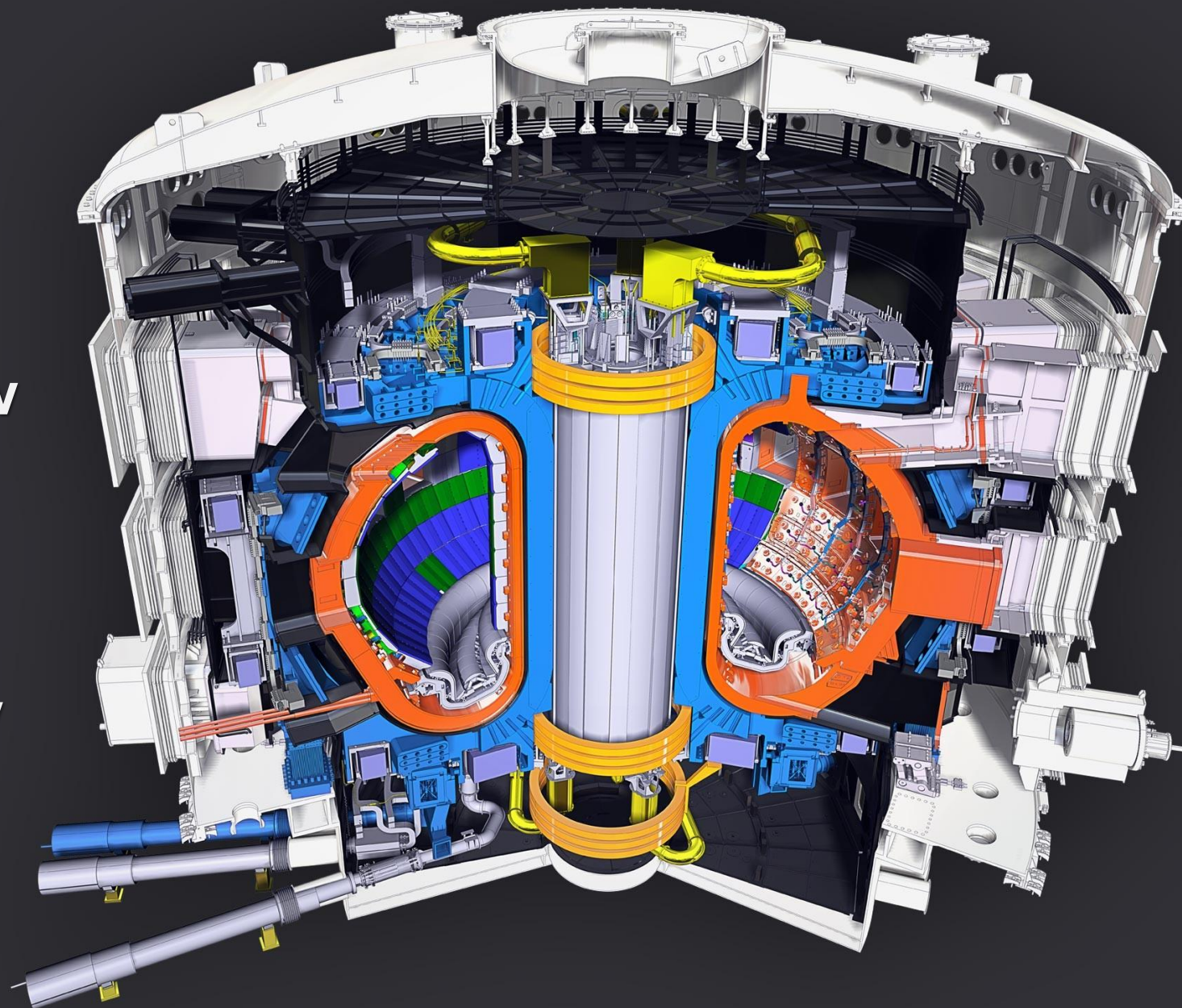
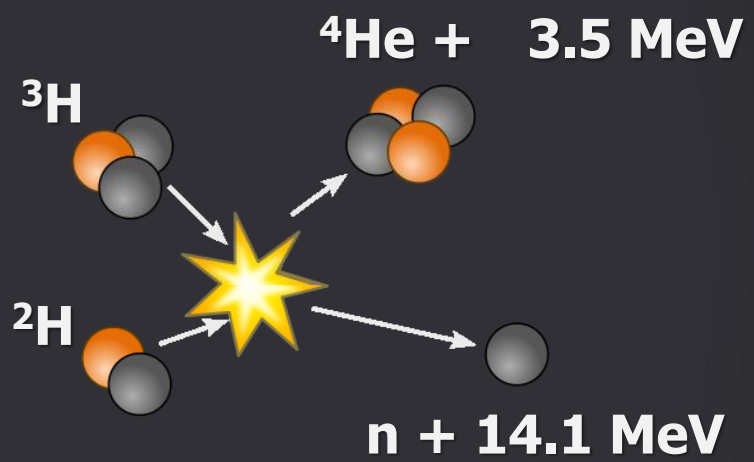




ITER Status and Business Perspectives

Hans Altfeld
Head of Project Control Office

Disclaimer: The views and opinions expressed herein do not necessarily reflect those of the ITER Organization



1. ITER Status
 2. IO Business Opportunities
 3. Focus: Detritiation Systems
 4. Focus: Hot Cell Facility
 5. Conclusion
- Back-UP (Descriptions, Upcoming Tenders, 'How-To', Contacts, etc)

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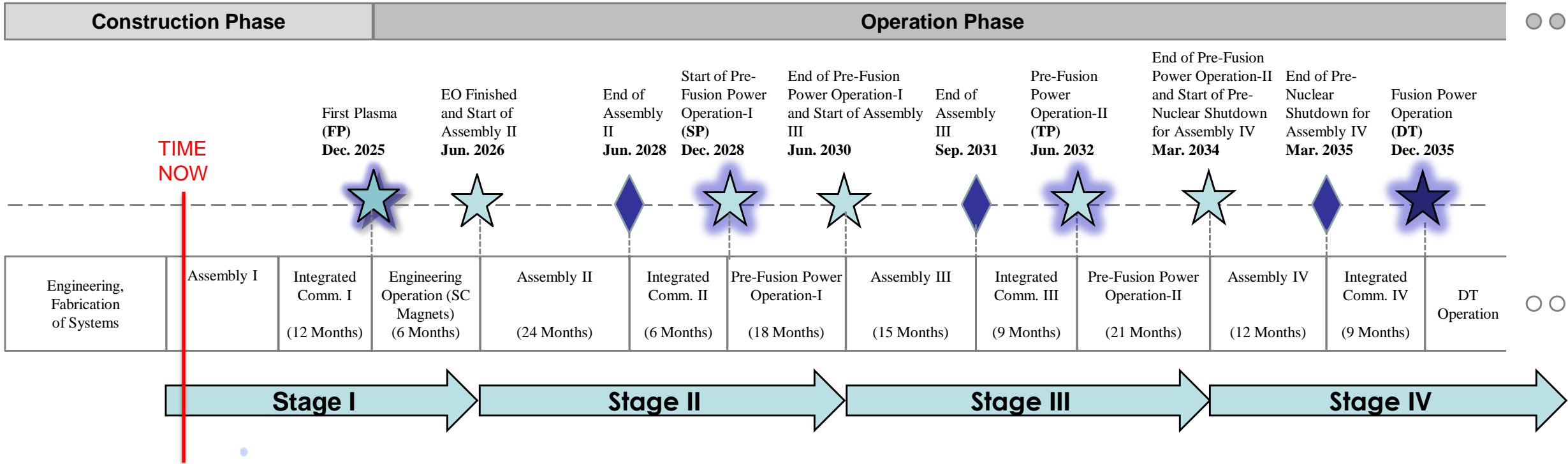
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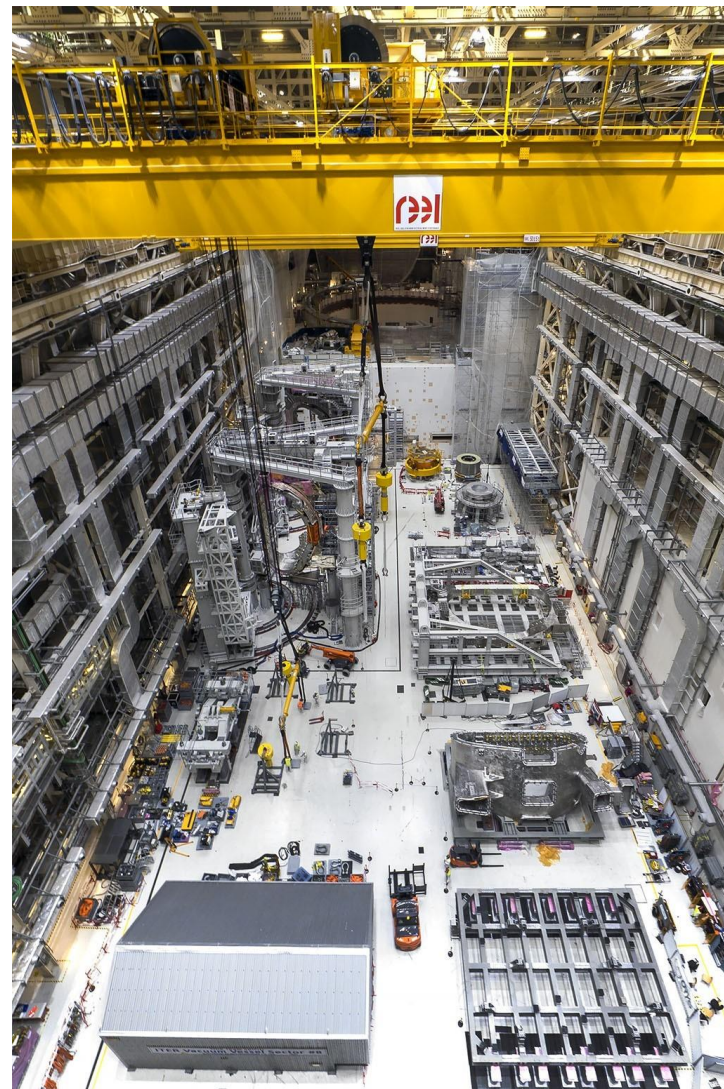
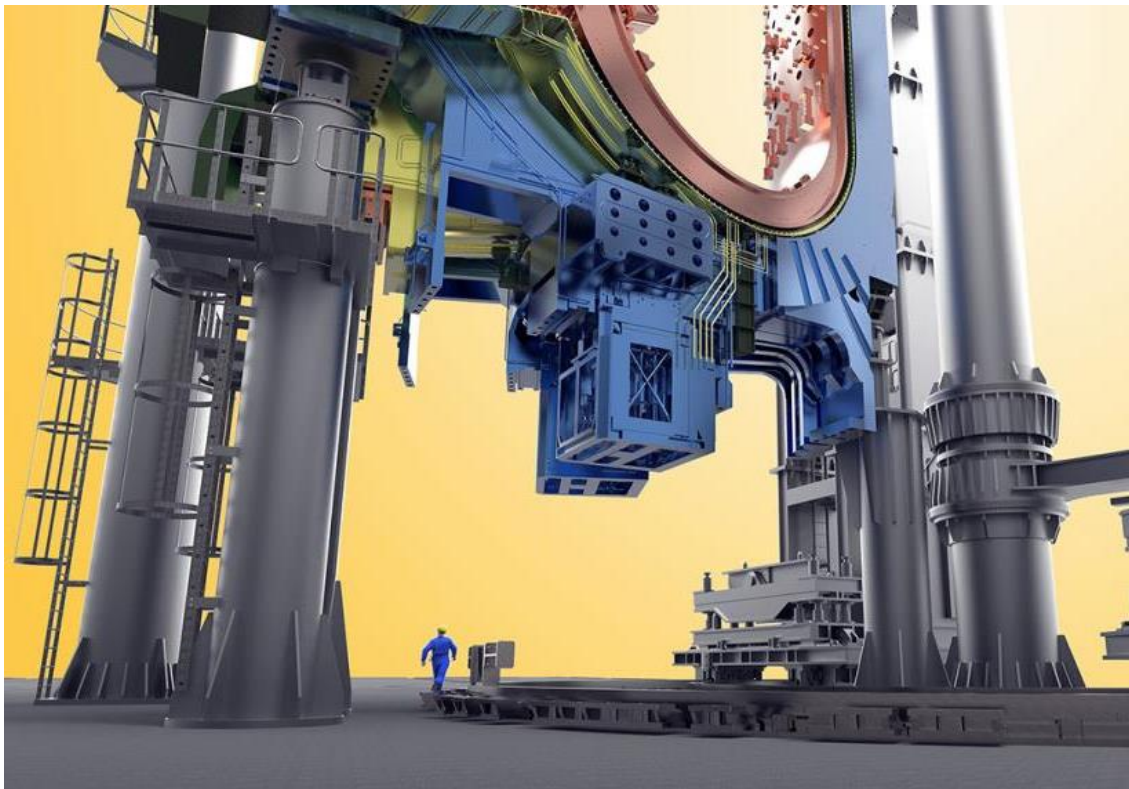
5. Conclusion

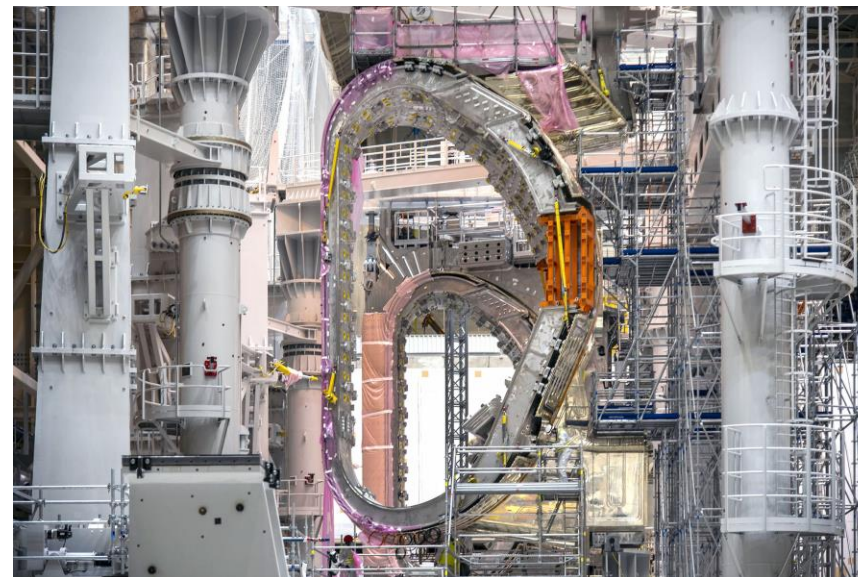
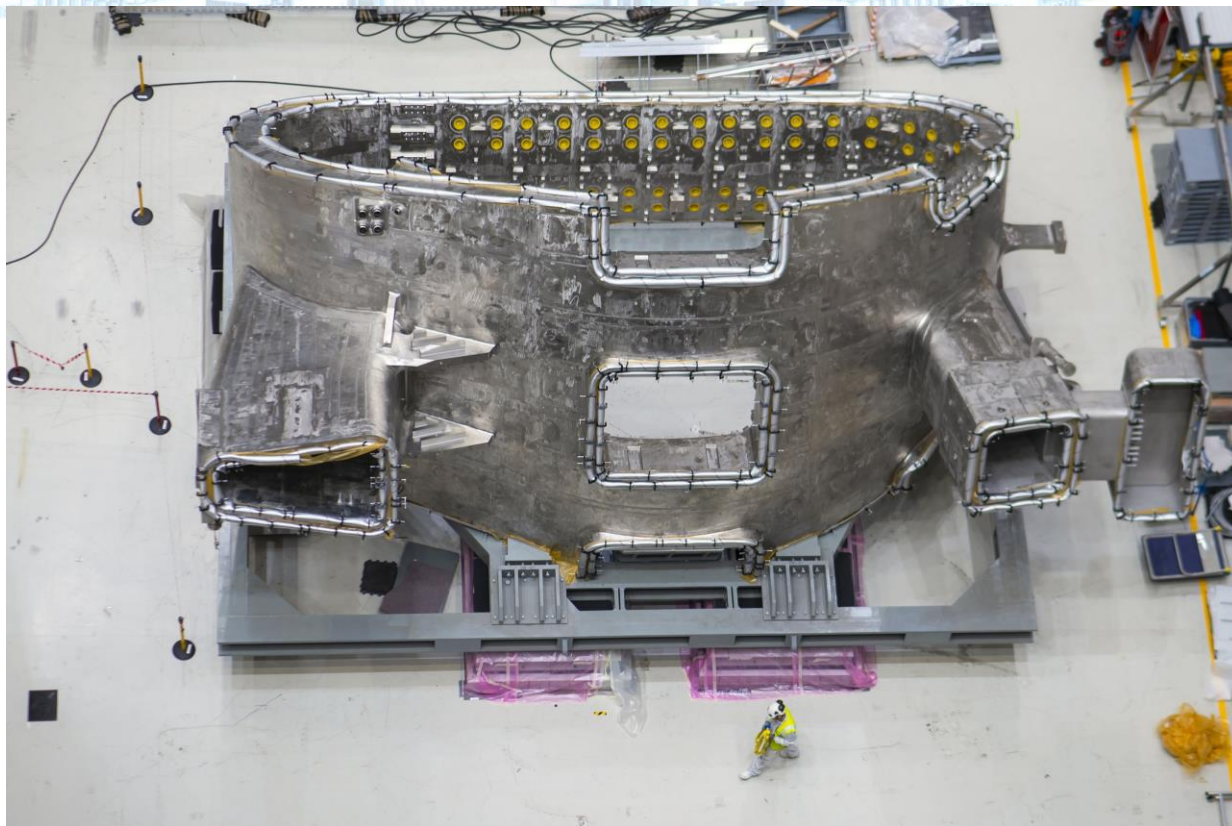
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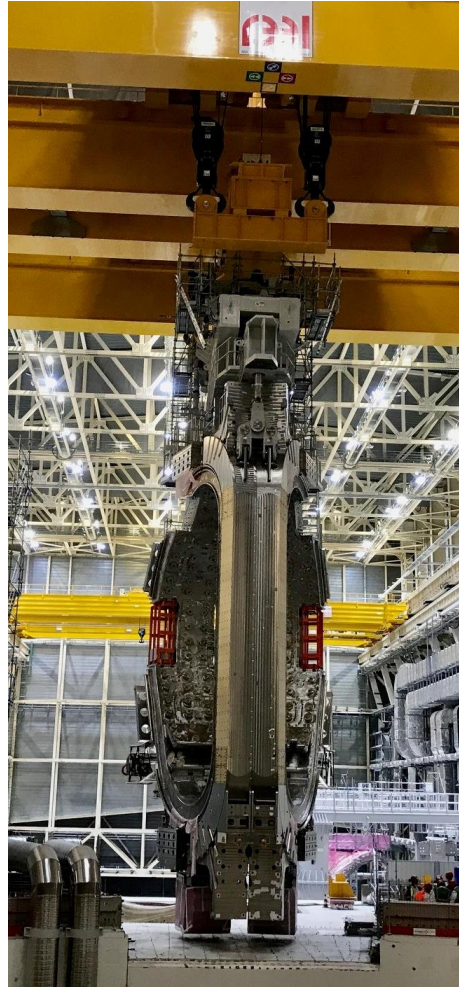




Assembly Hall







1. ITER Status

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4. Focus: Hot Cell Facility

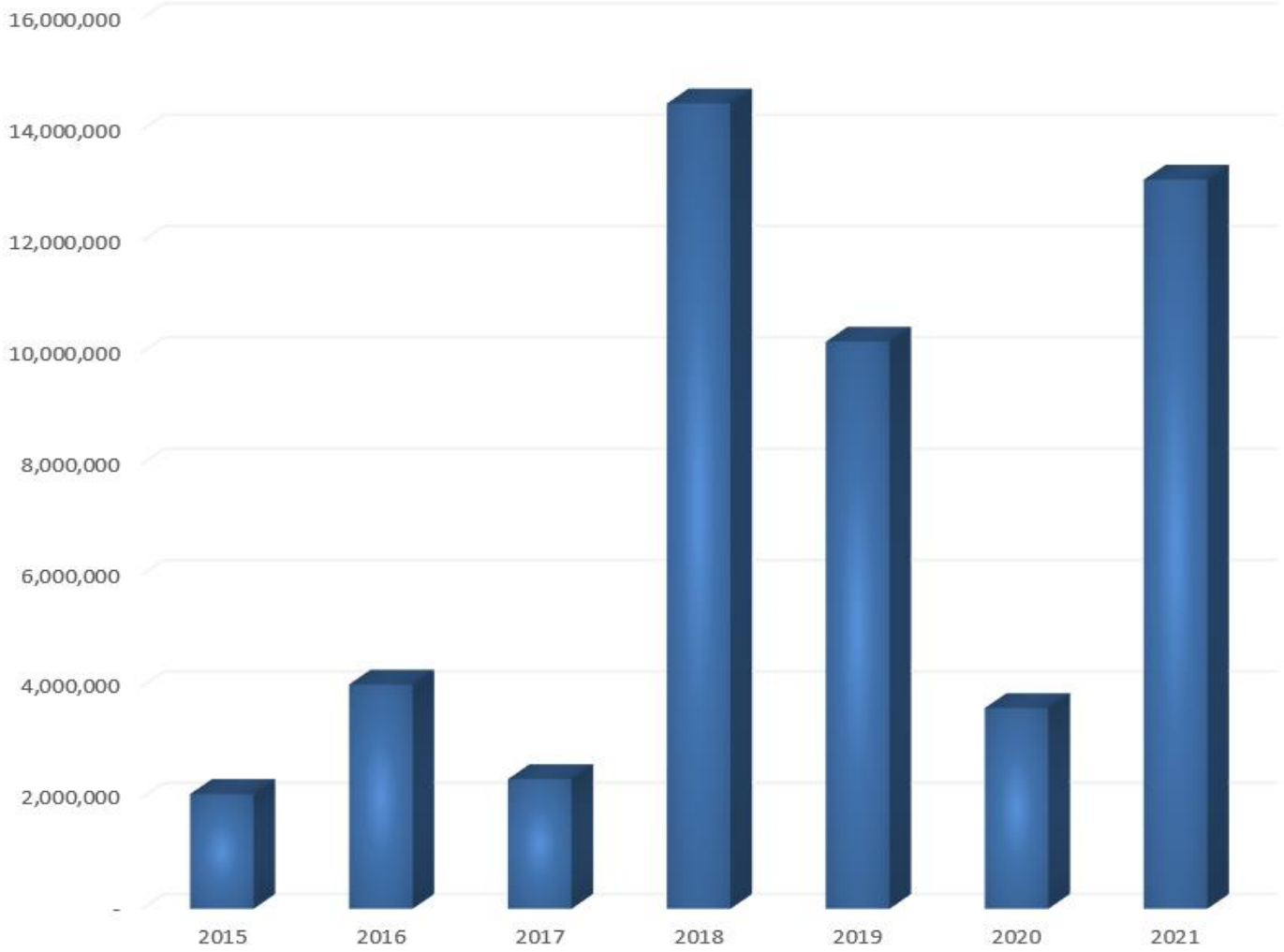
5. Conclusion

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Between €300 and €600 million placed on the market every year for the period 2019 - 2023.

Contract Value in EUR

Business awarded to Germany (2015-2021)



Germany represents only 2 % of the IO European Contractual Amount
→ Well below its contributions to Euratom

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- **ITER Organization Procurement**
 - Principles
 - Where to find more information
 - Forthcoming Tenders
 - Hints for successful tendering

- **Contract info Machine Assembly (for potential sub-contracts)**
 - Descriptions
 - Contact details

- **Contract info on Global Maintenance Services**
 - Scope description
 - Procurement roadmap

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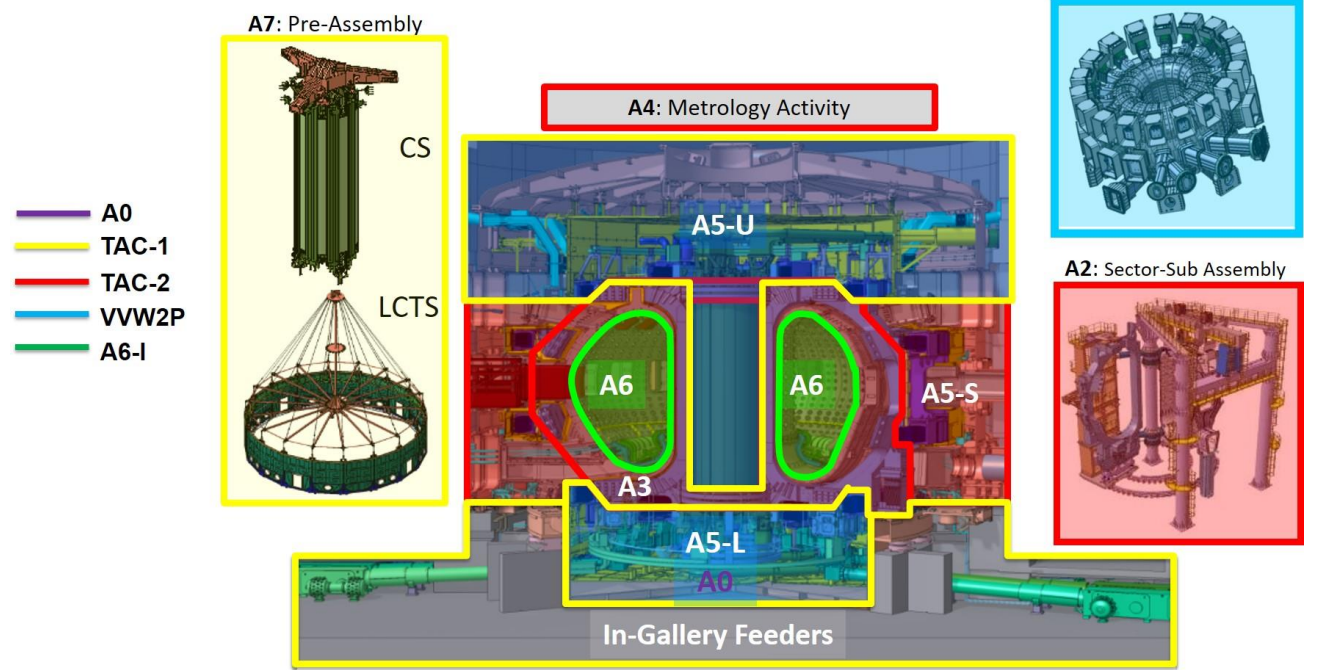
➤ Contract info Machine Assembly (for potential sub-contracts)

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➤ Contract info on Global Maintenance Services

- Scope description
- Procurement roadmap

- A0 Lower Cryostat early works/preparation (nearly completion)
- A1 Lower Cryostat activities
- A2 Sector Sub-Assembly (Assembly Hall)
- A3 Sector Assembly (In-Pit)
- A4 Align VV and Magnets Establish Tokamak Assembly Datum
- A5 Ex-Vessel Side Region Assembly activities (starts after the removal of the Radial beams in A4)
- A6 In-Vessel Assembly works
- A7 Components Pre-Assembly in Assembly Hall (CS/LCTS/UCTS/Ports Pre-Assembly).



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Tokamak Complex Detritiation System (1/1)



The Tokamak Complex

Tokamak Complex Detritiation System in B14 ([system shown in blue](#))

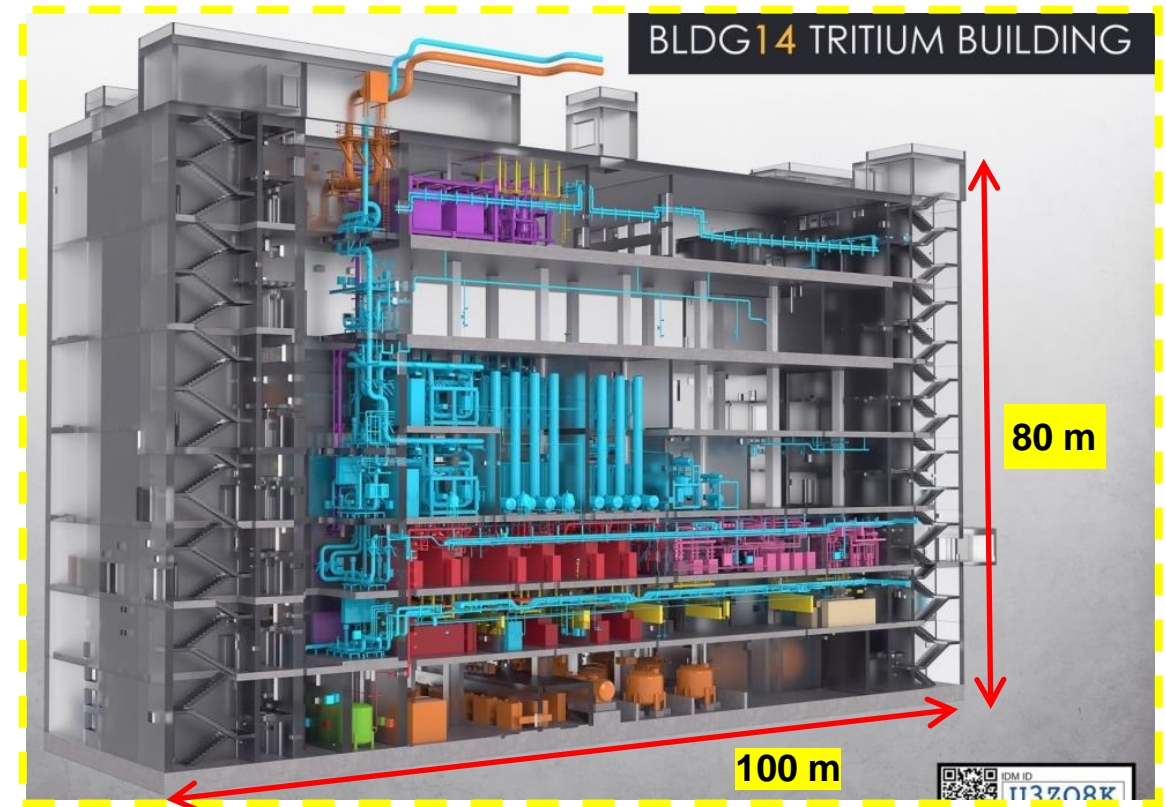
- **Design and Fabrication contract**
 - To be signed during Q1 / 2023

Process System in B14

- 16 catalytic reactors, 8 scrubber columns, 8 blowers
- Organised into 8 separate modules, each 1400 Nm³/hr capacity

Piping Network:

- Connects to 150+ clients
- ~ 11km stainless steel piping



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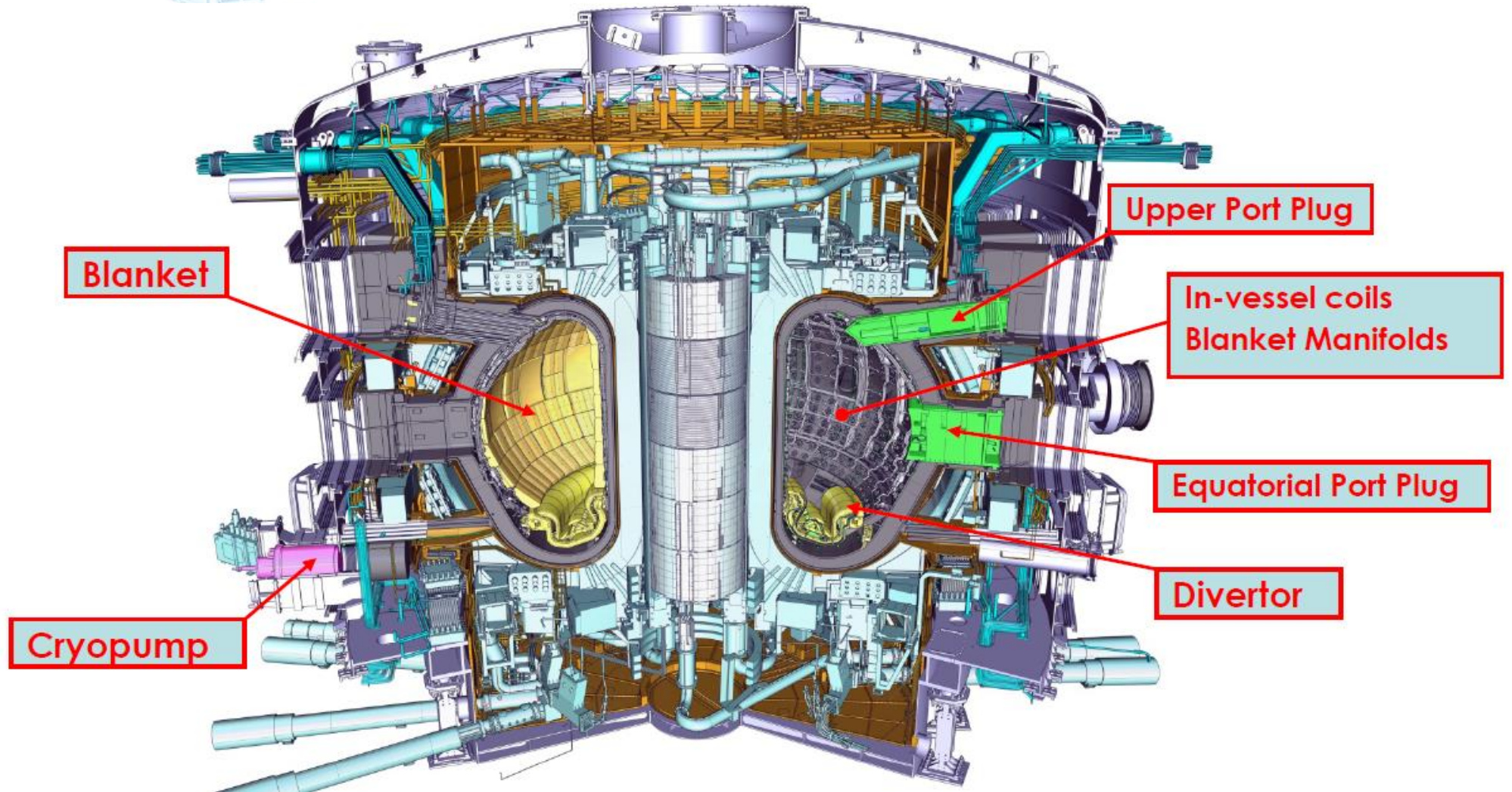
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The Main Functions of the ITER Hot Cell Facility:

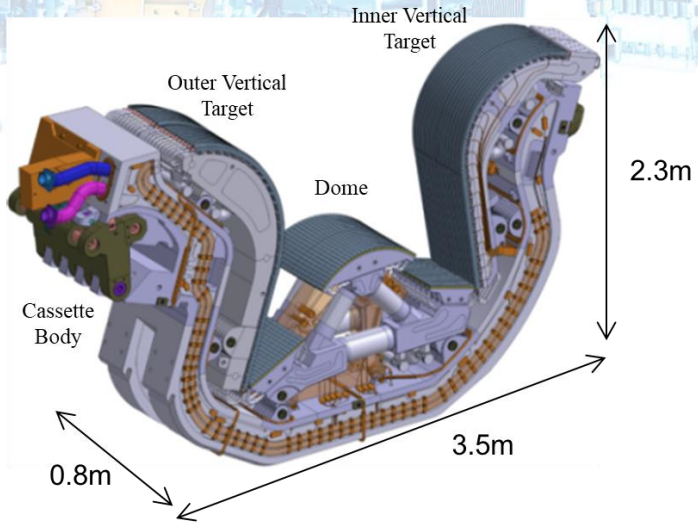
- ***To maintain activated and/or contaminated equipment,***
 - *In Vessel Components,*
 - *Port Cell Equipment,*
 - *Tokamak Remote Handling equipment,*
- ***To treat and interim store radioactive waste,***
- ***To import and export components and waste,***
- ***Human access to the Hot Cell and the Tokamak machine.***



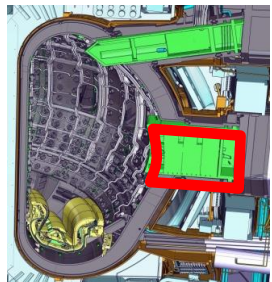
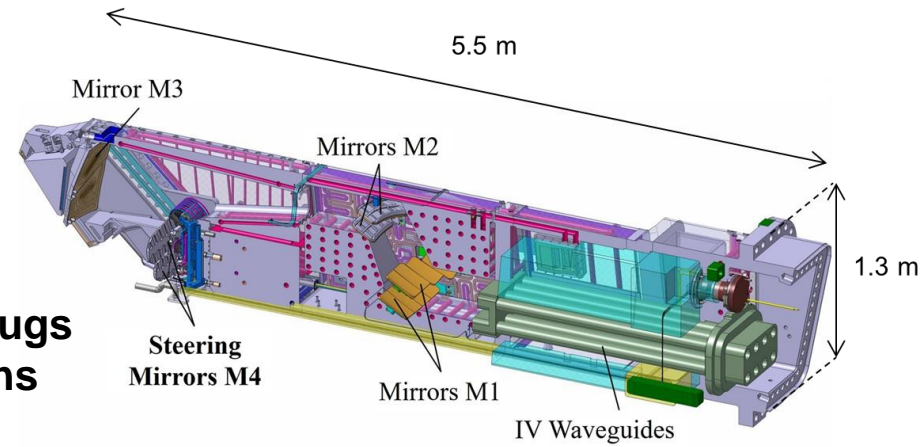
Illustrations of Tokamak Components to be Maintained



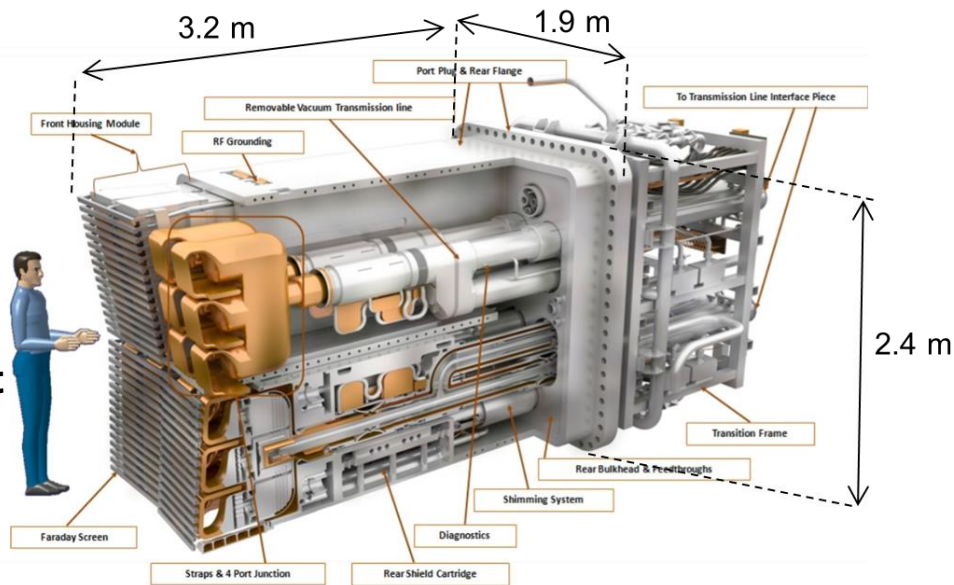
Divertor
~ 8 tons



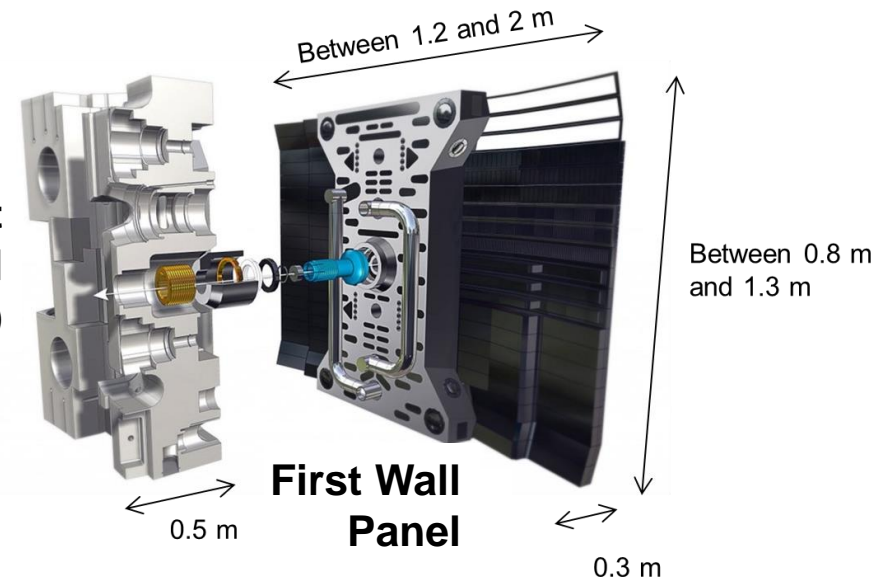
Upper Port Plugs (UPP) ~ 25 tons

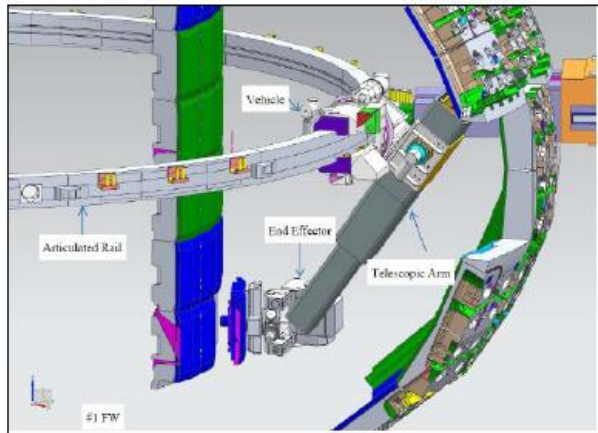
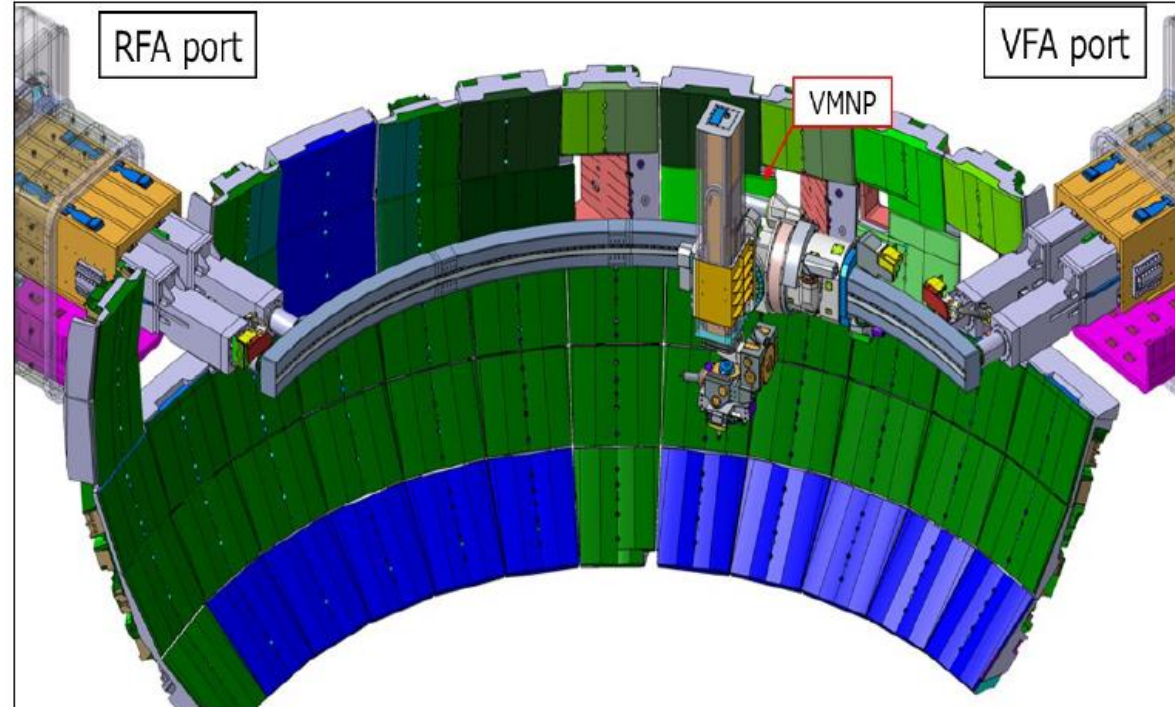
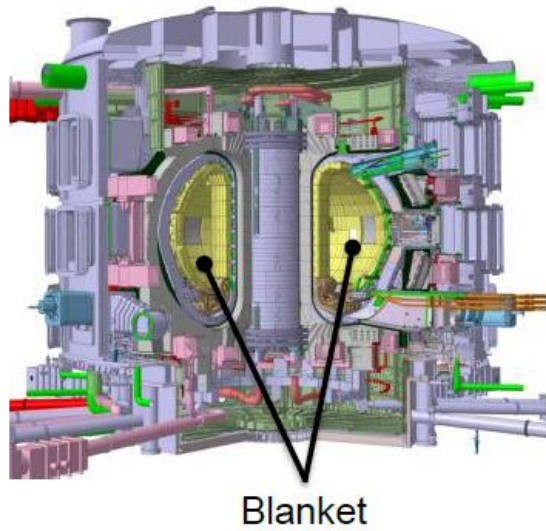


Equatorial Port Plugs (EPP)
~ 50 tons



Blanket Shield Block (SB)





The Blanket RH System comprises a heavy RH Transporter deployed from 2 ports and running on a suspended toroidal rail.

Maximum payload = 4.5 tonnes.

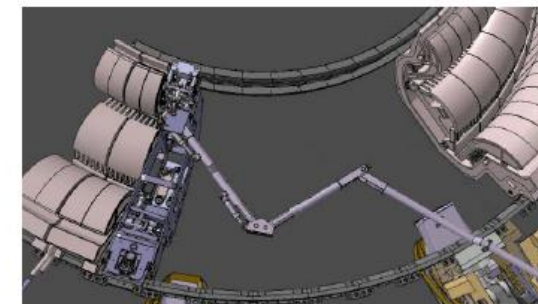
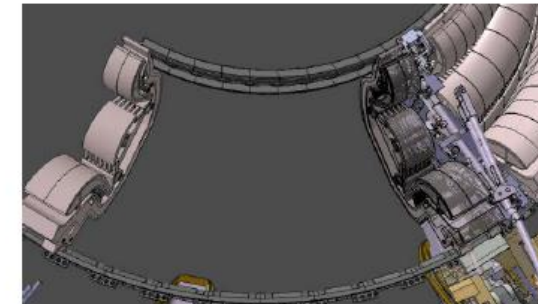
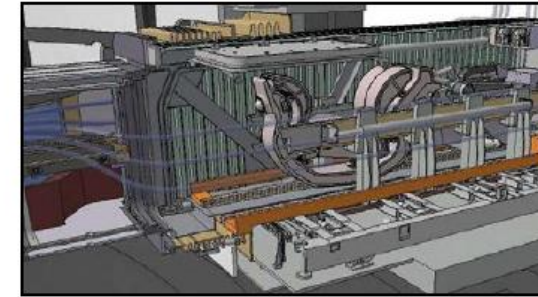
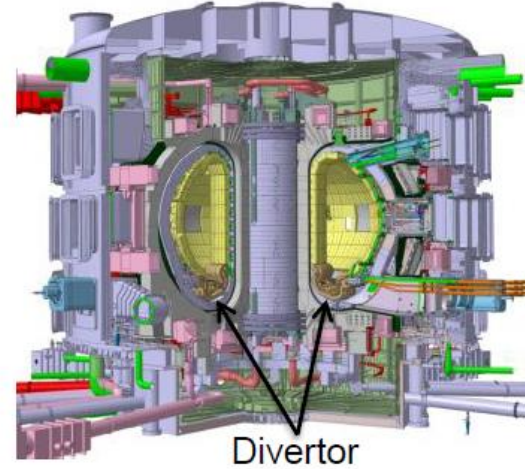
Target plant: Blanket Shield Blocks, First Wall panels

Suite of RH transporters deployed (in turn) from 3 divertor RH ports, running on in-situ radial and toroidal rails (built into vacuum vessel).

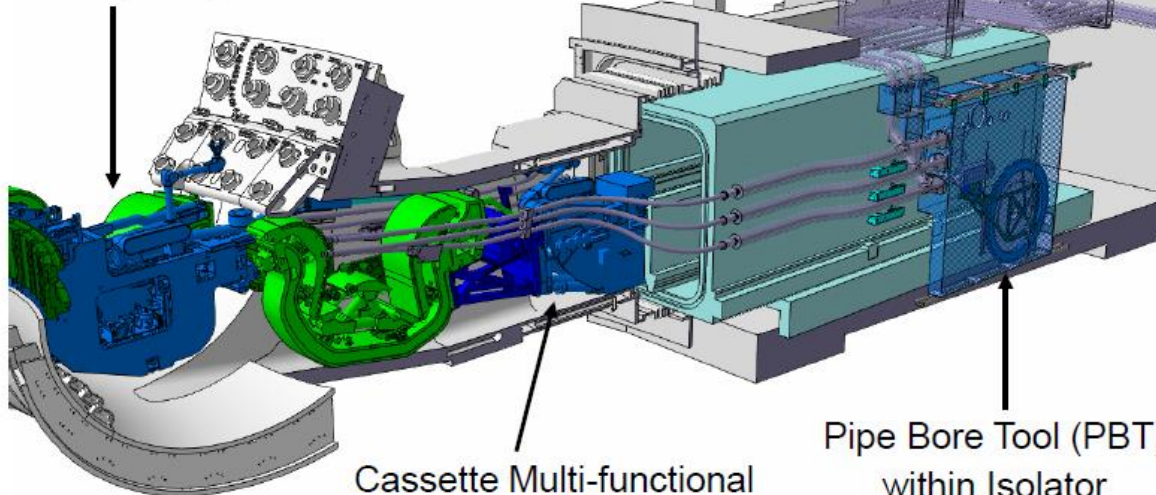
Max payload: 10 tonnes.

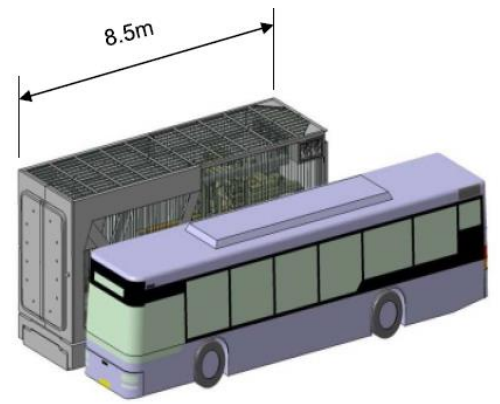
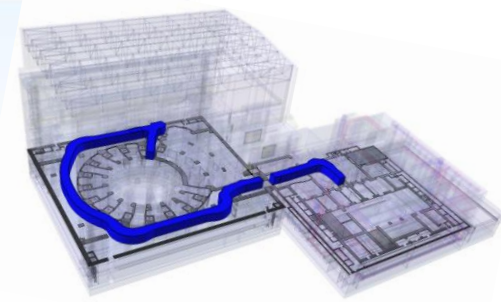
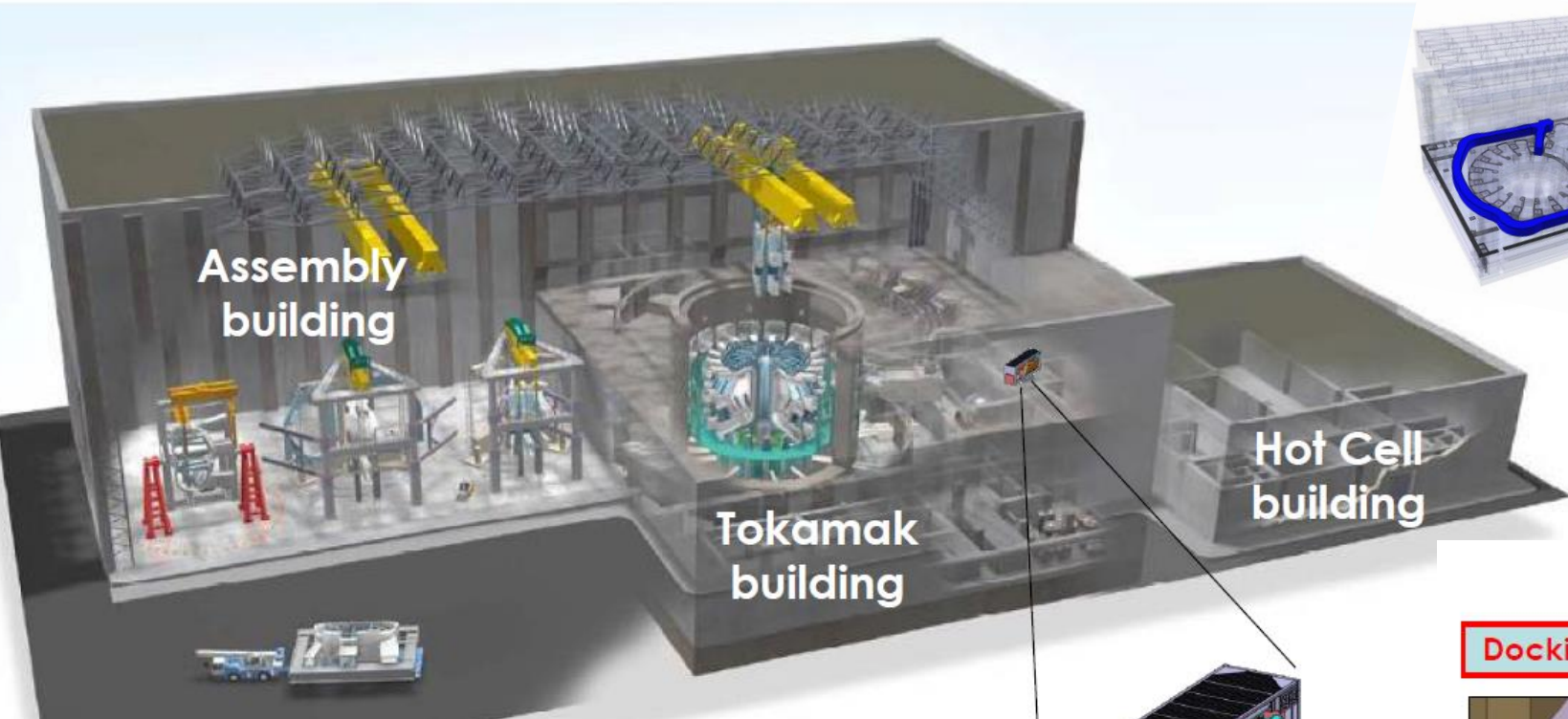
Target plant:

- Divertor Cassettes
- In-port diagnostic racks
- Shielding blocks
- Primary Closure Plate

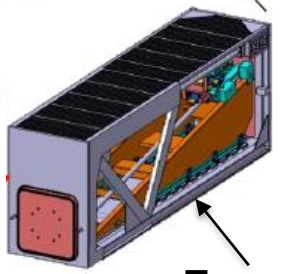
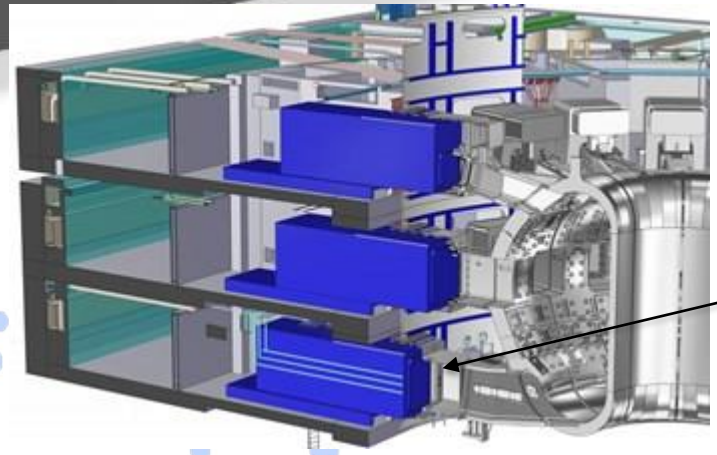


Cassette Toroidal Mover (CTM)

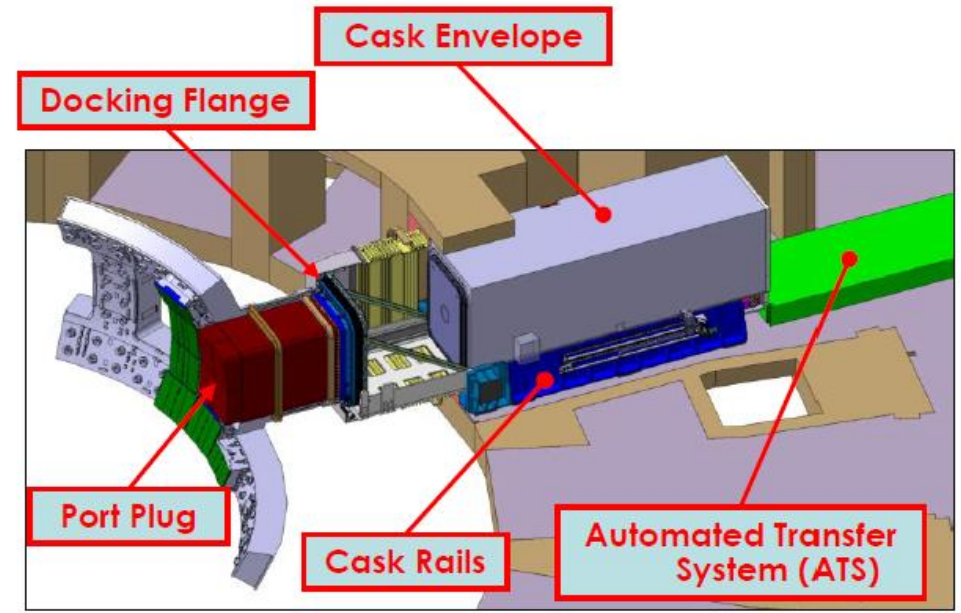


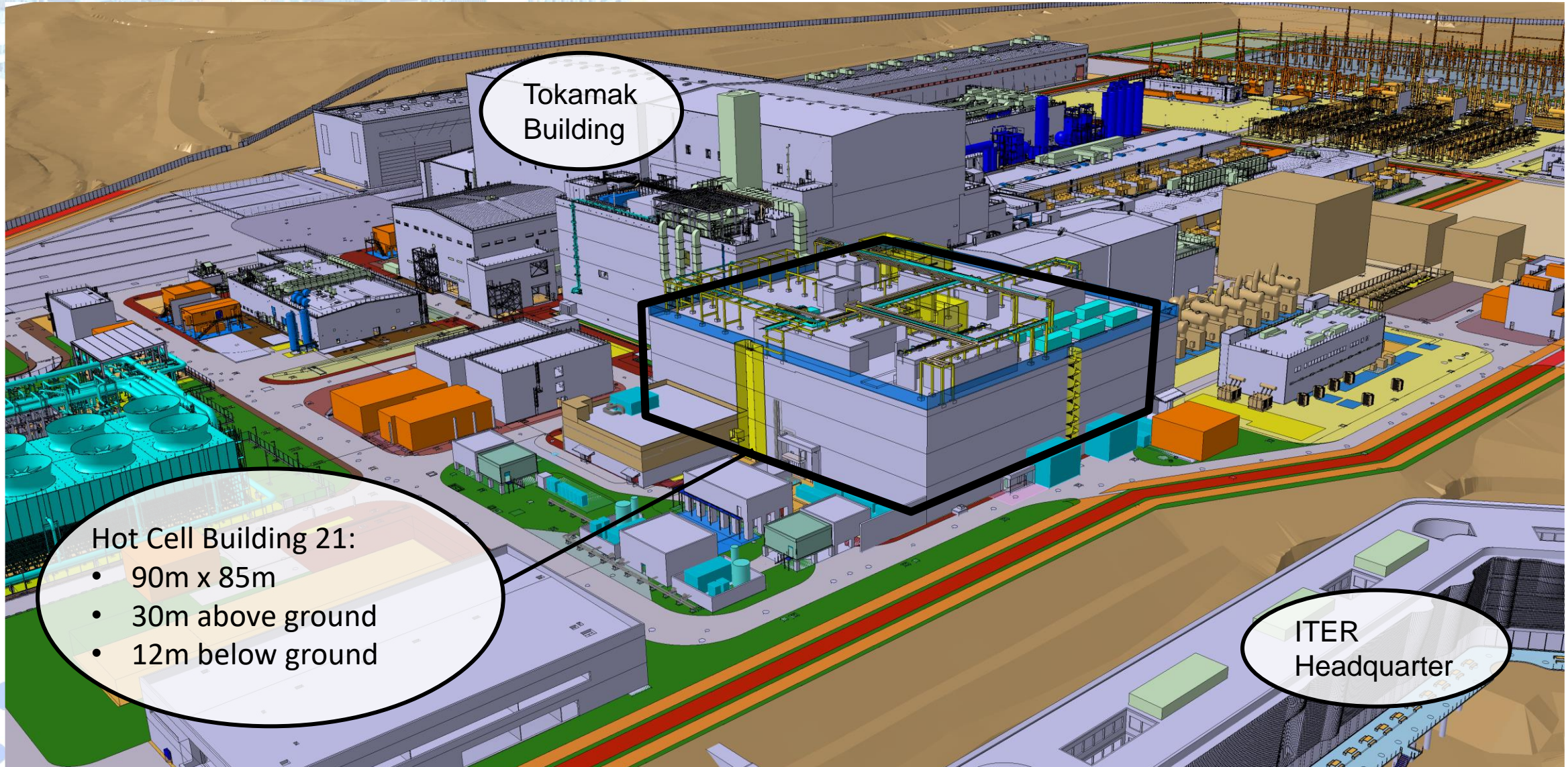


Cask Maximum Payload – 45 tons



Transfer Cask





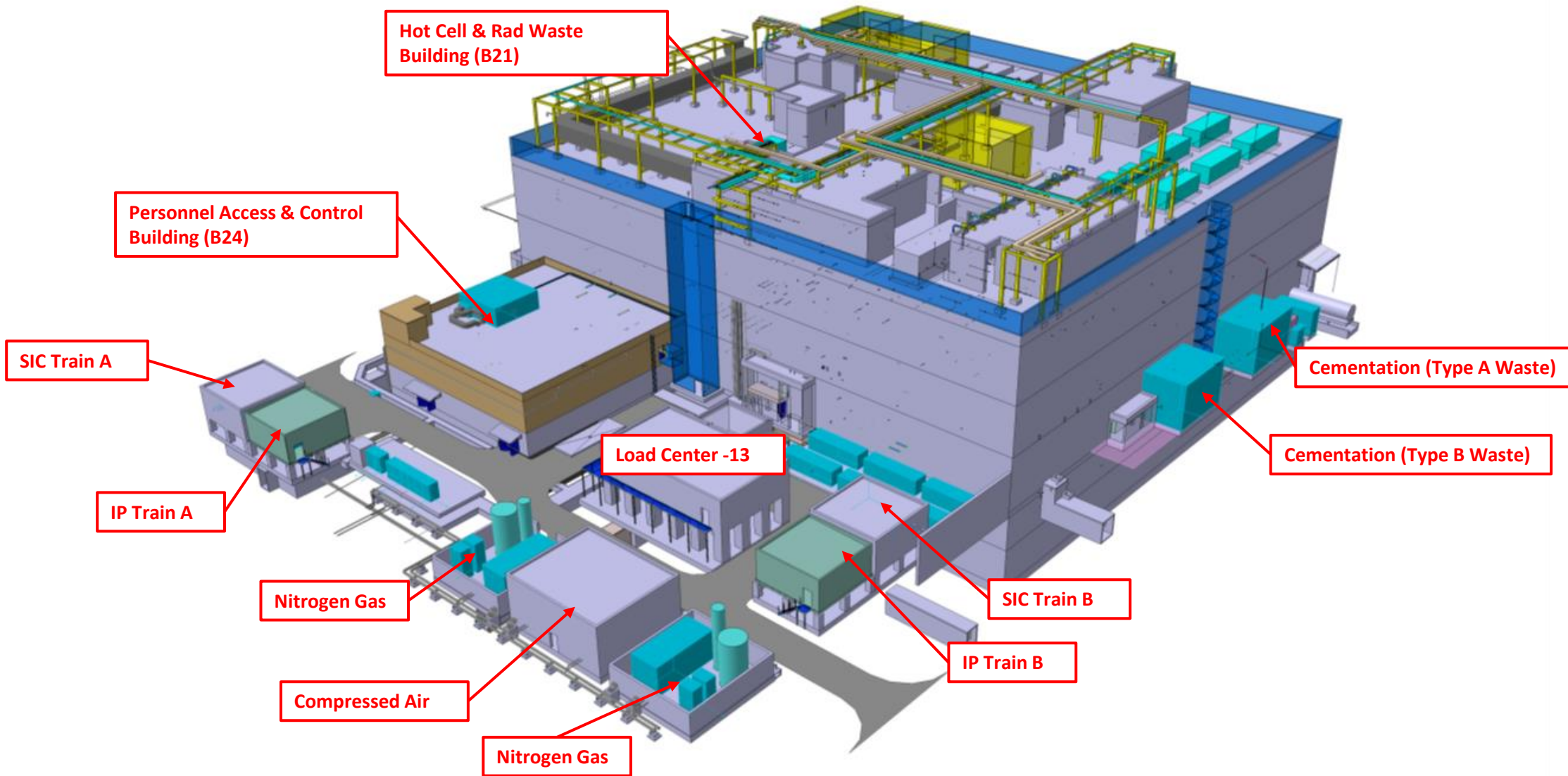
Tokamak Building

Hot Cell Building 21:

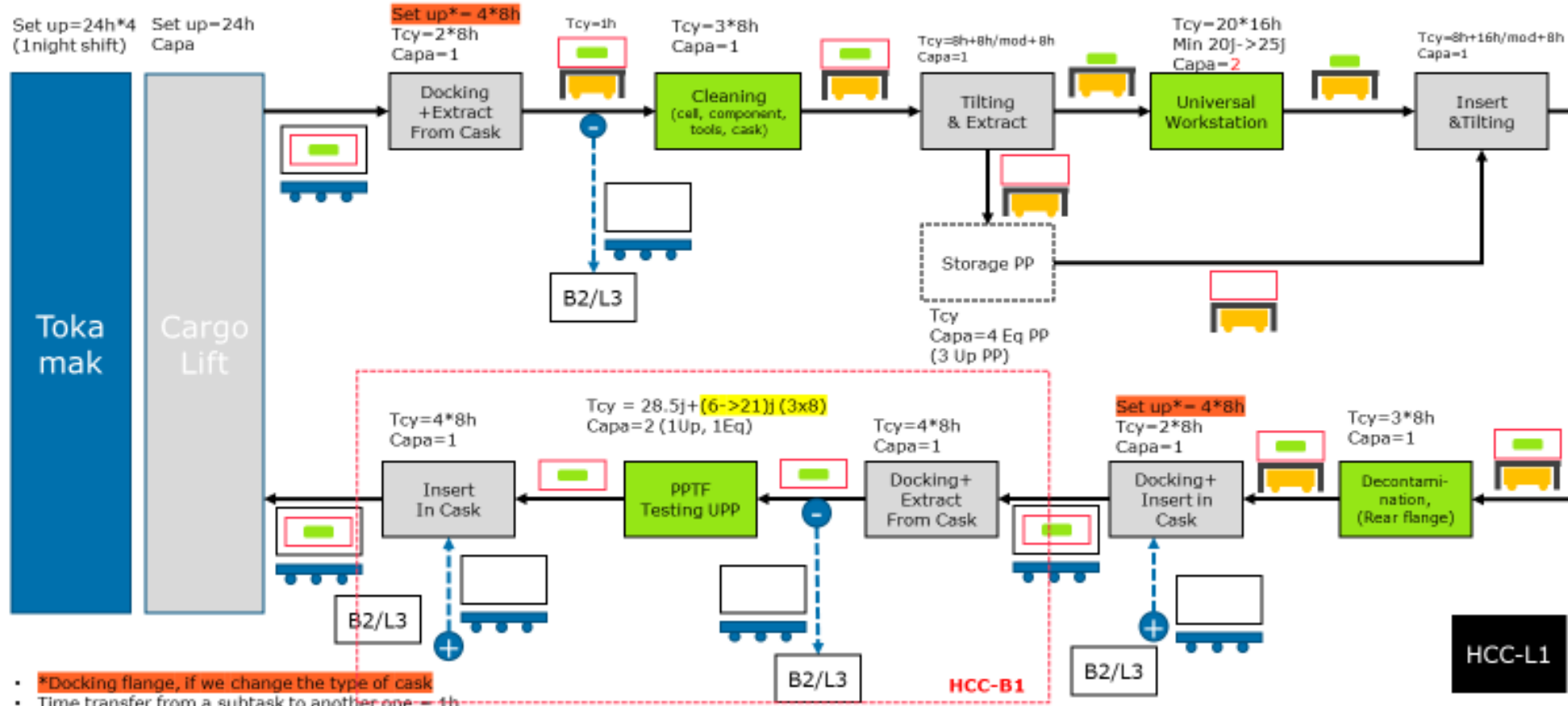
- 90m x 85m
- 30m above ground
- 12m below ground

ITER Headquarter





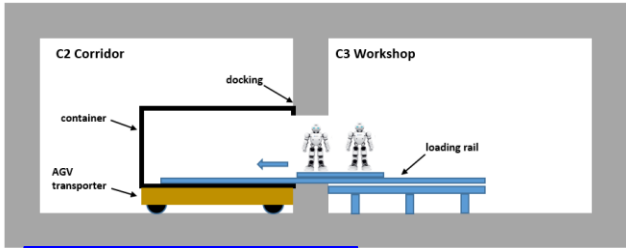
Up Port Plug UPP (PBS-55, -52) Refurbishment HCC view



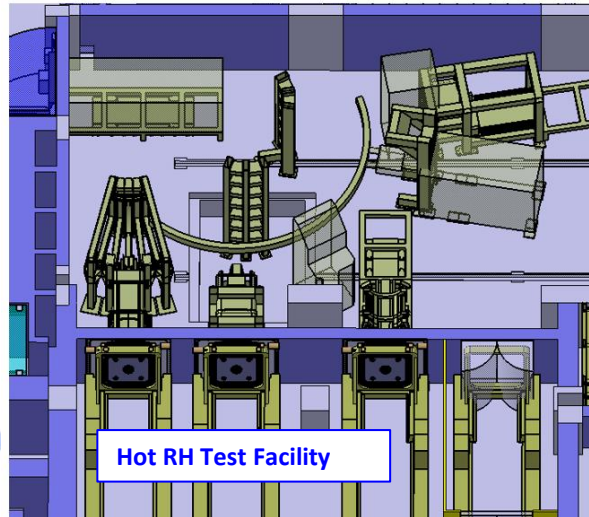
- *Docking flange, if we change the type of cask
- Time transfer from a subtask to another one - 1h

Presentation Title | Author | Date

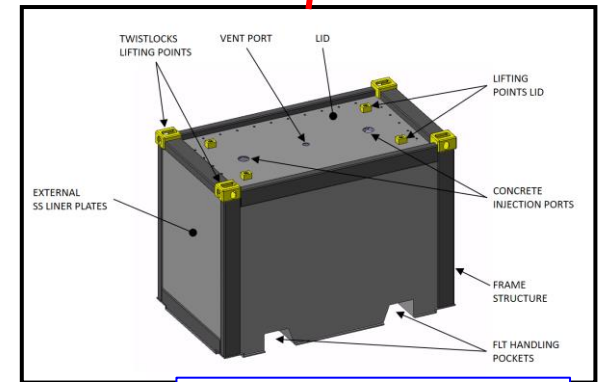
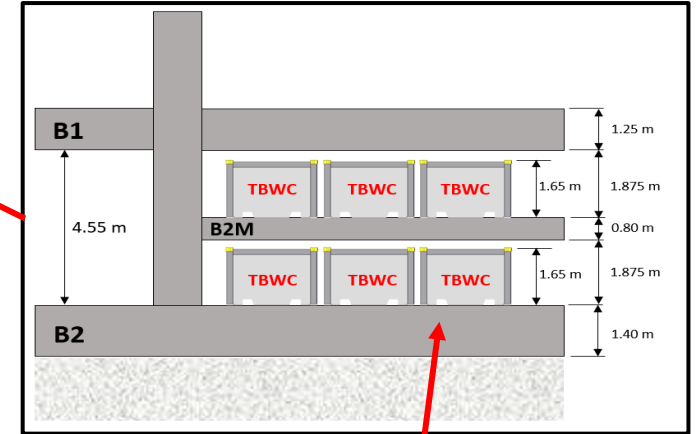
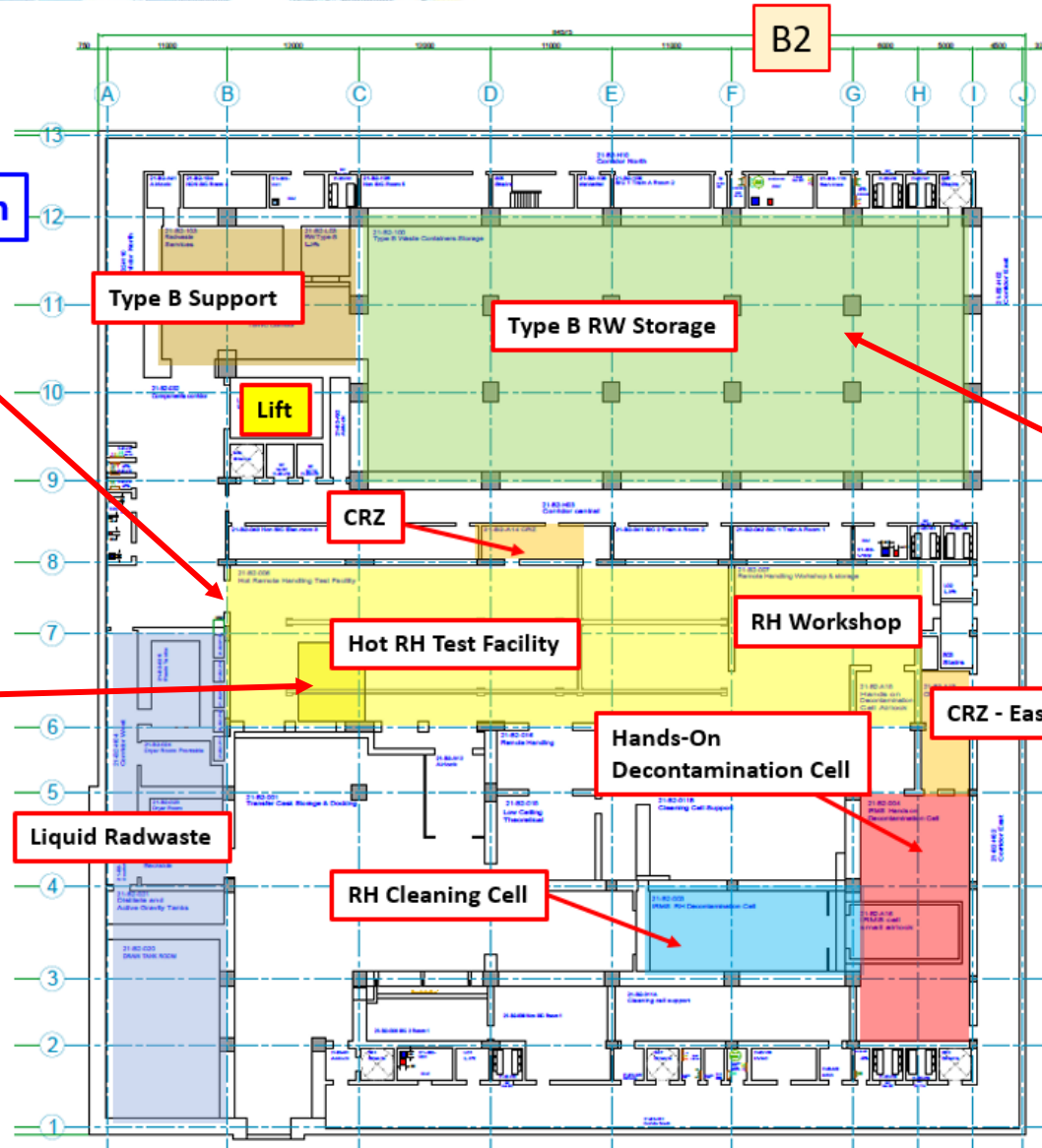
© Capgemini 2018. All rights reserved | 5



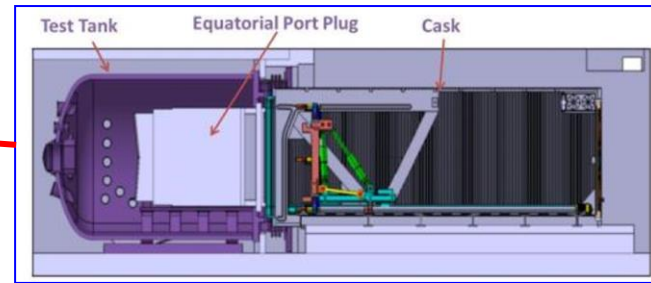
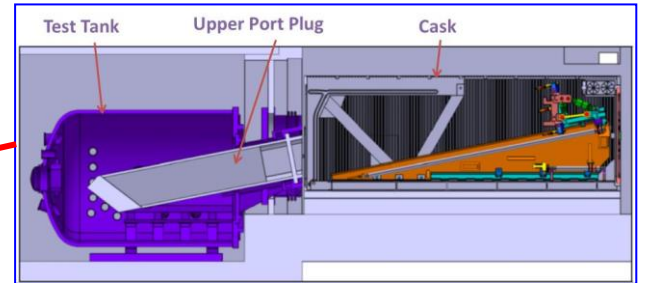
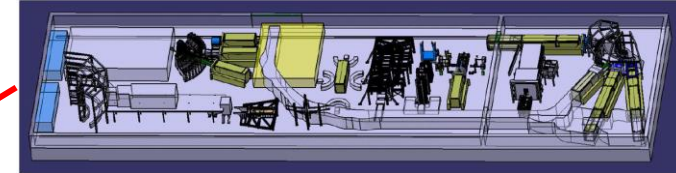
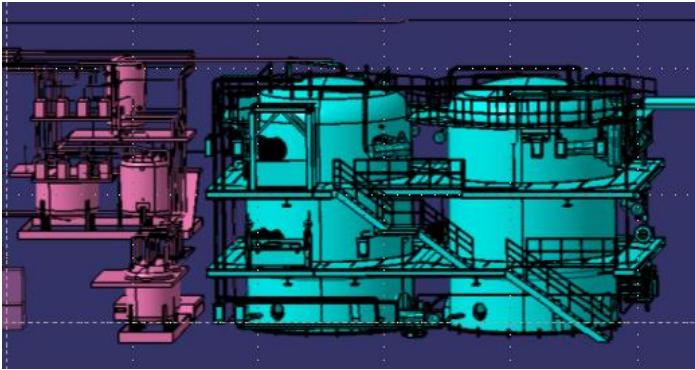
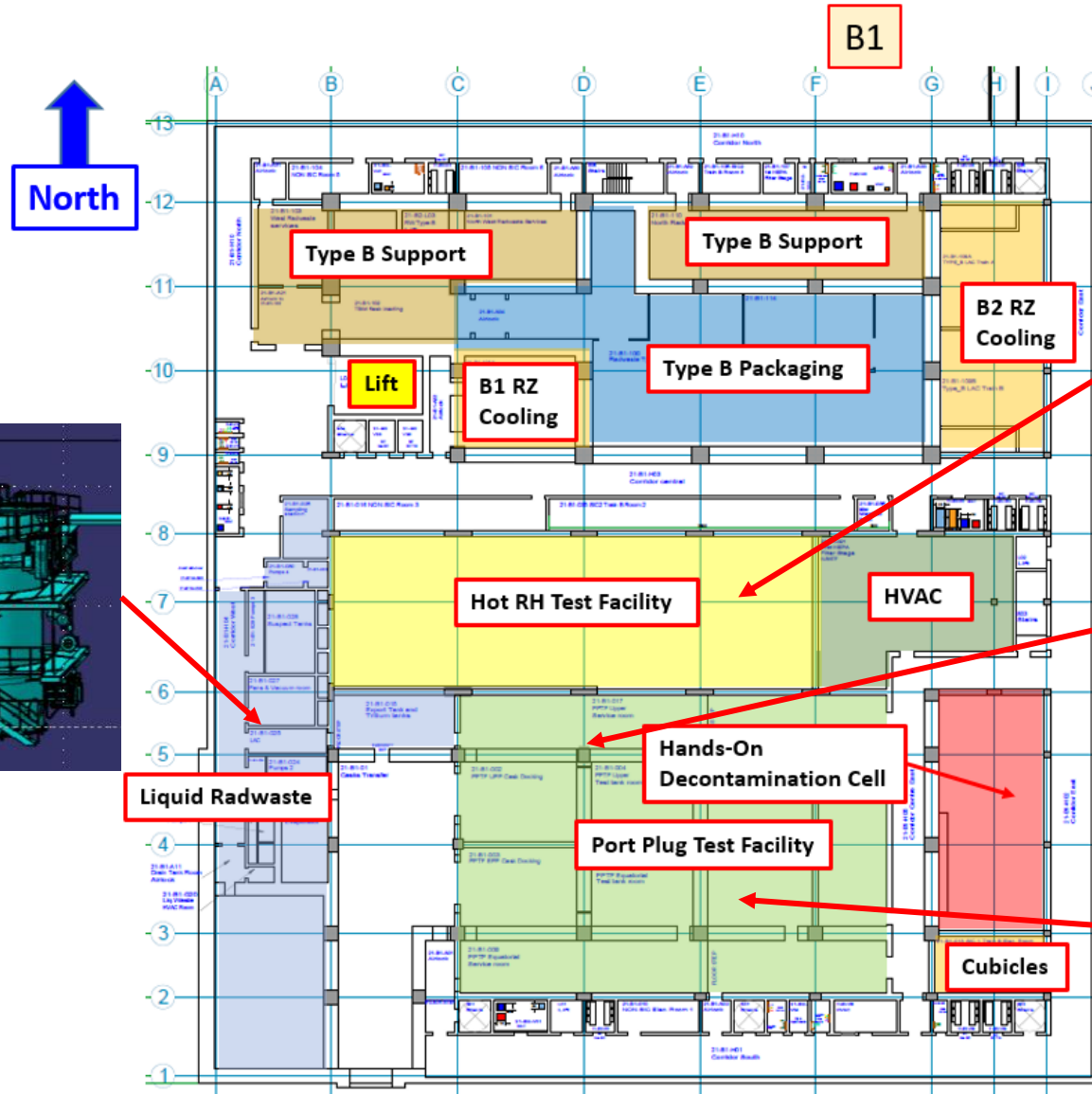
RH Storage Containers

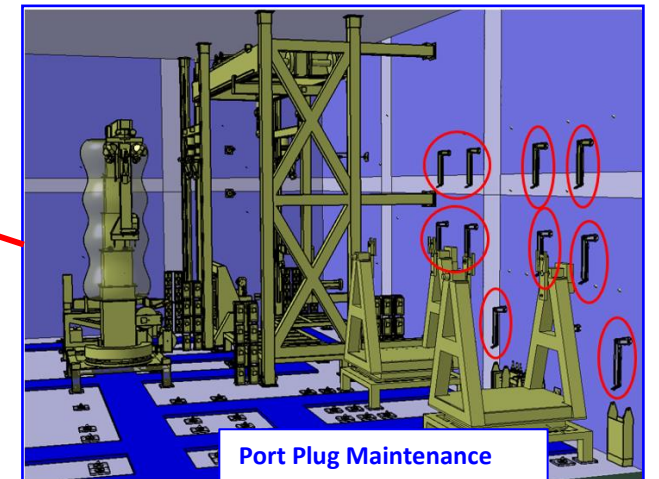
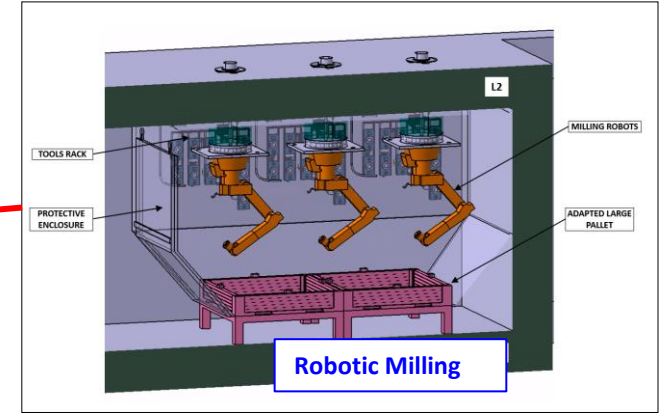
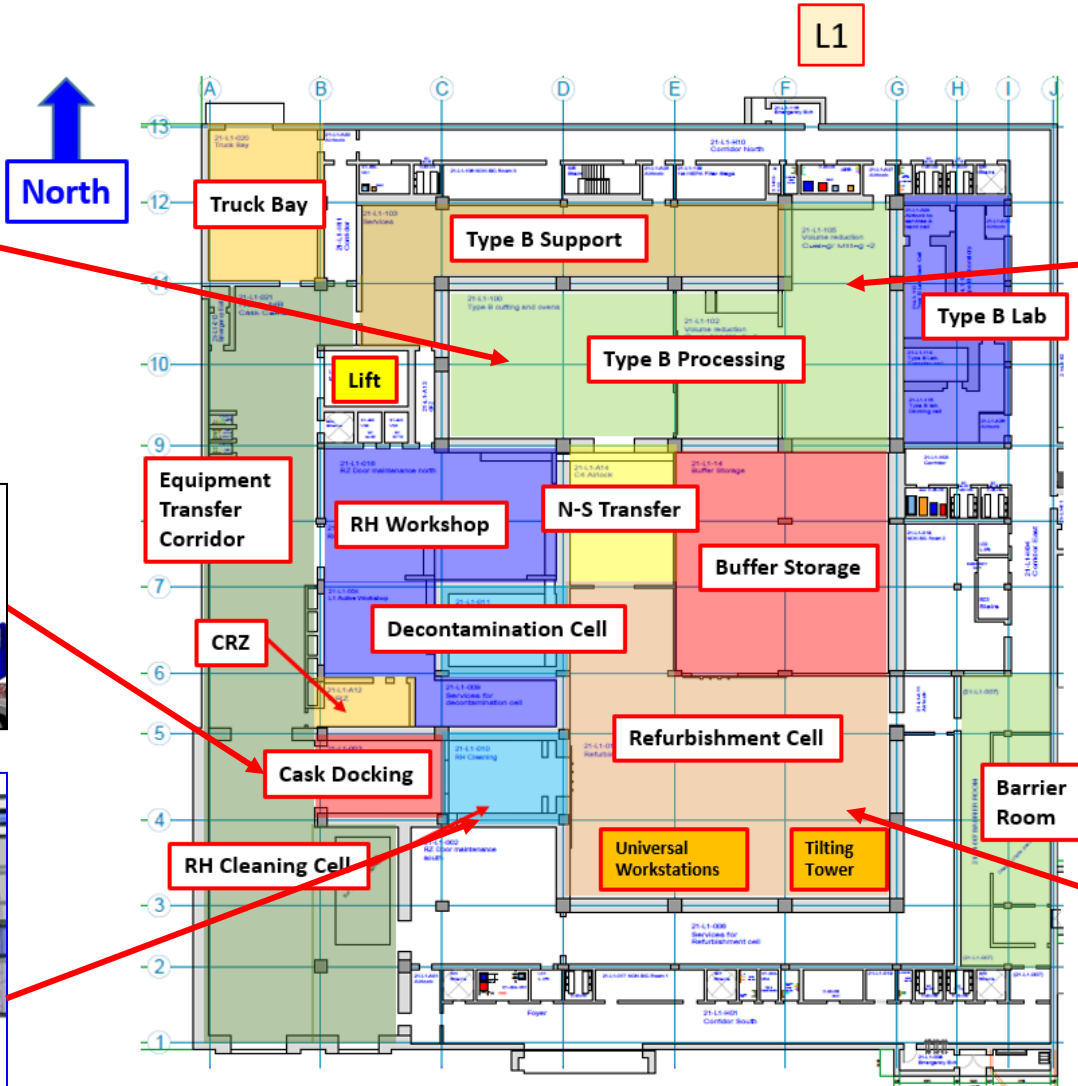
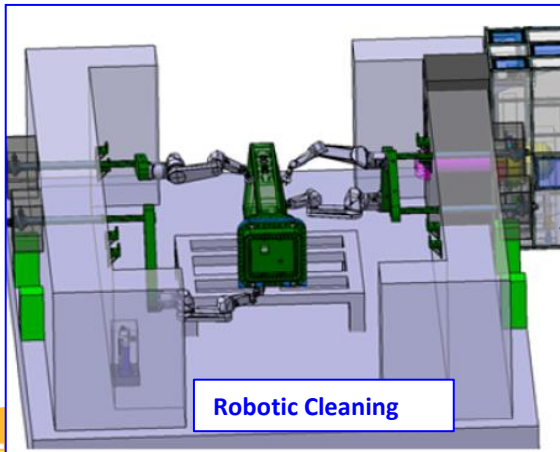
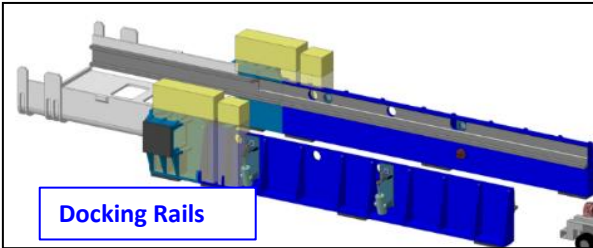
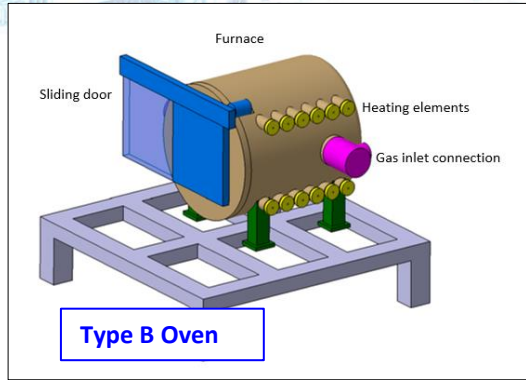


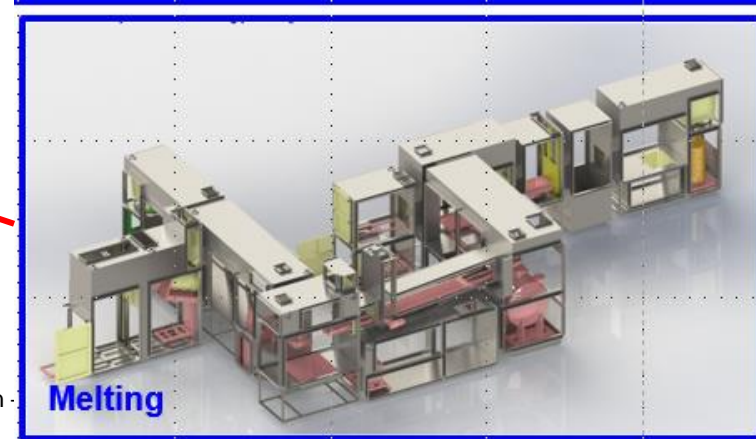
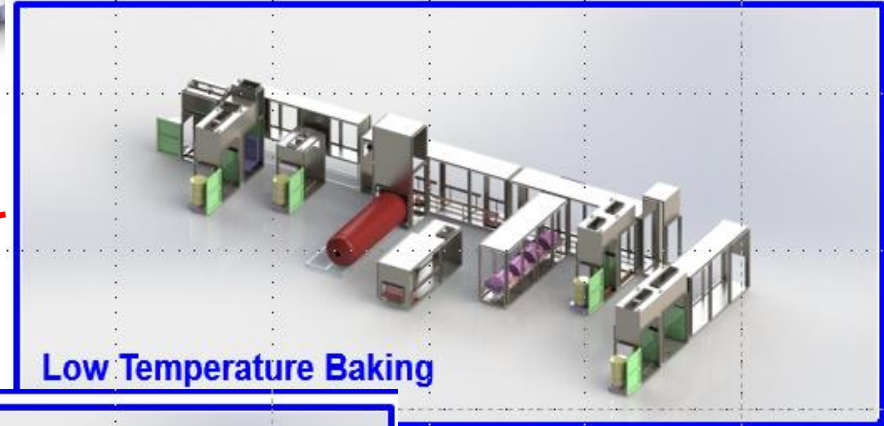
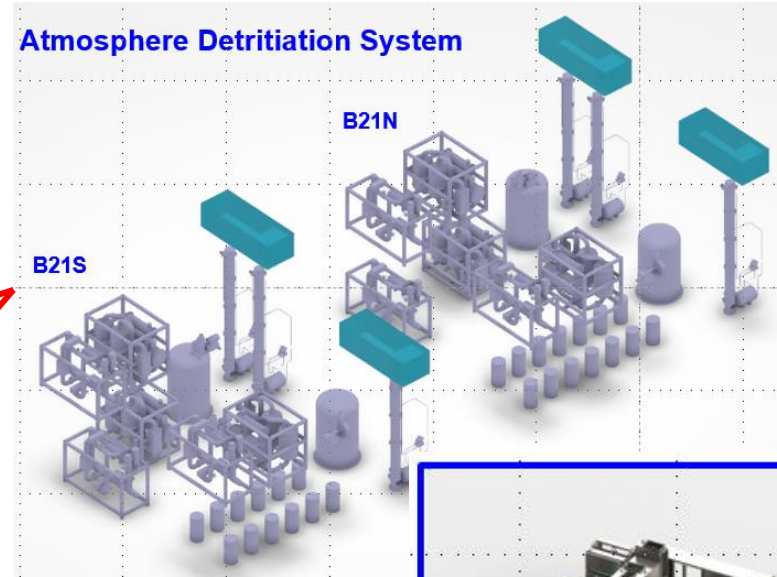
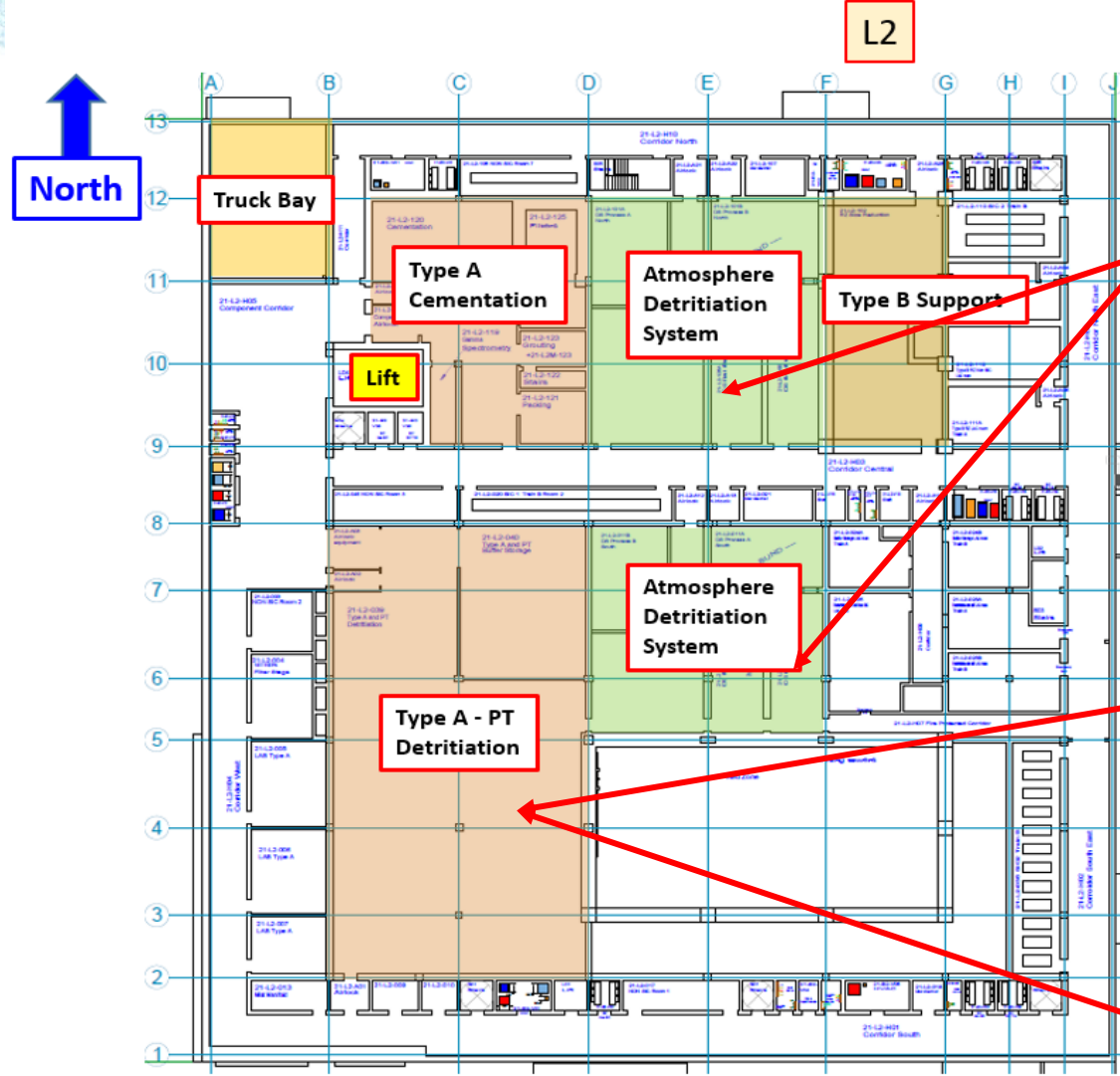
Hot RH Test Facility



Type B Radwaste Container

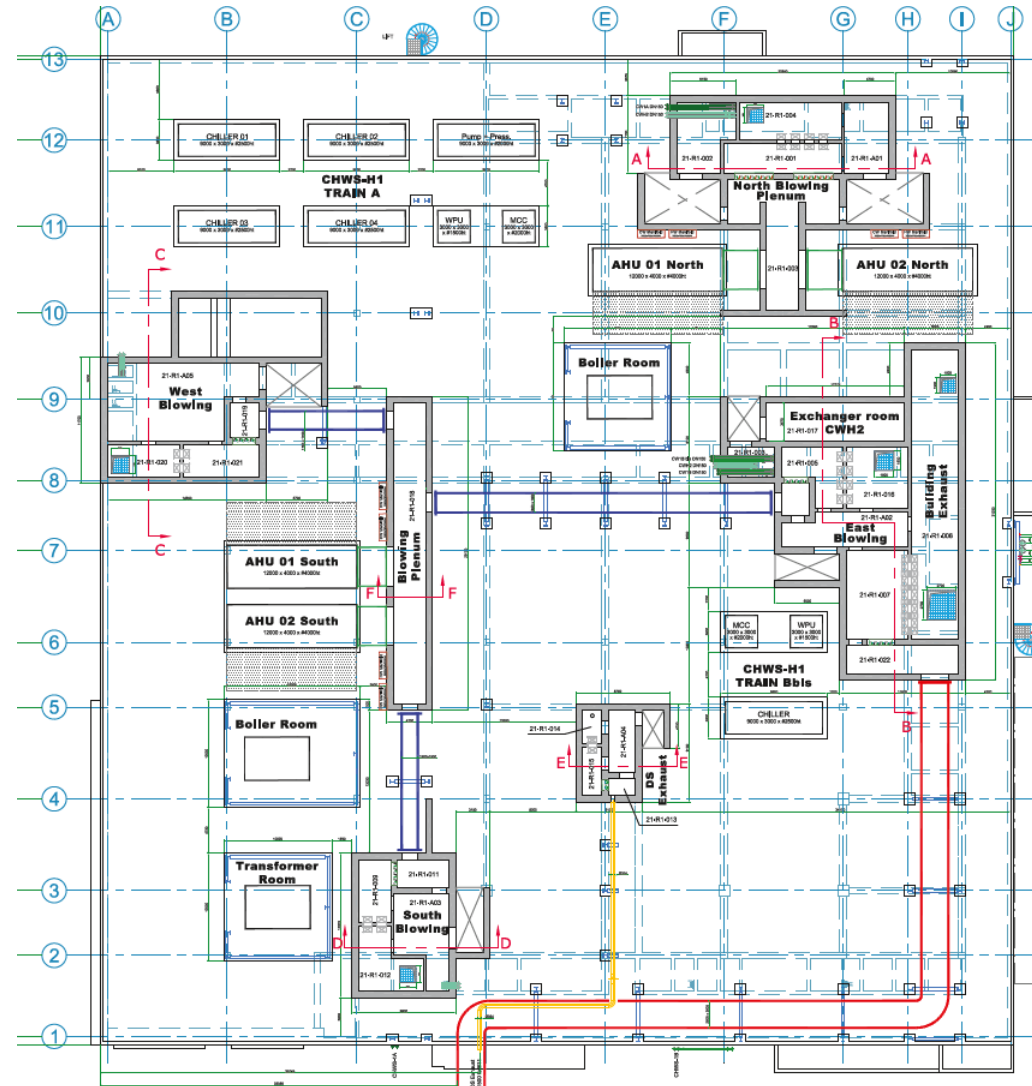






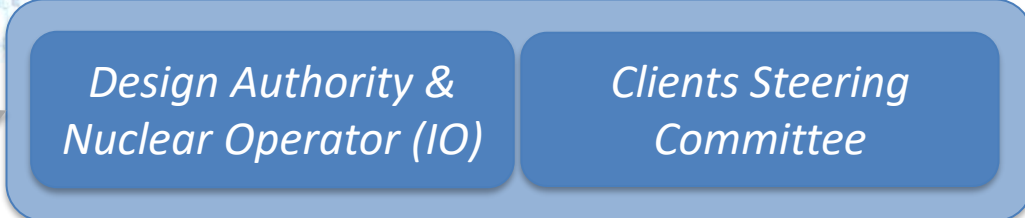
Building Services

- Chilled Water H1 Train A
- Chilled Water H1 Train B
- Lift
- HVAC
- Independent HCF Stack (Option)

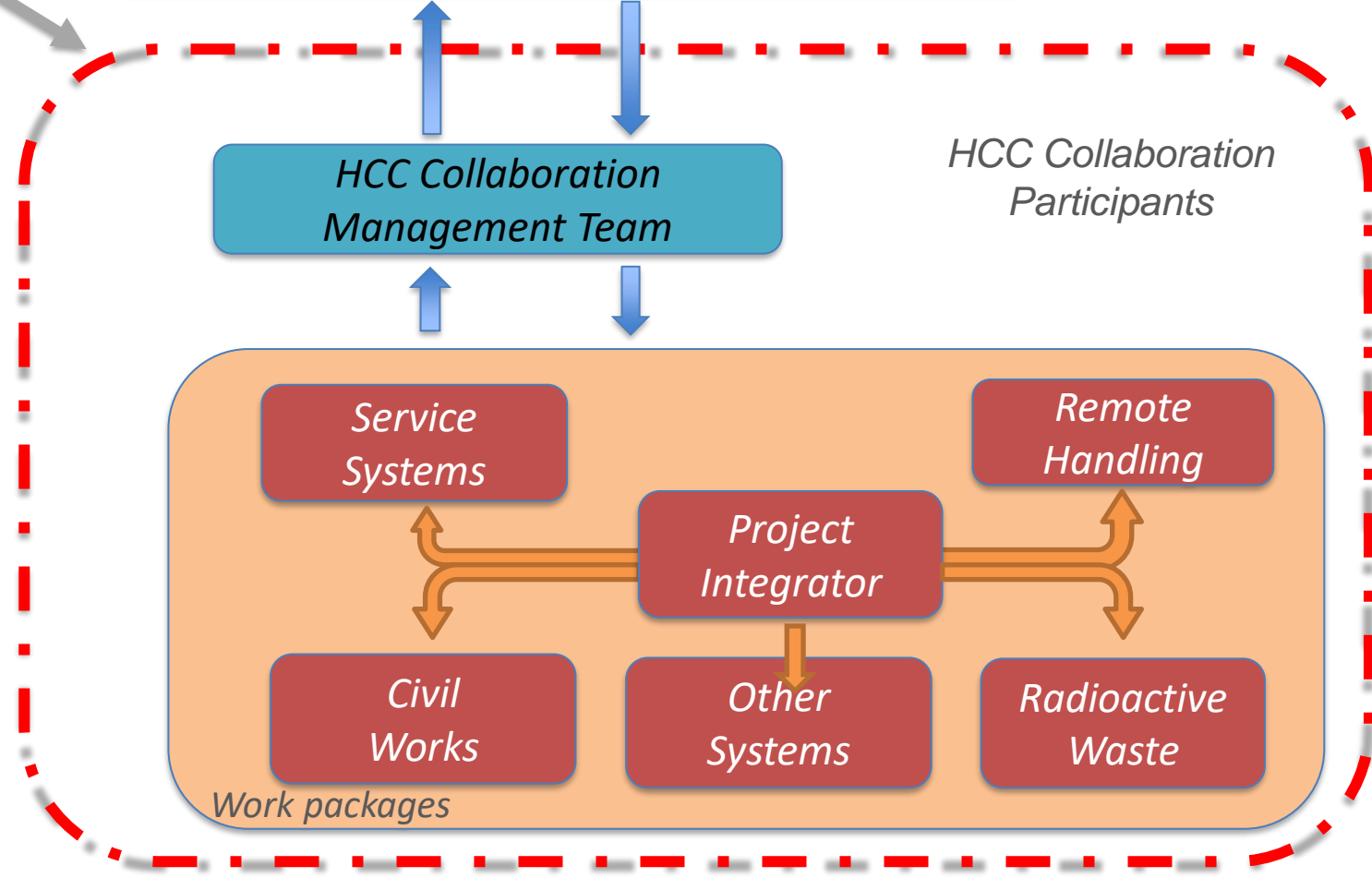


3rd Party Support Contracts

- Cost Control Auditor
- Behavioral Facilitator
- Support to Owner
- Site Service
- H&S coordination
- Etc.



HCC Collaboration Board



This line describes the border between Clients and Participants. The Collaboration will have certain self governance within the line; the clients set the input rules and guidelines for this through the Collaboration Agreement.

The Clients will also be participants – matrixed into the collaboration organization

➤ **Timeline for Upcoming Procurements**

- *Project Integrator is the first Contract to be launched – this is ongoing with a start of Tender Phase in June 2022*
- *Tier 1 design contracts will follow progressively with a target of signing all contracts before end of 2023*

➤ **Strategy for project Phases/Stages**

- *Early engagement is envisioned, specifically for the Project Integrator*
- *Once the Collaboration is formed, there will be a number of project phases, each there can be a re-formation of the collaboration to suite the phase ahead*

➤ **Governance and Roles**

- *IO and F4E are Clients forming the Steering Committee*
- *The Collaboration Board – typically senior executives from each Participant – High level management*
- *The Collaboration Management Team – Support the Participants in the day to day work*
- *Participants – Executes the Works*

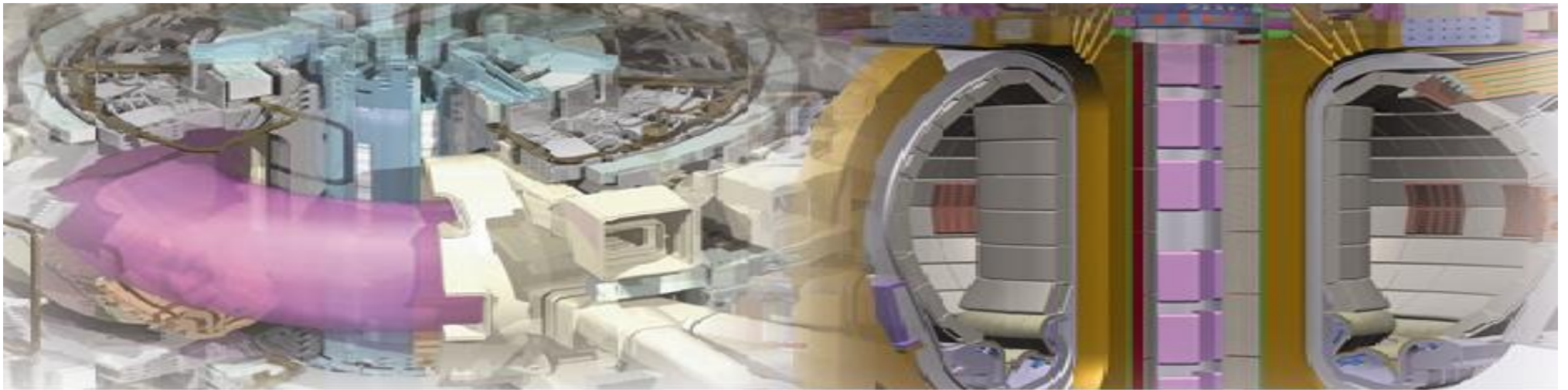
1. ITER Status
2. IO Business Opportunities
3. Focus: Detritiation Systems
4. Focus: Hot Cell Facility
5. Conclusion

Back-UP (Descriptions, Upcoming Tenders, 'How-To', Contacts, etc)

- ❖ In participating to the ITER Project with the IO and/or the Domestic Agencies, the Industry develops competencies that will be key for the next steps of the fusion programme.
- ❖ The ITER Project and Industry together have to find economically efficient solutions to a great technical challenge – requiring high skills and experience in high technologies, nuclear engineering and construction.
- ❖ The ITER Project is a unique industrial business opportunity for the Industry, including SMEs and National Laboratories, which are recognized as important players for the Project.
- ❖ There are still significant business opportunities!!
- ❖ The next ITER Business Forum will take place in Marseille, France, from 4 to 6 April 2023.



Thank You for Your Attention



1. ITER Status
2. IO Business Opportunities
3. Focus: Detritiation Systems
4. Focus: Hot Cell Facility
5. Conclusion

Back-UP (Descriptions, Upcoming Tenders, 'How-To', Contacts, etc)

Where to find more information:

❖ IO Website for Industry: <https://www.iter.org/proc/generalinfo>

▶ To find general information on how to apply, the tender processes, the publication of:

- ✓ List of ongoing Call for Tenders.
- ✓ List of ongoing Call for Expertise.
- ✓ List of ongoing Open Tenders.
- ✓ Forthcoming Call for Tenders.

▶ To ask general questions related to Procurement, contact: iopcd@iter.org

▶ To follow IO Business Events = <https://www.iter.org/businesssevents>

❖ Industry Liaison Officers

A network from different European countries works together with Fusion for Energy to raise awareness regarding funding schemes and ways to get involved in the ITER project. A series of information days and seminars are planned throughout the year to report on the roadmap of the different procurement packages and facilitate partnerships between companies.

More information = https://industryportal.f4e.europa.eu/ip_pages/ilocorner.aspx

Call for Tenders

Call for Expertise

Open Tenders

Forthcoming Tenders

54 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 iopcd@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
Q1 2021	Call for Tender	Floor Protection for Tokamak supply and service contract	A
Q1 2021	Call for Tender	Framework Contract IO Ex-Vessel ISS-PCSS manufacturing and assembly for IO Ports	C
Q1 2021	Call for Tender	Framework Contract CAD QA / QC	A
Q1 2021	Call for Tender	Cold Box prototype mock-up development and test Contract	A
Q1 2021	Call for Tender	Supply TCWS DYS ESPN Filter Contract	A

Doing Business in Vicinity of ITER:



- The Welcome around ITER network launched in 2013 plays a key role in welcoming and supporting companies having signed ITER contracts and required to operate on the ITER construction site at Cadarache in Saint-Paul-lez-Durance
- Propelled by the impetus generated around the project, **W@I** also supports companies looking to set up business in the Provence-Alpes-Côte d'Azur (PACA) region or to build bridges with local firms.
- The **W@I** network comprises Agence ITER France, Pôle Emploi (job centre), the Regional Agency for Innovation and Internationalization (ARII) , the ITER industrial committee (C2I), and the French chambers of commerce & industry (CCI).
This network offers a broad range of services to meet all corporate needs.

➤ **Contact:** AIF-WAI@cea.fr

**More information @ <http://welcome-around-iter.com>
and for Industrial support with C2I [here](#)**

■ General overview

- 4 Contracts signed and started for Worksite 1 : A0, TAC-1, TAC-2 and VVW2P
- 3 Contracts signed and started for Worksite 2 : TCC-0, TCC-1 and TCC-2
- FIDIC General Conditions based Works Contracts
- MOMENTUM SNC as Construction-Management-as-Agent / FIDIC Engineer
- Good level of competition based on Call for Tender with Negotiated Procedure in some cases
- Tendering started for In-Vessel Assembly (A6) CFN late early August

■ Focus on Worksite 1

A0 Contract



- Tokamak Assembly Early Works
- Signed in July 2018 with CNIM/MAN
- > 50,000 man.hours
- Start / End : 2018 / 2021

TAC-1



- Tokamak Assembly Works Lot 1 (A1/A5-L/A5-U/A7/Magnet Feeders)
- Signed in September 2019 with CNPE Consortium*
- > 1,800,000 man.hours
- Start / End : 2019 / 2026

TAC-2



- Tokamak Assembly Works Lot 2 (A2/A3/A4/A5-S)
- Signed in July 2019 with DYNAMIC SNC**
- > 1,100,000 man.hours
- Start / End : 2019 / 2026

VVW2P



- Vacuum Vessel Welding Production Phase
- Signed in October 2020 with ENSA
- > 650,000 man.hours
- Start / End : 2020 / 2026

* CNPE Consortium : CNPE (leader), Framatome, CNI23, ASIPP, SWIP

** DYNAMIC SNC : Ansaldo Nucleare, Ansaldo Energia, ENDEL, ORYS, SIMIC, Leading Metal Solutions

■ Focus on Worksite 2

TCC-0



- Tokamak Complex Early Works
- Signed in Dec 2018 with ENDEL-ENGIE Consortium *
- > 100,000 man.hours
- Start / End : 2019 / 2022

TCC-1



- Tokamak Complex Works Lot 1 (B11 Diag, Fuel, Vac, Cubicle, PRVR, and B14/15/74)
- Signed in Dec 2019 with FINCANTIERI Consortium **
- < 1,000,000 man.hours
- Start / End : 2020 / 2026

TCC-2



- Tokamak Complex Works (TCWS, VVPSS, TBM, B14 Valve Room, VAC)
- Signed in March 2021 with META SNC ***
- < 1,000,000 man.hours
- Start / End : 2021 / 2026

* ENDEL-ENGIE Consortium : Endel Engie (Leader), Engie Axima, Orys Ortec

** FINCANTIERI consortium : FINCANTIERI (Leader), FINCANTIERI SI, Delta-ti Impianti, Comes

*** META SNC : Ponticelli Frères (Leader), Cobra Instalaciones y Servicios, and Empresarios Agrupados Internacional

- Sub-contractors of TAC/TCC prime contractors (contact points in next slide)
- Various small / medium manufacturing / installation contracts (looking for agility, reactivity, specialized services / works)
- Various special supply contracts for construction such as :
 - ✓ Supply of High Performance Insulation Materials for Tokamak Cooling Water Systems piping and valves,
 - ✓ Supply of Upper Cryostat Bellows,
 - ✓ Supply of Magnet Instrumentation Pressure Transducers,
 - ✓ Supply of Lower Penetration Pipes and Supports,
 - ✓ Supply of CS Pre-Tensioning Tooling,
 - ✓ Etc ...

⇒ More information @ <https://www.iter.org/org/team/adm/proc/overview>

- TAC/TCC Prime Contractors Points of Contact :
 - TAC-1 - CNPE Cons. : Chunyu ZHANG - Contract Manager - zhangcyb@eu.cnpe.cc
 - TAC-2 - DYNAMIC SNC : Enrico SAVOLDI - Project Director - enrico.savoldi@dynamic-iter.com , Julien BERTHET - Deputy Project Director - julien.berthet@dynamic-iter.com
 - VVW2P - ENSA : Luis BLANCO - Project Manager - blanco.luis@ensa.es
 - TCC-0 – ENDEL Cons.: Jonathan PARRA – Project Director jonathan.parra@engie.com
 - TCC-1 - FINCANTIERI Cons.: Fabio Marchesi - Proposal Manager - fabio.marchesi@fincantierisi.it
 - TCC-2 -META SNC : David Maucorps - Project Director - dmaucorps@ponticelli.com

- TAC/TCC subcontracting / supplies main needs :

➤ **TAC-1 (CNPE Cons.):**

1. Custom machining and special tools manufacture
2. Local Labor resources / services (Workers incl. Mechanical, welding, lifting, painting, etc ..., and Engineers)

➤ **TAC-2 (DYNAMIC SNC):**

1. Manpower, with specific focus on Method Technician/CAD Operator, I&C Engineer/Operator, Planner/Project Controller
2. Construction tools and consumables delivery, such as small tools/parts, lifting items, etc.
3. Non destructive testing service (UT, PT, radio, etc.)

- TAC/TCC subcontracting / supplies main needs :

➤ **VVW2P (ENSA):**

1. Workers to cover fields such as: Welding, Machining using CNC milling tools, Maintenance, assemblers...
2. NDTs, subcontracting services for UT+LT+RT
3. Various supplies : Welding gas, Filler material, Consumables, Tools, Logistic, temporary construction equipment, HSE equipment, waste.

➤ **TCC0 (ENDEL Cons):**

1. NDT (mainly radios)
2. Painting
3. Scaffolding

- TAC/TCC subcontracting / supplies main needs :

➤ **TCC-1 (FINCANTIERI Cons.):**

1. NDT (Non Destructive Tests)
2. Platforms / metallic structures prefabrication
3. Piping (spools)

➤ **TCC-2 (META SNC):**

1. Steel structure fabrication
2. Non Destructive Test (RT) on site
3. Piping insulation & Painting
4. Services in the field of Instrumentation and Control, Electrical, Busbar

A6 : In-Vessel Components Assembly

■ A6.I: Assembly Phase I

⇒ 2 Works Contracts (FIDIC Red-Book) subject to CFT :

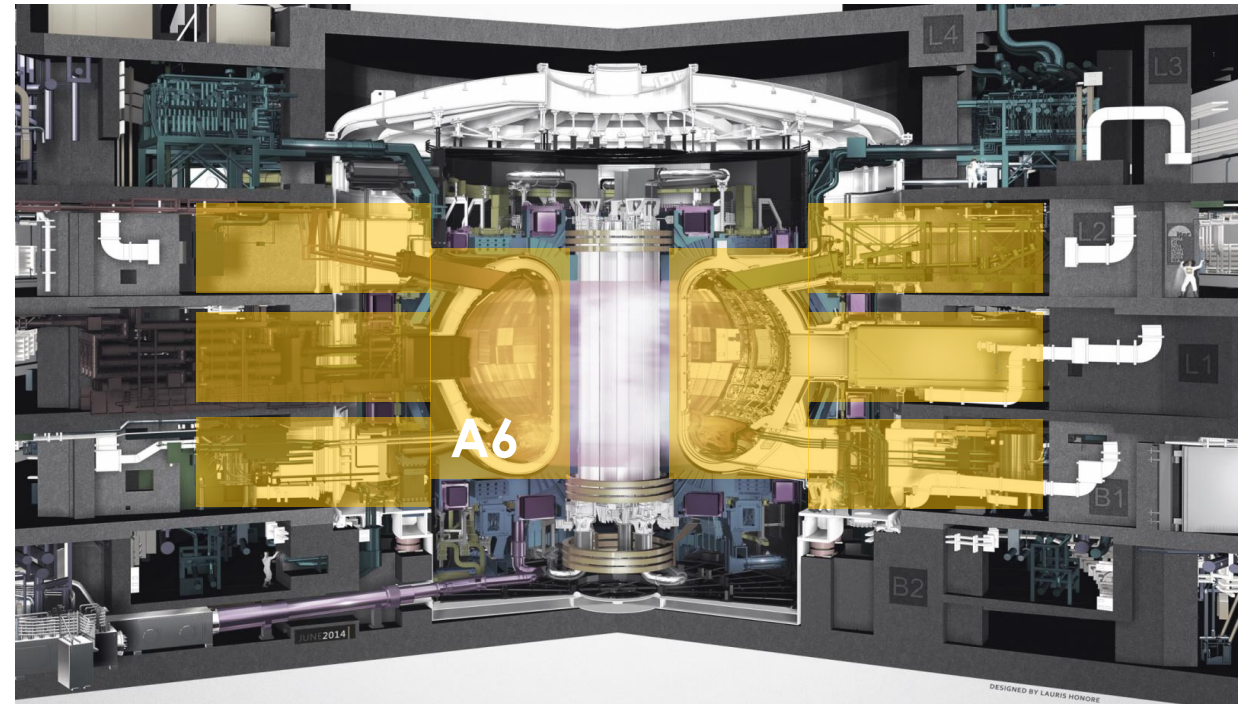
- IDI Contract (In-vessel Diagnostic Installations) (started in Aug 2021)
- FMI Contract (Final Mechanical Installations) (to start by Q2 2022)

Machine Assembly – Next Tendering A6

■ A6.II: Assembly Phase II

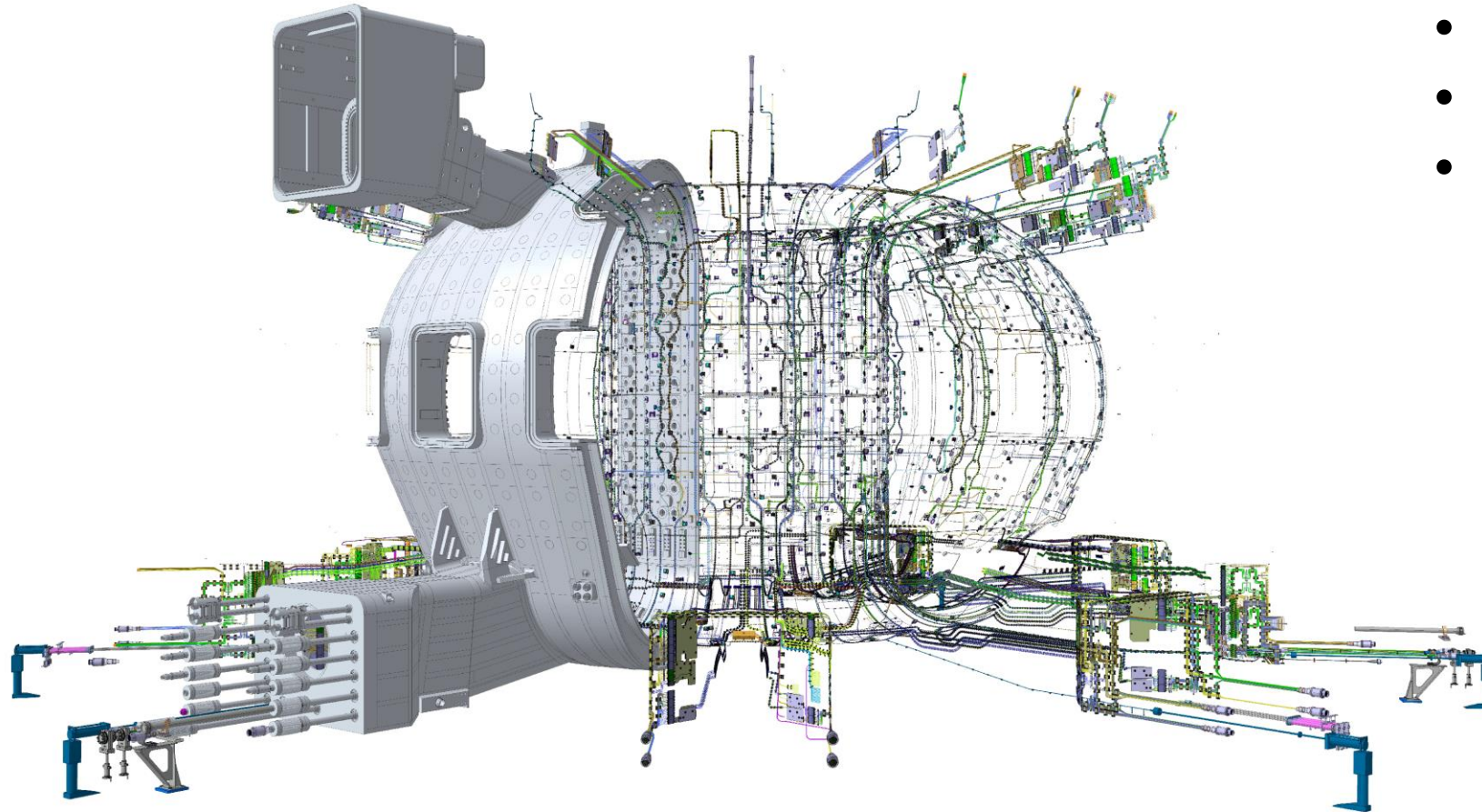
⇒ Strategy under development with

Call For Nomination foreseen in 2023



A6.1 In-Vessel Assembly Works Phase I

- **IDI (In-vessel Diagnostic Installations)**



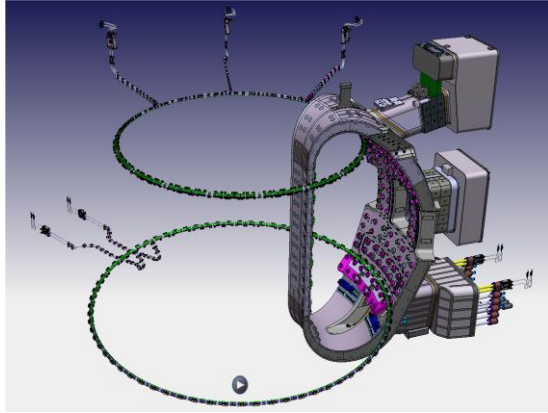
Machine Assembly Contracts (10/12)

- Diagnostics cabling, sensors, base plates, connectors
- Waveguides
- Feedthroughs
- Pipe-based systems:
 - Pellet and Gas Injection systems
 - In-service inspection
 - Neutron Activation
 - Gas Analyzer

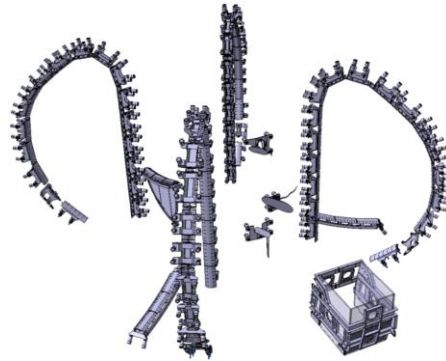
A6.1 In-Vessel Assembly Works Phase I

- **FMI (Final Mechanical Installations)**

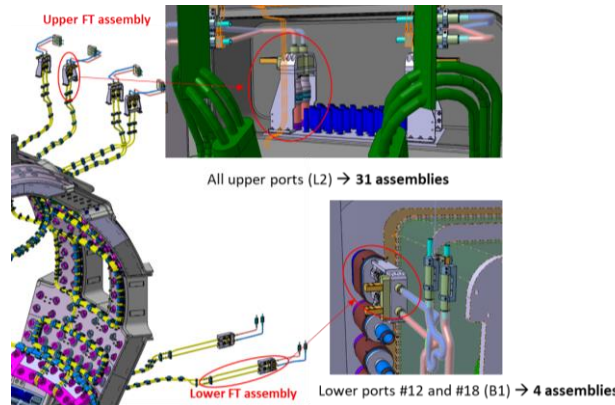
VS coil



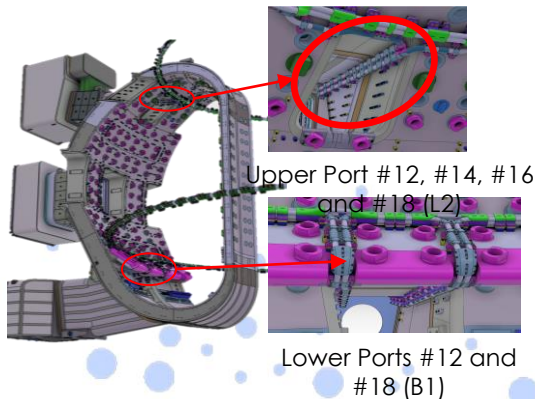
FFPC



Feedthroughs



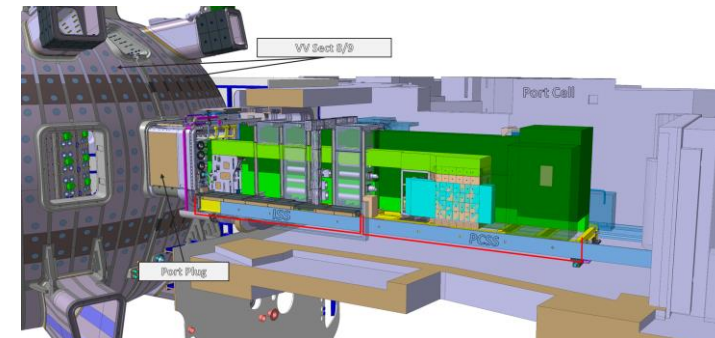
IVC Feeders



Machine Assembly Contracts (11/12)

- Installation of 2 Vertical Stability coils
- Installation of IVC Feeders
- Installation of 70 In-vessel Coil (IVC) Feedthroughs
- Installation of 2 x equatorial Diagnostic Port Plugs
- Installation of 1 x upper EC Heating Port Plug
- Installation of First Plasma Protection Components (FFPC)
- Installation of TF mapping system
- Removal of in-vessel tools
- Installation of 35 Port Closure Plates
- Support to IO for final inspection of VV
- Closure of VV

Port Plugs



A6.1 In-Vessel Assembly Works Phase I

Next Tendering :

- IDI (In-vessel Diagnostic Installations) : CFT start August 2021 to sign by Q4 2022
- FMI (Final Mechanical Installations) : CFT start Q2 2022 to sign by Q3 2023

Special features :

- High volume of work in a restricted space
- Different types of work but most repetitive
- Co-activities need to be considered
- Fragile components
- Handling and installation of PIC/SIC components
- Very good coordination with other in-vessel and in-port activities / stakeholders required
- High importance and priority to qualification of processes and training of personnel (key factor for the success of the installation activities)
- Tight tolerance – metrology for reverse engineering and as-built data is essential

Machine Assembly Contracts (12/12)

Area of Competence	Core Competence
Assembly Tooling	√
Clean Conditions Working	√
Mechanical and Electrical Codes and Standards	√
High Vacuum and UHV	√
Occupational Safety	√
Bending & installing MI cables (limited scope)	√
Process Development and Qualification	√
Quality Assurance / Quality Control	√
Regulated Construction	√
Welding & NDE	√
Clean Conditions Staging	Mainly IO supply
Cleaning	√
Inspection and Non-Destructive Examination	√
Instrumentation Installation	√
Metrology	
Lifting and Handling up to 2000kg, up to 40t for port plugs	√
Reverse Engineering, Customisation and Precision Machining, Workshop	√
Tooling Maintenance, Storage and Preservation	√

- Maintenance of all components turned over to Operations Division
- Excluding design modifications / upgrades
- General coordination of all involved disciplines and contractors
- Coordination, supervision and receiving all the sub-contracted activities
- Based on obligation of results principle
- Strong incentive to propose any upgrade or modification in order to optimize components safety, reliability or integrity level or make maintenance in more efficient way

Non core activities

- Scaffolding
- Insulation
- Lifting
- ...

Shared services contractors

Existing

Operation & Maintenance of Infrastructures and buildings

Facility Management contract

Core activities

Maintenance of Mechanical & Metallurgical components

Preventive Maintenance on :

- Static equipment (piping, vessels, relief valves, ...)
- Rotating equipment (pumps, compressors, ...)
- ...

Fitters
Welders
Mechanical specialists
Manual Valves specialists
...

Maintenance of Electrical LV and Instrumentation components

Preventive Maintenance on :

- 380V, 220V, 48V, 24V
- Electrical equipment (LV motors, cabinets, breakers ...)
- Instrumentation (sensors, control systems, safety systems, ..)
- HVAC
- ...

Electricians
Instrumentation technicians
HVAC Technicians
Control Valves specialists
...

Specialized activities

Existing

Operation and Maintenance of Electrical Power Distribution

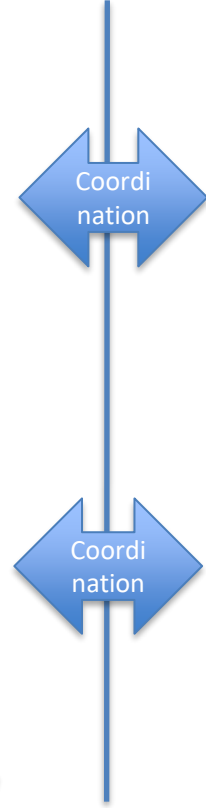
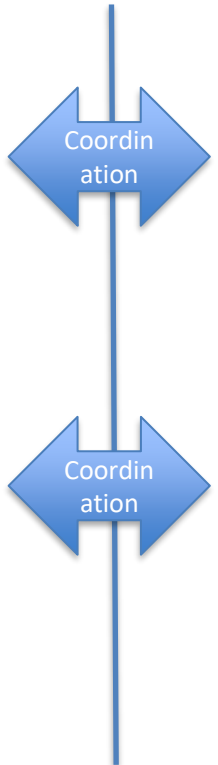
HV Electricians

Technically specific equipment (EPD, RPC, Cryoplant LHe compressors, ...)

Specialized contractors

First of a kind equipment (ECH, Diagnostics, ...)

Original Manufacturers



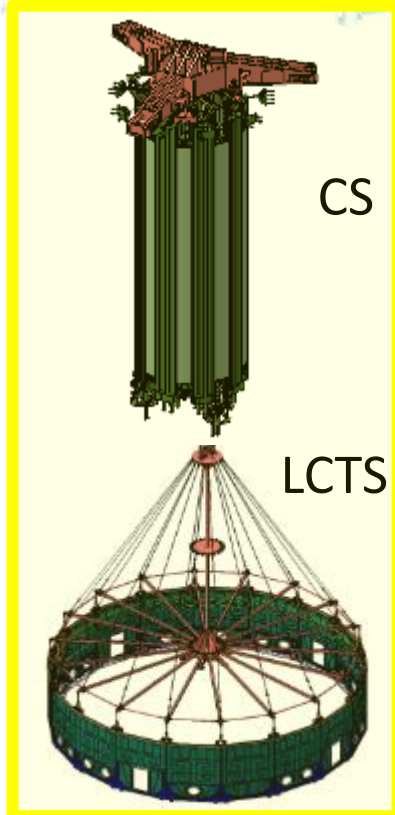
Global Maintenance Services future contract scope

- IO takes staged approach on Maintenance Contracting Strategy:
Short Term : 2021-2022
Mid Term: 2023-2026
Long Term: 2026 onwards
- IO plans to launch a Call for Tender for Global Maintenance Services Contract(s) for Mid term period in **the end of 2021/ beginning of 2022**

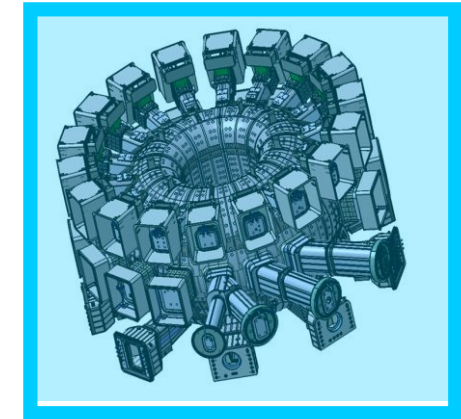


BACK-UP II

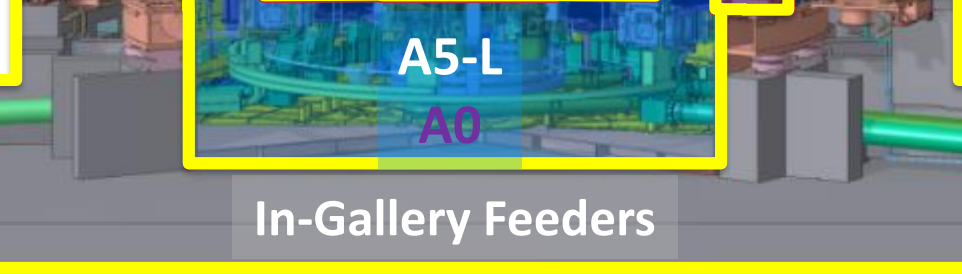
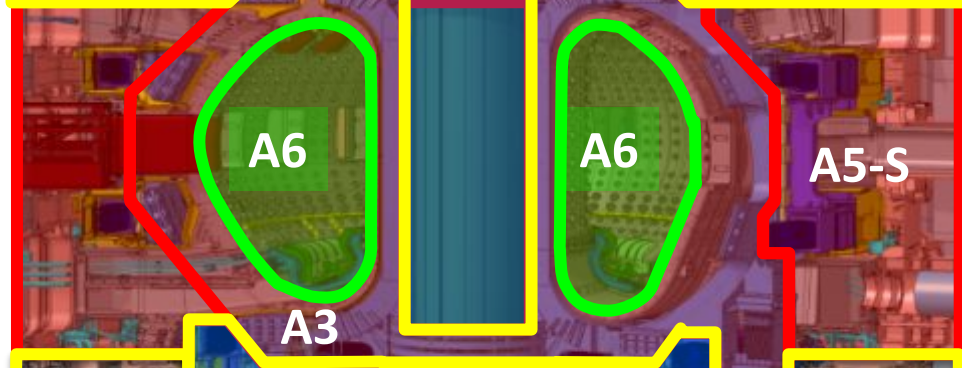
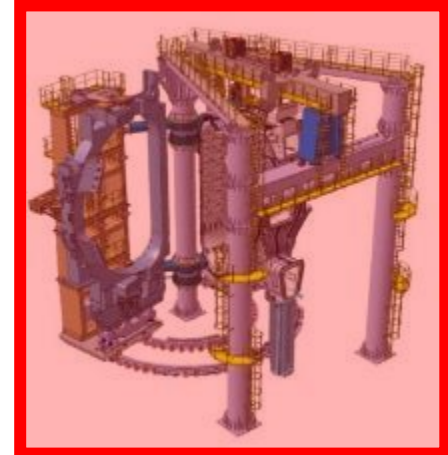
A7: Pre-Assembly



A4: Metrology Activity



A2: Sector-Sub Assembly



- A0
- TAC-1
- TAC-2
- VVW2P
- A6-I