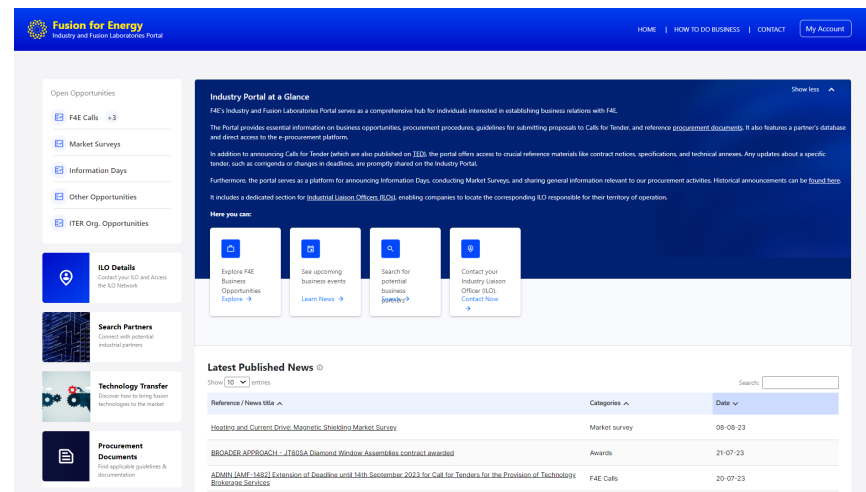
- At this moment Iter Organization has limited information concerning forthcoming and open tenders, for specific questions please contact lpcc@iter.org
- The list is published for information purposes.
- The potential tenderers shall declare interest ONLY further Call for Nomination publication or Open tender.

* In the column "Cost Range", an indication of the cost range of the tender is given in the form of letters A, B, C and D.

A Item range 300 000 – 2 000 000 EUR
B Item range 1 500 000 – 5 000 000 EUR
C Item range 4 000 000 – 12 000 000 EUR
D Item range above 10 000 000 EUR

Estimated Publication Period	Tender Type	Title	Cost range
Q2 2022	Call for Tender	Aveva Service Contract (ERA)	B
Q2 2022	Open Tender	Expert support on maintenance strategy service Contract (YMA)	A

<https://www.iter.org/proc/fc>



Fusion for Energy
Industry and Fusion Laboratories Portal

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Open Opportunities

- F4E Calls +3
- Market Surveys
- Information Days
- Other Opportunities
- ITER Org. Opportunities

Industry Portal at a Glance

F4E's Industry and Fusion Laboratories Portal serves as a comprehensive hub for individuals interested in establishing business relations with F4E. The Portal provides essential information on business opportunities, procurement procedures, guidelines for submitting proposals to Calls for Tender, and reference procurement documents. It also features a partner's database and direct access to the e-procurement platform.

In addition to announcing Calls for Tender (which are also published on ITER), the portal offers access to crucial reference materials like contract notices, specifications, and technical annexes. Any updates about a specific tender, such as complements or changes in conditions, are promptly shared on the Industry Portal.

Furthermore, the portal serves as a platform for announcing Information Days, conducting Market Surveys, and sharing general information relevant to our procurement activities. Historical announcements can be found [here](#).

It includes a dedicated section for Industrial Liaison Offices (ILOs), enabling companies to locate the corresponding ILO responsible for their territory of operation.

Here you can:

- Explore F4E Business Opportunities [Explore](#)
- See upcoming business events [Learn News](#)
- Search for potential business partners [partnerby?](#)
- Contact your Industry Liaison Office (ILO) [Contact Now](#)

Latest Published News

Show 10 entries

Reference / News title	Categories	Date
Health and Current Drive Magnetron Shroterly Market Survey	Market survey	08-09-23
BROADEN APPROACH - JT60SA Diamond Window Assemblies contract awarded	Awards	21-07-23
ADMIN LIAISON - 14921 Extension of Deadline until 14th September 2023 for Call for Tenders for the Provision of Technology Resources Services	F4E Calls	20-07-23

<https://industryportal.f4e.europa.eu/>

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- A** Item range 300 000 – 2 000 000 EUR
- C** Item range 4 000 000 – 12 000 000 EUR

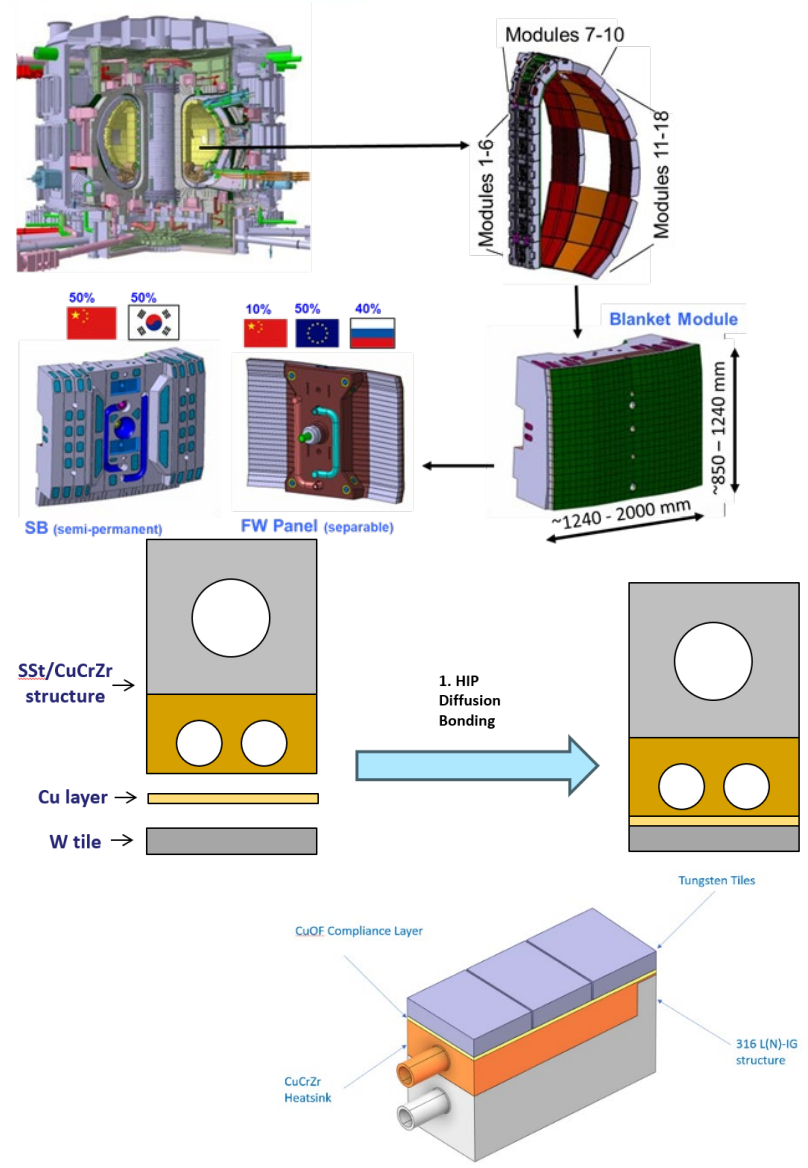
- B** Item range 1 500 000 – 5 000 000 EUR
- D** Item range above 10 000 000 EUR

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- **Upcoming ITER opportunities (F4E)**



Tungsten Tiles. Cat D.

- W tiles supply, machining, Joining, and assembly.
- About 600 m²=> 200-500 k pcs.
- Market Survey ongoing. See F4E Industry Portal.
- CFT in Q3 2024.
- Contract signature: Q3 2025.



TRITIUM=> Stainless Steel components

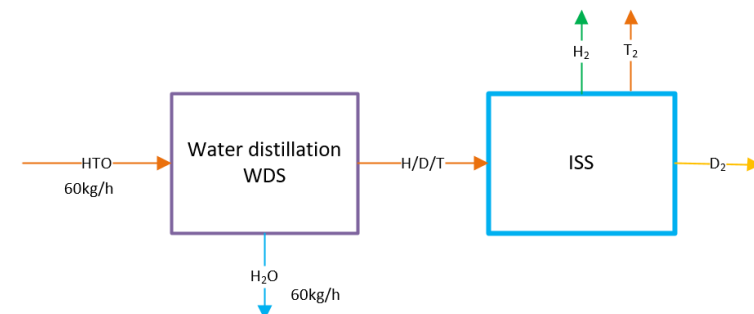
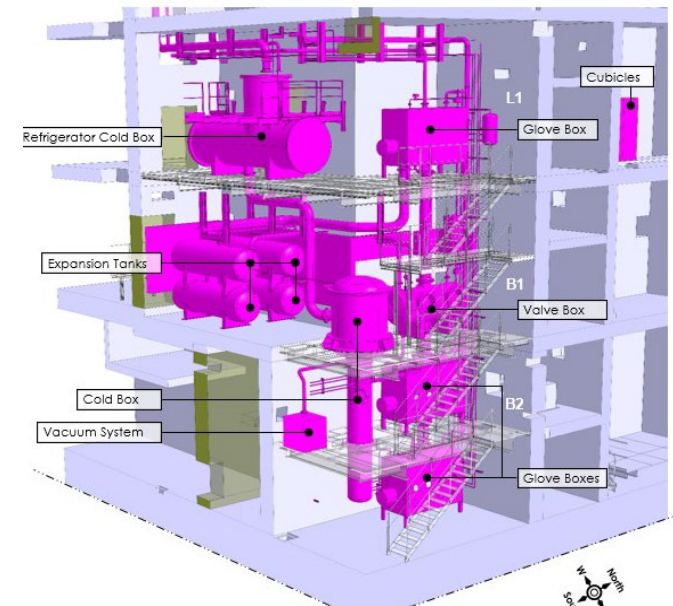
• Isotope Separation System (cat D)

- Cryogenic distillation of >650 thermal shield panels
- Cold boxes, Gas Handling System, Tanks, Valve Box, helium refrigerator components, Glove box, Heat exchanger, Metal Bellows pumps, cryogenic lines, etc...

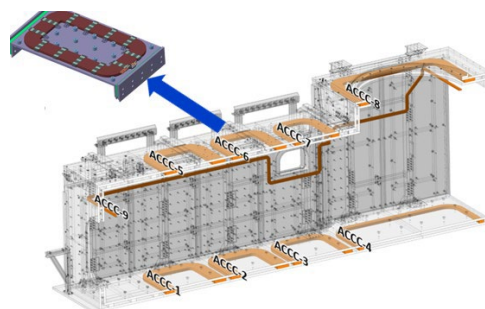
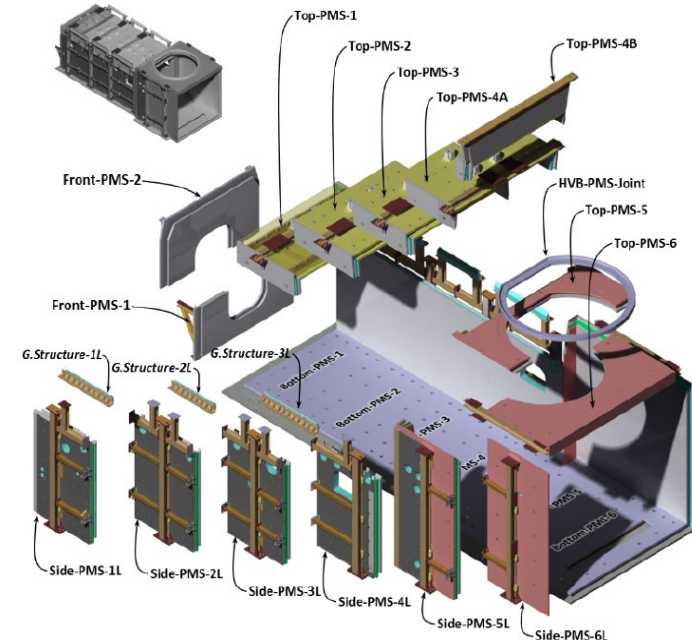
• Water Detritiation System (cat D)

- Water Distillation columns, or Combined Electrolysis Catalytic Exchange solutions.

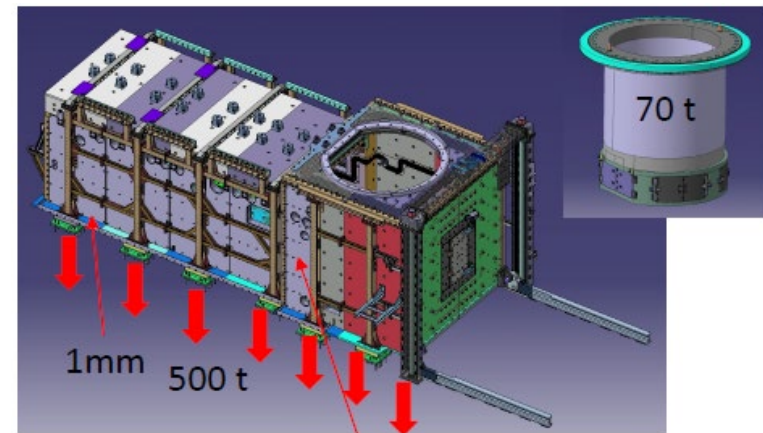
Ask F4E for Technical Description. Market Surveys ongoing.



- **Neutral Beam Magnetic Shielding (NBMS)**
Cat. **D.** (2 units)
 - Active Compensation Correction Coils (ACCC): 2 x 8 units.
 - Passive Shielding with plates (see next slide)
 - Skills: Machining and precise Assembly (1mm gaps/0.1 mm tolerances) of heavy components (500t) nuclear classified (RCC-MR) + coil design and manufacturing).
 - Market Survey ongoing
- => Target CFT: Q3 2024. Market Survey online.

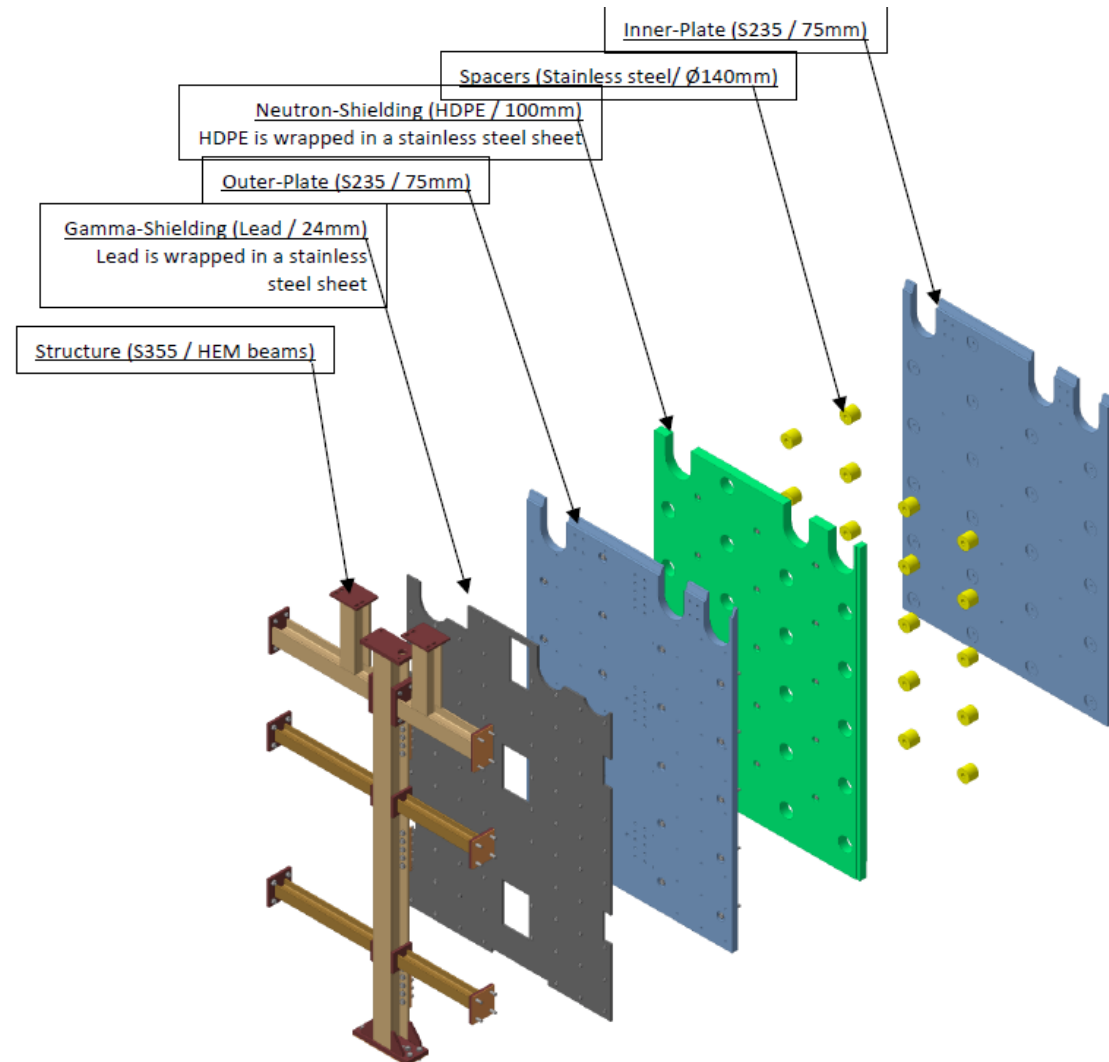


Active
Compensation
Correction Coils
(ACCC)



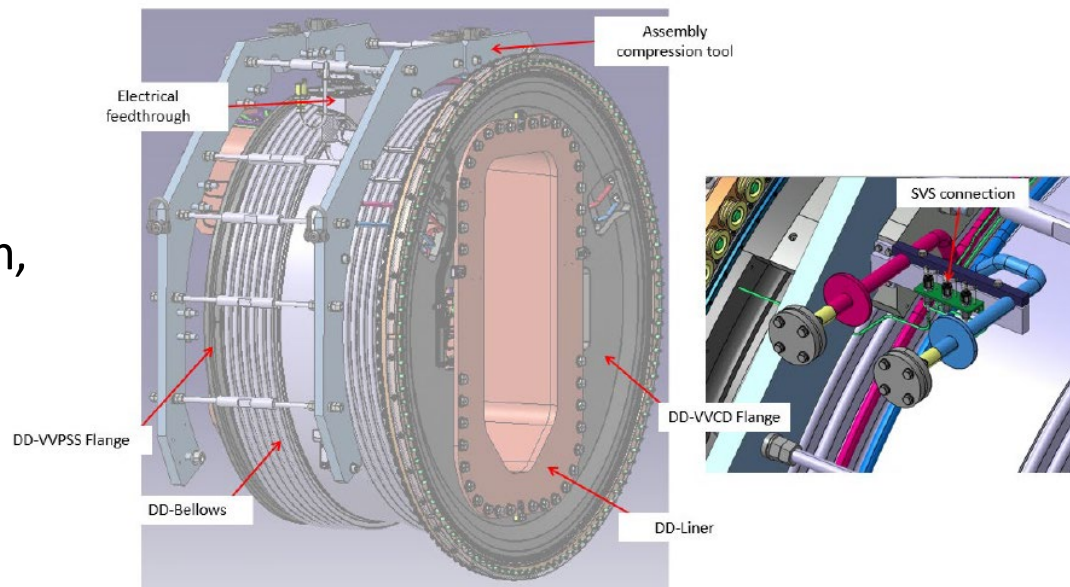
- **NBMS- FOCUS on Materials**

- **Steel S235** plates (EN 10025-2) (2 x 400 tons): 1 or 2 additional sample(s) still welcome nowadays for characterization.
- **LEAD** plates
- **HDPE** plates
- **Inconel** or special **316L Stainless Steel** BOLTS (High content in molybdenum)



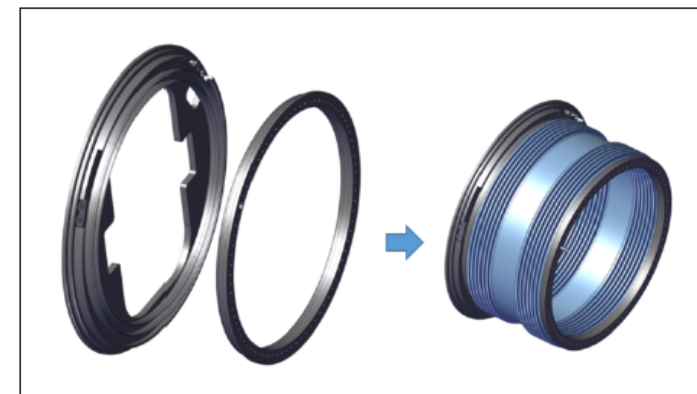
ITER Heating and Current Drive

- Drift Duct. Cat. C. (2 units)
- Skills: Nuclear component manufacturing, High Vacuum, Stainless Steel welding, Brazing of S.S pipes over the CuCrZr plates, NDTs, EBW of CuCrZr.
- S. Steel SIC-1 Bellows and flanges.



L1.4 m x W3.2 x H3 m -Weight ~ 5.7 t

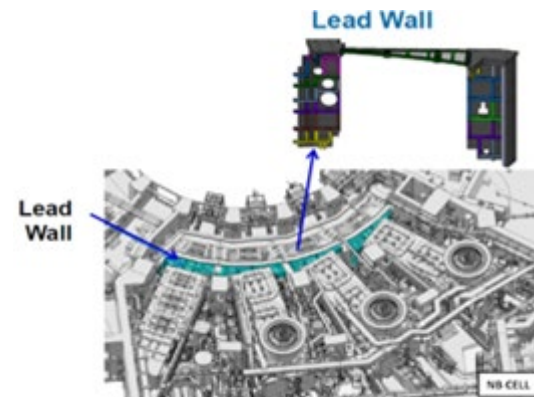
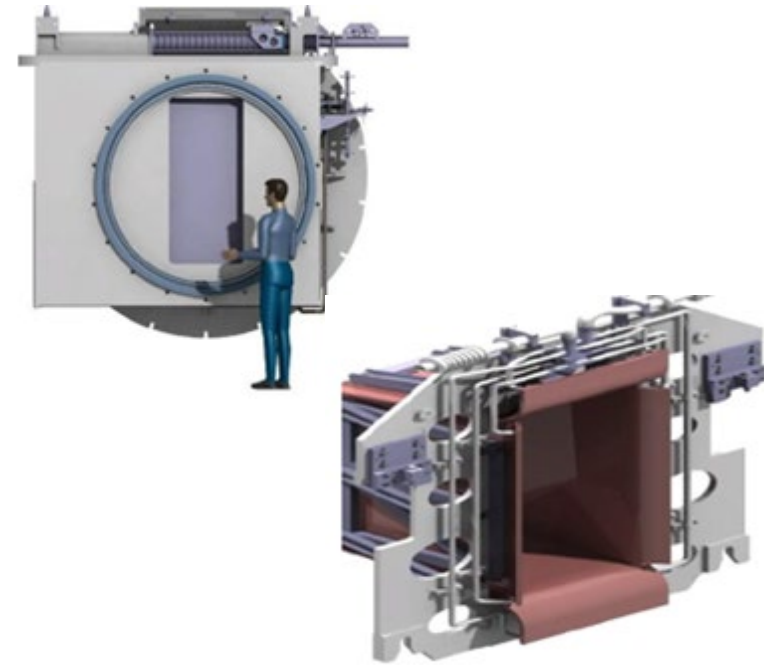
=> Target CFT: Q2-Q3 2024.



View of the flanges

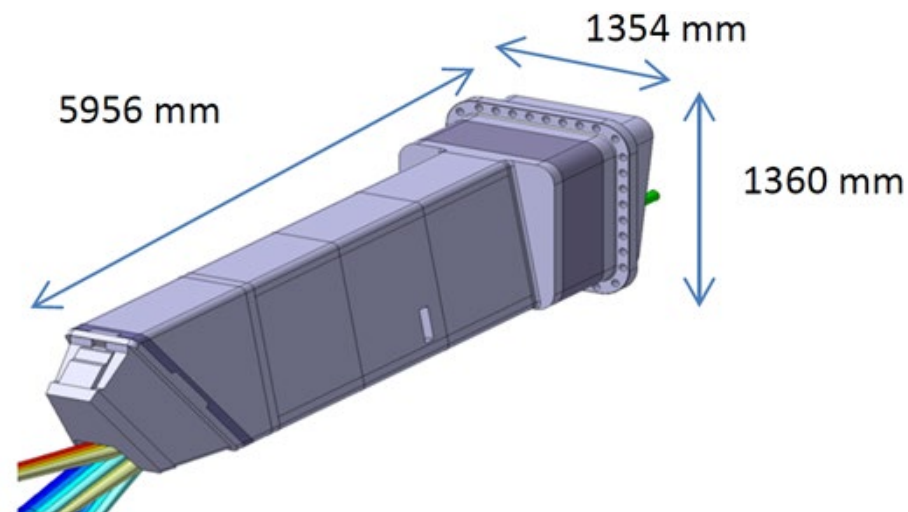
Longer-term (up from 2026):

- **2 Fast Shutters** (extension of the primary vacuum barrier, Nuclear Safety Relevant)
- **2 Exit Scrapers** (High Vacuum, non-safety relevant): Stainless Steel support + Deep drilled water cooled Panels in CuCrZr, Electron Beam Welding (vacuum tight) of CuCrZr.
- **2 Lead Walls** (Gamma protection): Panels of lead and Steel structure.





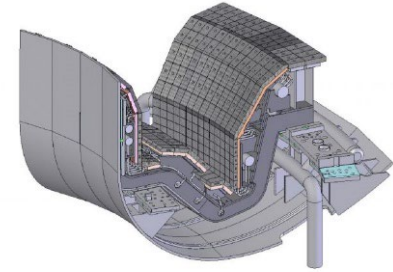
- 6 Diag **PORTS Manufacturing and Assembly**. Cat. **D.** (OFC-1183)
- Target => CFT: Q3 2024.
- **316L(N)-IG) Austenitic stainless steel**
“X2CrNiMo17-12-2 controlled nitrogen” with a concentration of Cobalt, Niobium and Tantalum not exceeding 0.05%, 0.01% and 0.01% weight respectively
- **Polybore** HE 430, as neutron shielding blankets for ISS (TBC).
- **B₄C pellets**: sintered B₄C pellets used to fill the DSMs B₄C Shielding Chambers, as neutron shielding (about 15 tons).
- **Commercial Off-The-Shelf (COTS) items**: bogie wheels, fasteners, flexible metal seals, piping fittings, connectors, etc.
- **Glass To Metal Process** with 99% purity N₂ atmosphere.
- **Feedthroughs** etc. + **TESTING FACILITY**



Upper Port Plug general dimensions

- **CAD Design, Dimensional Variation Analysis, General Mechanical and Plant Design Support:** (including scope OMF-1058) Cat. **B**. Target CFT: Q1 2024.
- **Qualification testing:** Cat **B** Target CFT: Q1 2024.
- **Seismic, Dynamic and Structural Analyses of ITER Buildings and Mechanical Components Support.** (renewal of OMF-1023) Cat. **A**. Target CFT: Q1 2024.
- **Nuclear Analysis Support** (renewal of OMF-0882): CFT: Q1 2024. Cat. **A**.
- **Destructive and ND Testing of Material and Mock-ups:** (renewal of OMF-1082). Cat. **B**. Target CFT: Q2 2024.
- **I&C Integration Services** (renewal of OMF-0989). Target CFT Q2 2024. Cat **D**.

- **OPE-1405: Integration and testing of Actively Cooled Divertors of JT-60SA**, estimated contract value: **C D**, Annex B under preparation, planned launch Q1/Q2 2024 (Competitive with Negotiation).
- **OPE-1407: LIPAc Injector Upgrade**, estimated contract value **A**, Q1/Q2 2024 (Competitive with Negotiation).
- **OPE-1XXX: JT60SA Pellet Injectors (re-issue)**: Pre-information notice will be done with overview of technical scope and commercial way forward + dissemination to target companies and ILO network. Value **A**, planned Q1 2024.

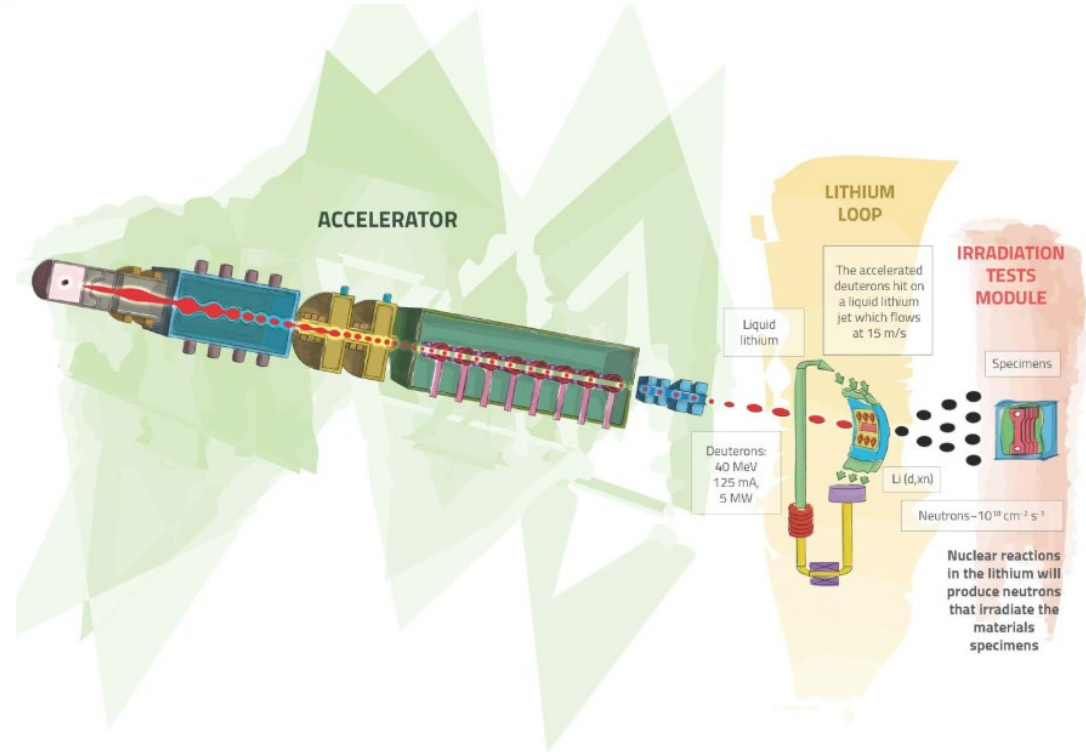


Source: JT60SA.org



Source: IFMIF-DONES.es

DONES Program: see <https://ifmif-dones.es/es/> (Irradiation facility for the development of fusion-like neutron effects database).

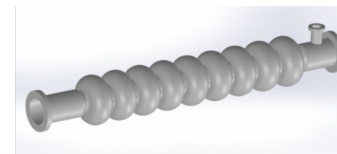


- **Superconducting Radio Frequency Power Coupler.**
- **Design and Supply of a superconductive Cavity.**

IFMIF-DONES – Functioning Scheme



Source: CERN



Source: Wikipedia



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See you during our next CFTs!

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