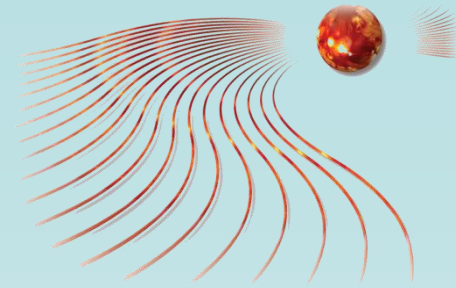


New Technologies For a New Industry

Future Call for Tenders

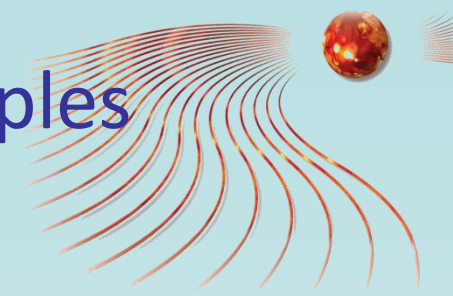
Part II: ITER Organization Calls



Outline

1. ITER Project Procurement Key Principles
2. IO Forthcoming Call for Tenders
3. Cooling Water Systems and Centralized Piping
4. Integrating the Machine and Plants
Assembly Contracts

1. ITER Project Procurement Key Principles



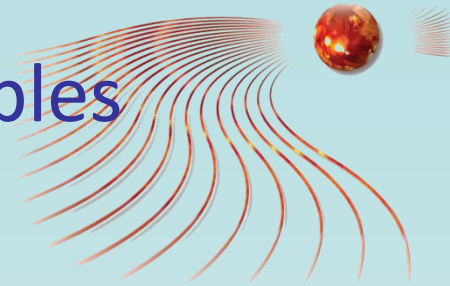
□ ITER Members In-kind Contributions:

- The Procurement Process starts with the signature of a Procurement Arrangement (PA) between IO and a DA, according to the Procurement sharing fixed by the ITER Agreement.
- Each PA defines the specifications, the schedule and interfaces at different steps of design maturity:



- In-kind contributions represent about 85% of the total budget of the Construction Budget for the ITER Project.

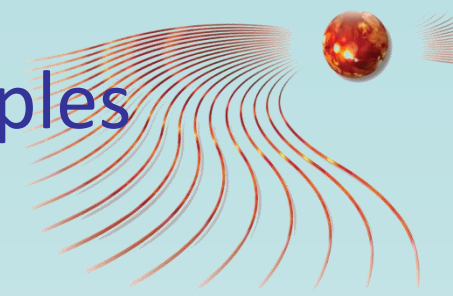
1. ITER Project Procurement Key Principles



□ ITER Members In-kind Contributions (cont')

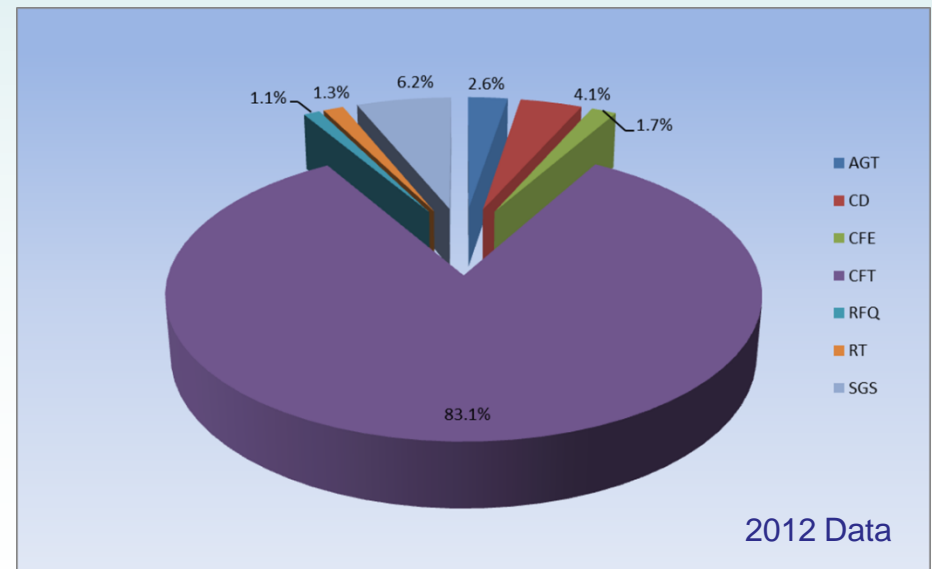
- As of end of November IO and DAs signed:
 - A total of 92 out of 140 PA signatures have been completed, In addition 14 signed CDP's (Complementary Diagnostics PA's) were signed.
 - The total achieved signature value as of to date is 2470.6 kIUA out of the planned value of 2891.3 kIUA, This represents 85.4% achievement of the total value of PAs.
 - For 2013, a total of 24 signatures is forecasted by the end of the year, including 12 PA's & 12 CDP's. Of the number forecasted for this year, 20 signatures have now been completed (8 PA's and 12 CDP's).

1. ITER Project Procurement Key Principles

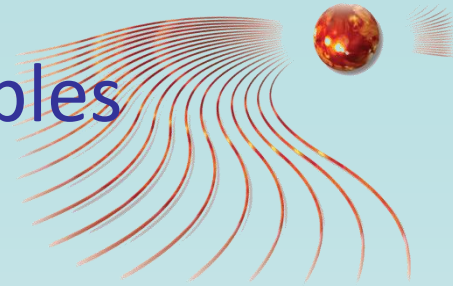


□ ITER Project Procurement Procedures:

- The IO Procurement Process is based on International Public Procurement Rules,
- Most of the contracts are placed through a Call for Tender process starting by the call for nomination published through the DAs,
- The award criteria are of two types:
 - Cheapest technically compliant offer
 - Best value for the IO
- Other Procedures in place:
 - Call for Expertise
 - Request for Quotation
 - Competitive Dialogue
 - Restricted Tender



1. ITER Project Procurement Key Principles

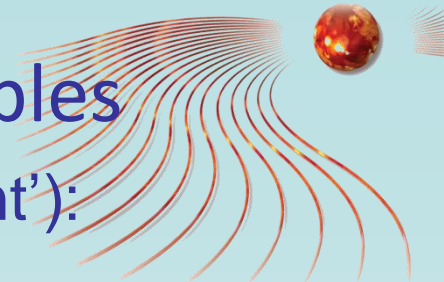


□ ITER Organization Procurement scope:

➤ IO overall scope of work:

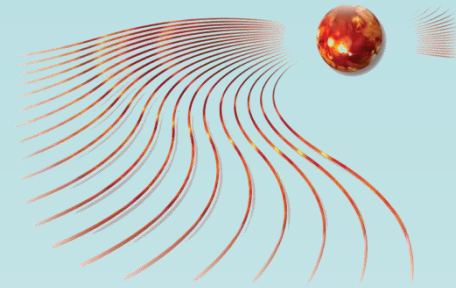
- Overall Design, Integration and Management of the ITER Project,
- CODAC : Control and Data Acquisition and Communication,
- Magnets Feeders Sensors,
- Hot cells maintenance Equipment,
- Cooling Water System : engineering and on-site assembly,
- Part of the Thermal Shield, the Vacuum Pumping & Fuelling,
- Tritium Plant,
- Liquid Helium Plants,
- Heating and Current Drive,
- Diagnostics of the First Wall,
- Assembly Operations and Tooling.

1. ITER Project Procurement Key Principles



- ITER Organization Procurement scope (cont'):
 - Transfer of responsibilities or joint tenders with DAs:
 - Design and Manufacturing of the Port Plugs,
 - Final design and manufacturing of the Tokamak Cooling Water Systems, transfer of procurement responsibility agreed at IC-13 (Nov. 2013),
 - Test Blanket Modules (TBM) Pipings, transfer of responsibility agreed at IC-13 (Nov. 2013).

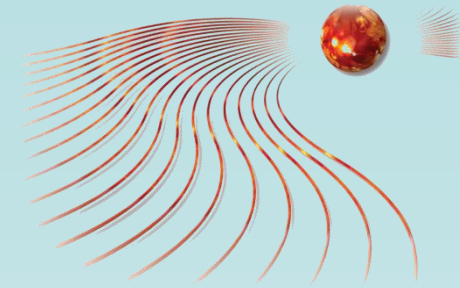
- IO Procurement Portal
 - More than 1000 companies registered as of to date,
 - Re-configuration of the IO Portal in order to develop further the information communicated to Industry on:
 - On-going calls/Forthcoming calls with a 3-Year visibility on significant contracts,
 - Working Instructions,
 - Visas and relocation supports, etc...



Outline

1. ITER Project Procurement Key Principles
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2. IO Forthcoming Call for Tenders



Project Engineering and Integration

System Engineering Support (Call for nomination launched)

The purpose of this framework contract is to support IO Directorates for the development and implementation of the System Engineering Management Plan (SEMP) within the ITER Project.

The SEMP gives the collection of technical and management processes, responding to high level requirements, to be applied for the development of the ITER systems and their integration in the ITER Plant. The development of the SEMP is done according to the project management standards (ISO 15288 & EN9200), and shall be based on demonstrated experience in the nuclear field.

Q4-2013

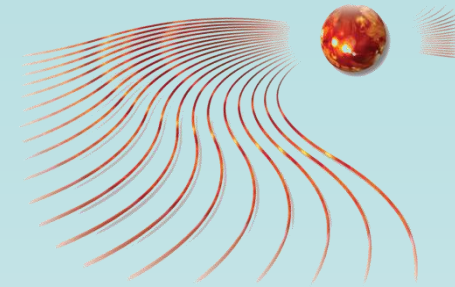
Design for In-Vessel Test facility

Design, procurement/manufacturing and commissioning of the facility for testing all in-vessel components - Mechanical, vacuum and cryogenic experience is required.

Q3-2015

Note: This information is indicative

2. IO Forthcoming Call for Tenders



Magnets (1/2)

Supply Contract for Quench Detectors

To provide electronics in order to perform quench detection system for magnet systems, including bus bars and current leads.

Q1-2014

Supply Contract for Current Leads Heater and related power supplies

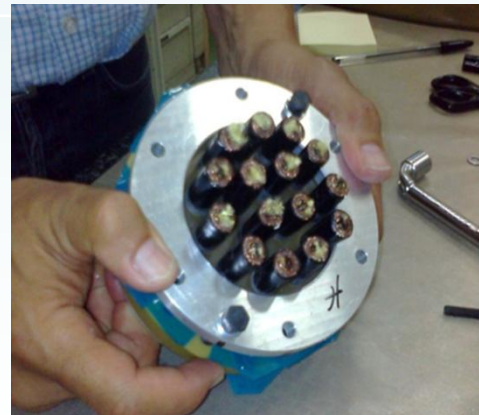
To provide heating elements and related power supplies for temperature regulation on current leads, including dedicated sensors at high voltage.

Q1-2014

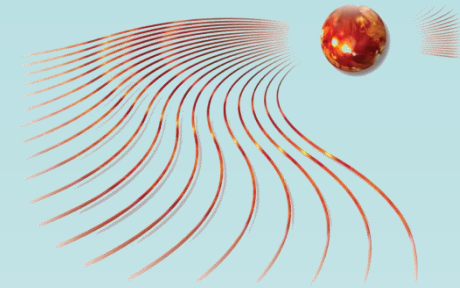
Supply Contract for high voltage plugs

To provide High Voltage Plugs at the level of the vacuum barrier supporting the HV cables

Q3-2014



2. IO Forthcoming Call for Tenders



Magnets (2/2)

Low Voltage Cables Links connectors for the Cryostat

To provide multi-wire low voltage cables and connectors which will be installed inside the cryostat and feeders. These cables connect patch panels to plugs, or vice-versa, and plugs to feedthroughs, they include special cold connectors.

Q2-2014

Design and Supply contract for Fuses

To provide Cryogenic and RT fuses to protect the instrumentation wires

Q1-2014

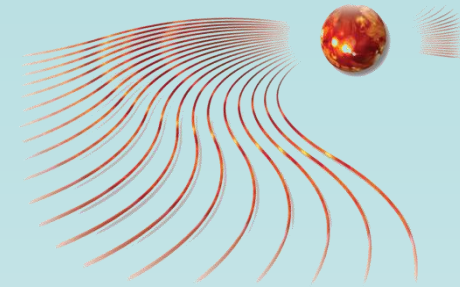
Supply of High Voltage Connectors

To provide high voltage connectors to be installed on the input patch panels of the cubicles, therefore being the termination of the warm cable routed from the HV feedthroughs to the cubicles containing the quench detector electronics

Q2-2015

Note: This information is indicative

2. IO Forthcoming Call for Tenders



Vacuum Vessel

Manufacturing and testing of the In-Vessel Coil

Detailed manufacturing design, fabrication and testing of the In-Vessel Coils, including conductor procurement, manufacture of the ELM and Vertical Stabilization coils and in-factory acceptance tests. This procurement will be split into multiple contracts, at least one for conductors and one for coil manufacturing and assembly.

Q1-2014

Additional Neutron Shielding supply

Procurement and assembly of the Additional Neutron Shielding, which consists of about 1,000 shielding blocks to be attached to the VV thermal shields, including attachment systems

Q2-2014

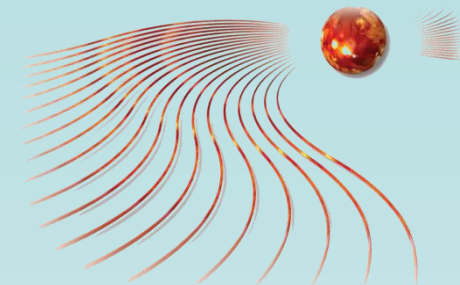
VVPSS Condensation Study

VVPSS Condensation Study to set-up of a test facility for sub-scale or full-scale demonstration of the condensation capabilities of the pressure suppression system spargers and to validate the analytical simulations, in order to meet the French Regulator requirements

Q4-2013

Note: This information is indicative

2. IO Forthcoming Call for Tenders



Plasma Operations

Demonstration of remote maintenance operations

This item concerns the demonstration of the RH replacement operations needed for refurbishing the TBM Port Plug with two new TBM-Sets to be made in the Hot Cell (red zone). Such operations involve the replacement of the metal gaskets that are used for ensuring the leak tightness of the joining between the TBM-Sets and the frame.

It is expected to have several steps for these activities.

Q4-2014

Maintenance Tools & Equipment for Port Cell

This item concerns the demonstration of all the maintenance operations (either hands-on or RH-assisted) needed for replacing the Pipe Forests in the TBM Port Cells using the appropriate maintenance tools & equipment as developed by the IO study (typically exiting tools with modified characteristics). Such operations involve the cutting and welding of pipes made with a robotic arm and several hands-on operation needed to position the maintenance tools in the correct locations.

Q4-2014

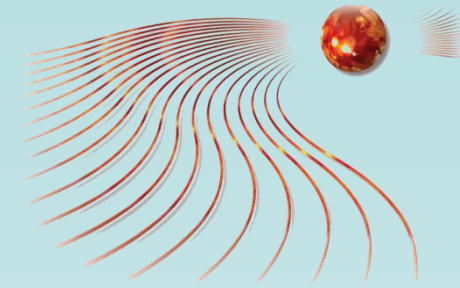
Integrated Modelling

To support and develop the ITER Integrated Modelling & Analysis Suite (IMAS), including the provision of documentation and training. To package IMAS for qualification and validation within the ITER Member's domestic fusion programmes, and to extend the physics capabilities in support of a modular Plasma Simulator that that can be used in conjunction with the Plasma Control System Simulation Platform.

Q1-2014

Note: This information is indicative

2. IO Forthcoming Call for Tenders



Control Systems (1/2)

CODAC Core System, Phase 2 . Framework Contract.

Continuation of the development, maintenance and user support of CODAC Core System, the EPICS based framework software used by all plant systems. Good knowledge of Linux, EPICS, device drivers, communication software, real-time software, Java and Eclipse are required as well as user support.

Q2-2015

CODAC Network Infrastructure Supply.

Supply of all passive network infrastructure components such as fibre optic cables, copper cables, network cubicles and patch panels for the whole ITER site. It does not include any active components such as switches. Good knowledge of large IT network infrastructure is required.

Q3-2014

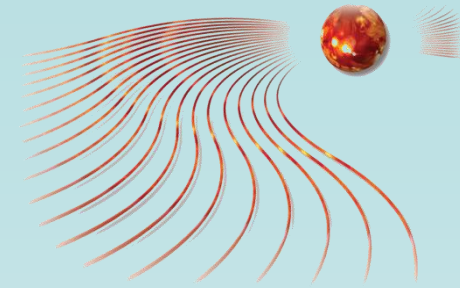
Integration and Control Integration Support

This contract provides support for integration, testing and acceptance of plant systems arriving at ITER site. A total of 206 such systems delivered by 89 procurement arrangements with Domestic Agencies are expected. Good knowledge of instrumentation and control, ITER standards, site acceptance test methodologies as well as trouble shooting and problem solving skills are required.

Q2-2015

Note: This information is indicative

2. IO Forthcoming Call for Tenders



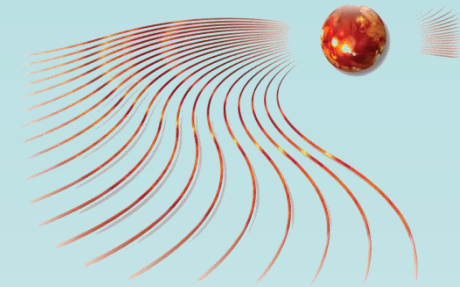
Control Systems (2/2)

<p>Central Safety System for Occupational Safety Final Design & Supply Final design and supply of the central occupational safety system instrumentation system (CSS-OS). This system allows central monitoring and coordination of all occupational safety functions on the ITER site. Good knowledge of personnel safety systems and associated standards and norms are required.</p>	Q2-2014
<p>Instrumentation and Control (I&C) Database support, Framework Contract. Continuation of the development and maintenance of the plant system profile database and its interfaces. This database captures all design and configuration data for plant system I&C and interfaces to other design and project management databases of the ITER project. Good knowledge of relational databases such as MS SQL, postgresQL, MySQL or Oracle is required as well as SQL and Java programming language.</p>	Q1-2014
<p>Central Safety System Support, Framework Contract. To support the final design and implementation of the central nuclear and the central occupational safety systems. The contractor shall support IO staff in the execution of the supply contracts. Good knowledge of nuclear and occupational safety standards, functional analysis, qualifications and project management are required.</p>	Q2-2014

Note: This information is indicative

2. IO Forthcoming Call for Tenders

Heating and Current Drive



Framework contract for Technical support in Electron Cyclotron (EC) system installation.

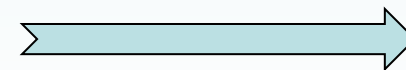
This contract is to get the support of technical expertise capable of installing the EC Transmission Line launcher components. The services will rely on an accumulated experience in installation of high vacuum equipment, precision alignment, high power microwave systems, high voltage power supplies, and commissioning of said systems.

Q2-2015

Contract for prototype and test IC High Voltage Power Supply.

Design and manufacture a pair of High Voltage Power Supply especially designed to feed any of the IC RF sources.

Q1-2014

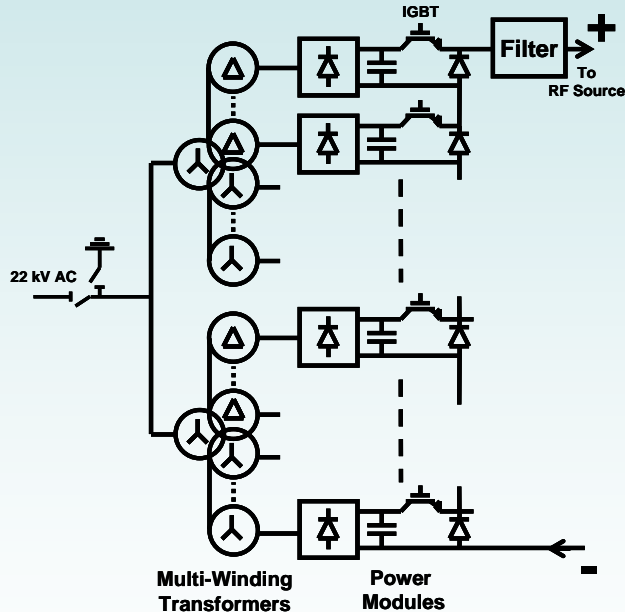


Note: This information is indicative

2. IO Forthcoming Call for Tenders

Procurement of High Voltage Power Supply for IC RF sources test

- Procurement of specific HVPS for RF source on-site acceptance testing. Contract to be launched in 2014.
- 3MW ; 15kV/20A and 30kV/170A outputs.
- Compatible with long cable connection to any of the RF sources.



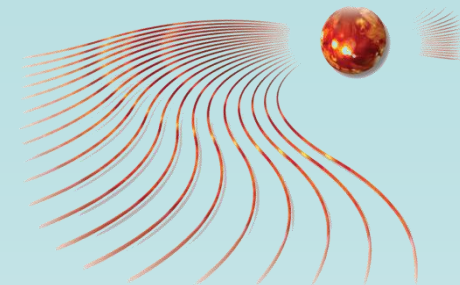
PSM system Reference design: in-series connected small power modules



Transformer Modules Filter

Similar, lower power HVPS

2. IO Forthcoming Call for Tenders



Diagnostics (1/2)

Engineering Framework contract for Diagnostics Optical consultancy.

Technical expertise on development analysis of optical design, advise, manufacturing, testing (mock up and prototype) of components and assembly of optical systems. Mainly in Visible and Infra red part of the spectrum. Nuclear environment.

Q1-2014

Engineering Framework contract for Diagnostics Remote Handling.

Technical expertise to design and specify solutions that can be remote handle-able. Design for mechanical structures interfaces of Diagnostics components with remote handling. Nuclear environment with safety relevant components.

Q1-2014

Engineering Framework contract for Diagnostics general engineering.

General engineering support for Diagnostics engineering design, integration, assembly and testing. Concerns mechanical engineering, integration engineering, sytems analysis and engineering analysis.

Q1-2014

Engineering Framework contract for First Wall manufacture.

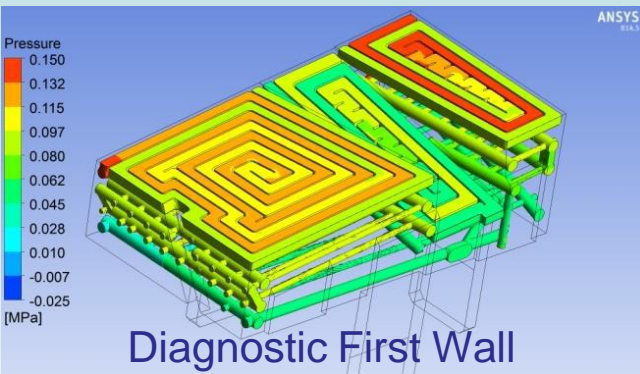
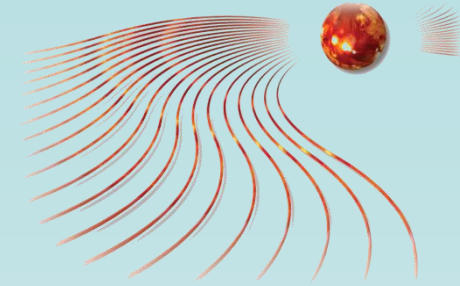
To design, manufacture, test and deliver all the Diagnostics First Wall modules for ITER. Nuclear components.

Q1-2015

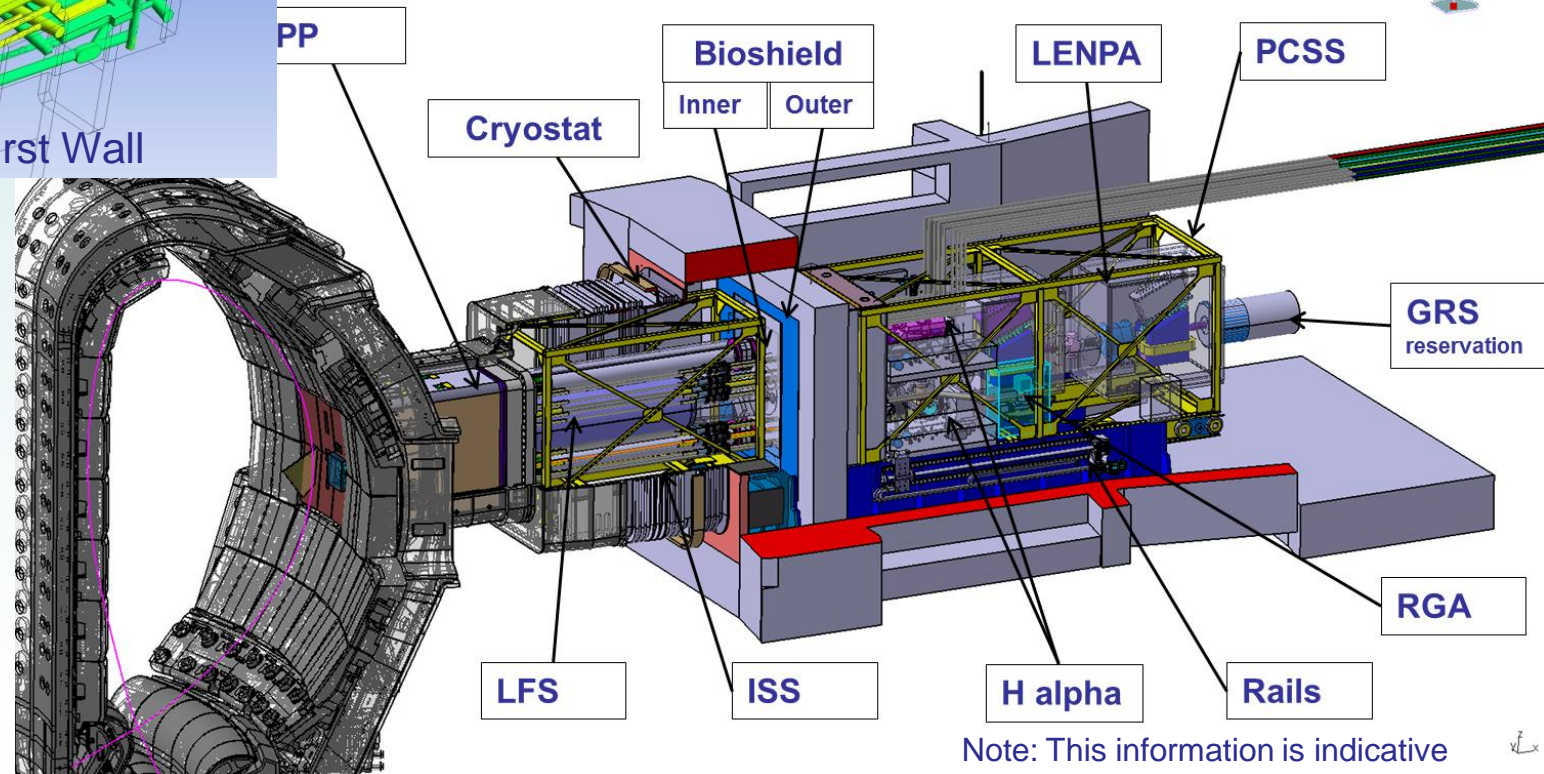
Note: This information is indicative

2. IO Forthcoming Call for Tenders

Diagnostics (2/2)

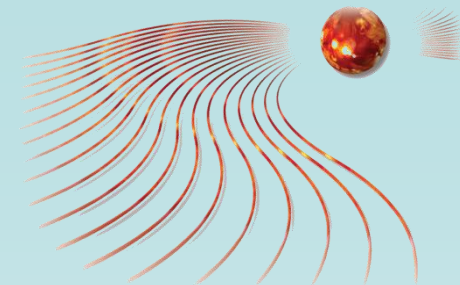


EP#11 general overview



Note: This information is indicative

2. IO Forthcoming Call for Tenders



Tritium Plant System (1/2)

Tritium Plant Control System Tools

Service contract requiring expertise in nuclear process control and deliver templates to organise control for each Tritium Plant System.

Q2-2014

Analytical System Preliminary Design

Expertise in Tritium and gas analysis required for designing Analytical System (ANS).

Q2-2014

Tokamak Complex-Detritionation System - Final

Design/Fabrication/Delivery/Installation

Several Contracts related to Professional Engineering Services, Scrubber Column, Balance of System, Instrumentation and Control, and Installation.

Q2-2015

Detritiation System Qualification Test (component testing is separate)

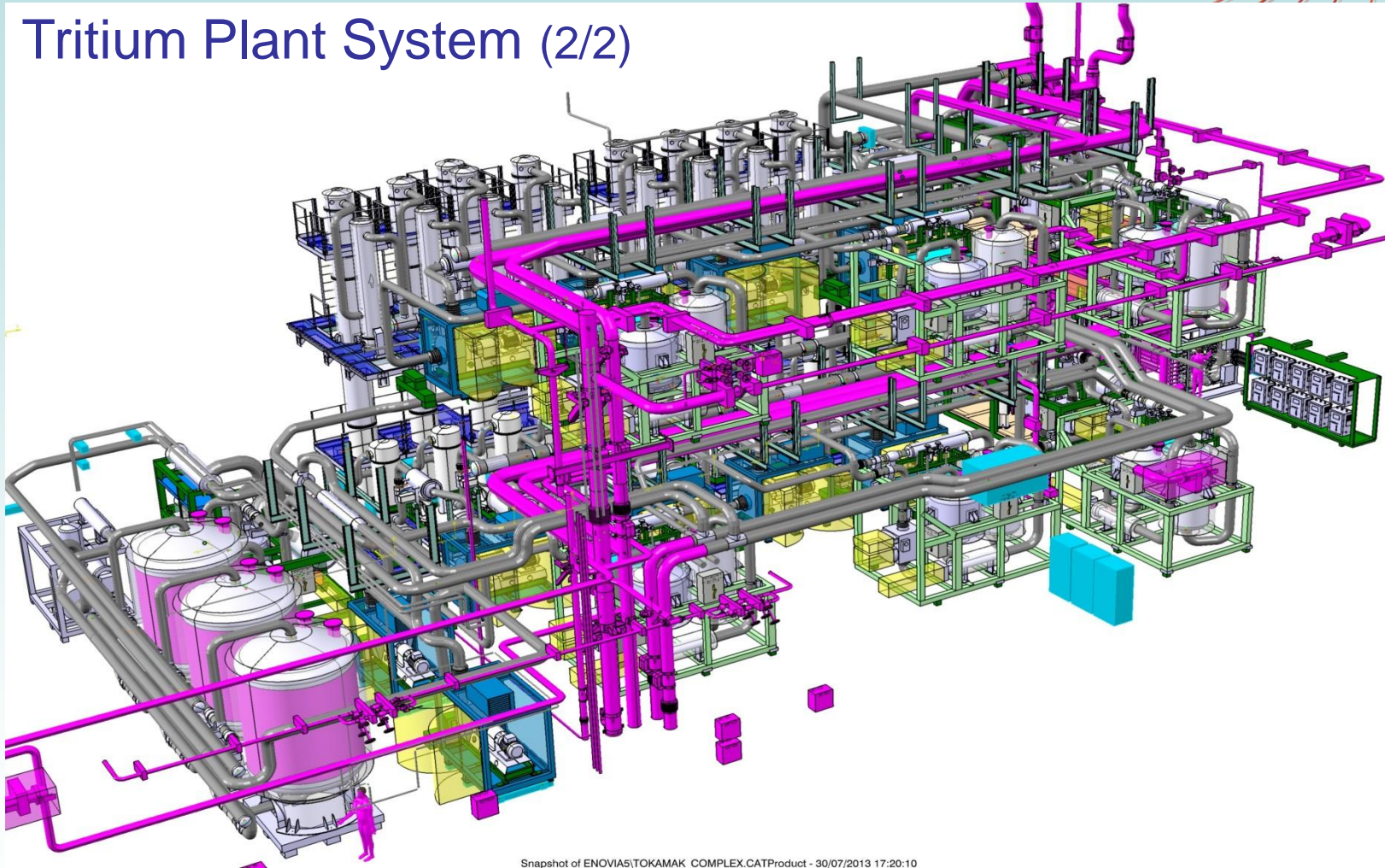
Contract to ensure that the Detritiation System design complies with nuclear safety requirements.

Q2-2015

Note: This information is indicative

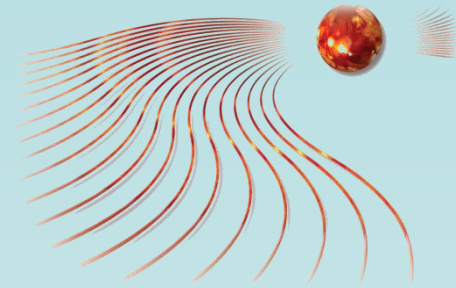
2. IO Forthcoming Call for Tenders

Tritium Plant System (2/2)



Snapshot of ENOVIA5/TOKAMAK COMPLEX.CATProduct - 30/07/2013 17:20:10

2. IO Forthcoming Call for Tenders



Cryogenic System (1/2)

Master Controller support

Programmers to implement the mater control of the cryogenic system as well as the operator interface; framework contract

Q1-2014

Cryogenic fluids supply

Supply of Cryogenic fluids (Helium, Nitrogen) for the test, commissioning and operation of components and systems of the ITER machine up to 2019

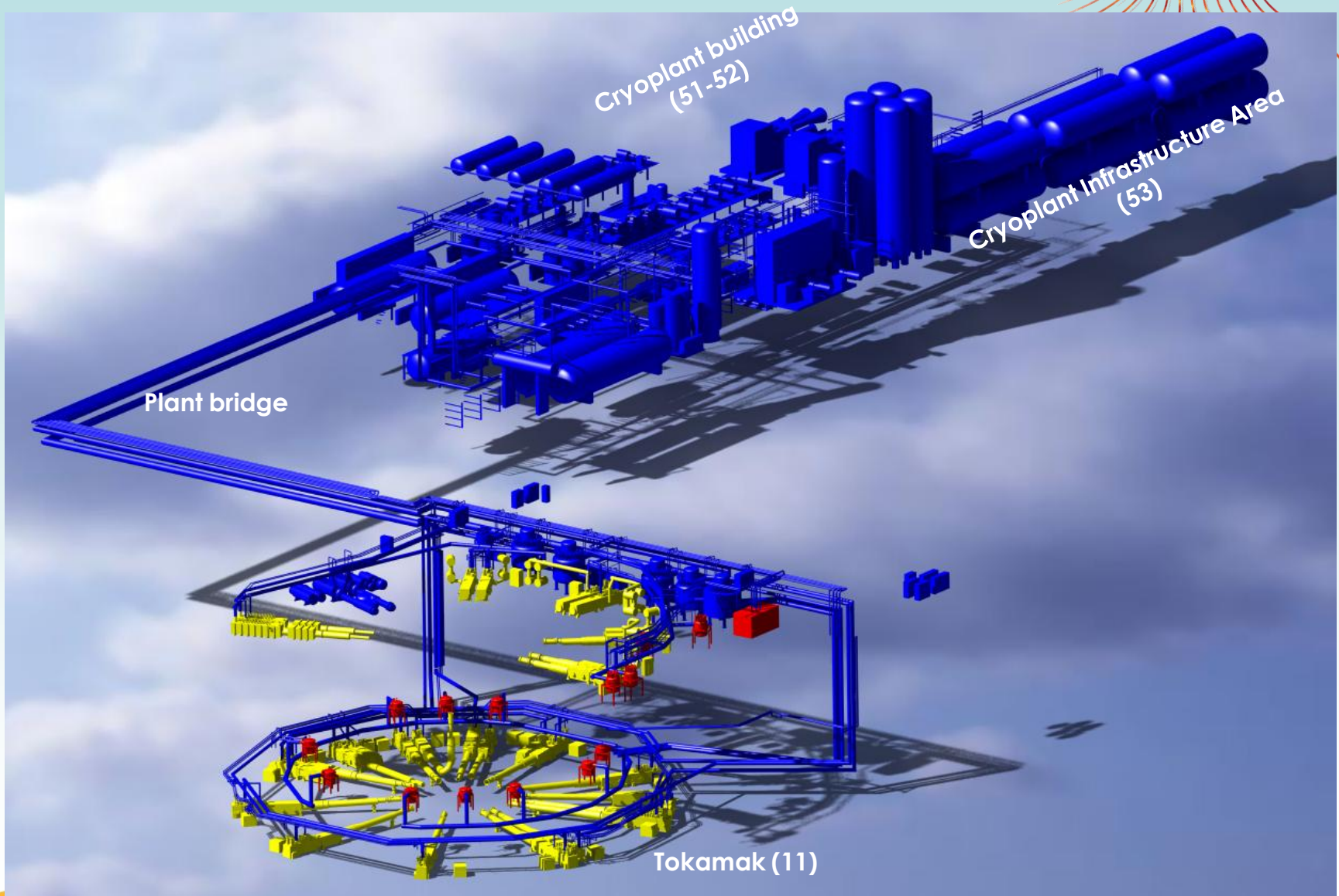
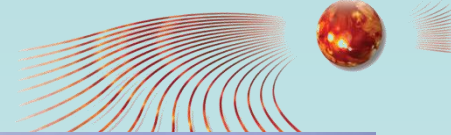
Q1-2015

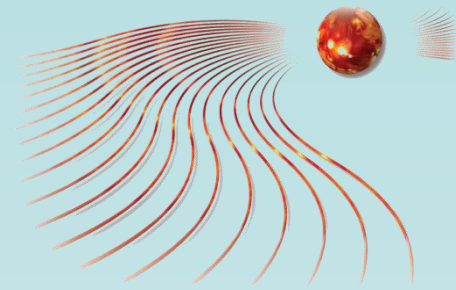
Cryogenic System – Cooling Capacities

- LHe Cryoplant: avg. 75 kW equivalent @ 4.5 K
 - Cooling of the superconducting magnet system, HTS current leads
 - Cooling of cryo-pumps with high regeneration frequency and small users
- LN2 Cryoplant: 1300 kW @ 80 K
 - Thermal shielding, LHe Cryoplant pre-cooling
- Helium inventory: 27 t

Note: This information is indicative

The ITER Cryogenic System (2/2)

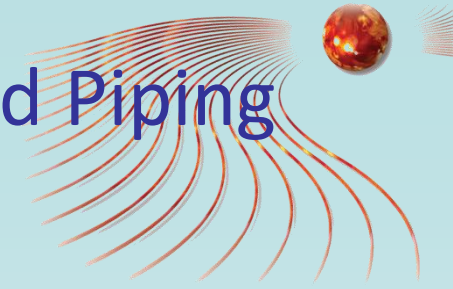




Outline

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3. Cooling Water Systems and Centralized Piping



Cooling Water Systems

- Transfer of procurement responsibility from the US-DA to the IO
- Final Approval at IC-13

Completion of the Final Design for Tokamak Cooling Water System (Call For Nomination launched)

The purpose of this Contract is the Completion of the Final Design for TCWS including the Tokamak Cooling Water System (TCWS), the Component Cooling Water System (CCWS), the Chilled Water System (CHWS), and the Heat Rejection System (HRS). The TCWS is designed to reject all the heat generated in the plasma and transmitted to the in-vessel components to the intermediate closed loop Component Cooling Water System (CCWS-1) and then to the environment via the open Heat Rejection System (HRS).

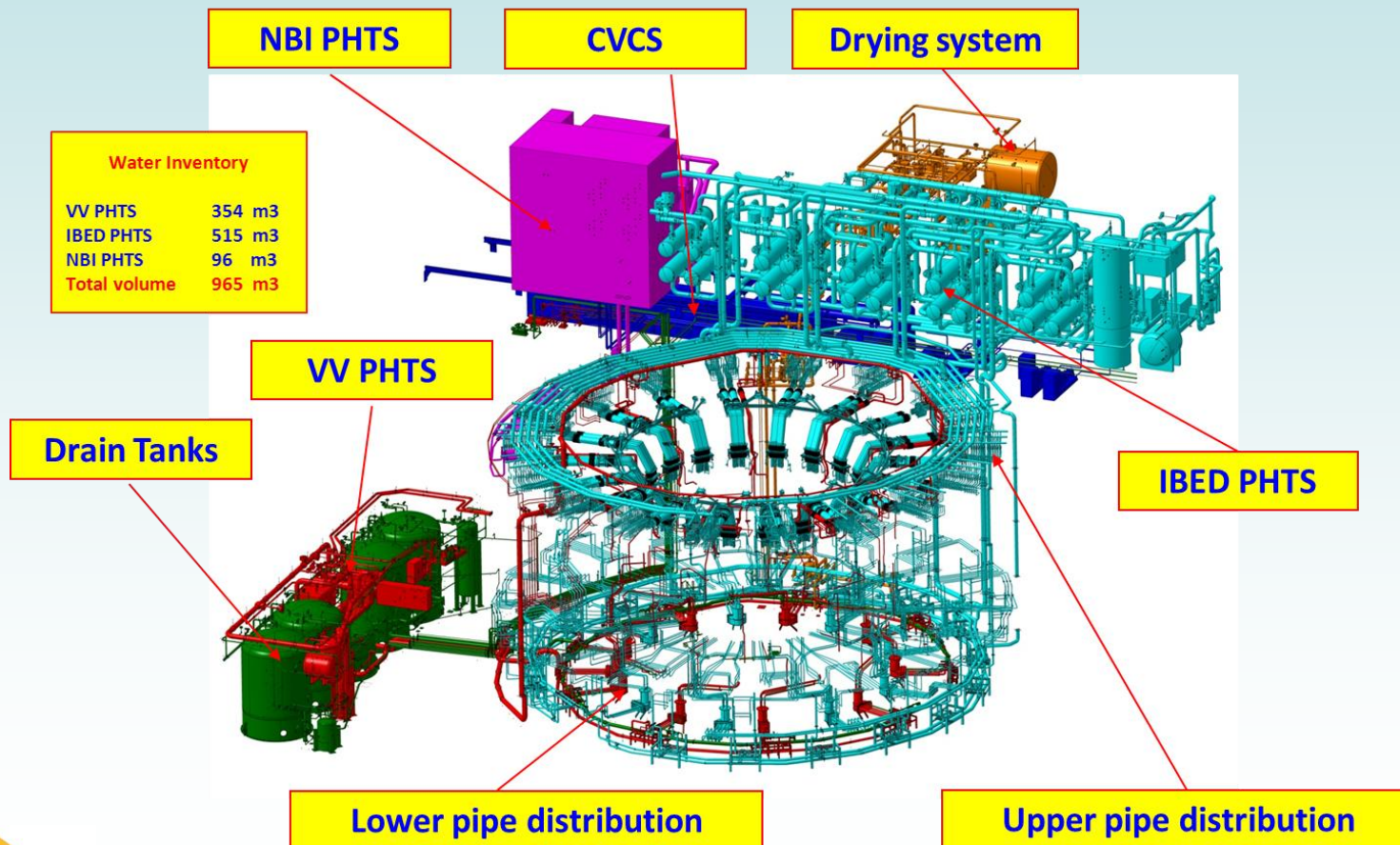
Q4-2013

Note: This information is indicative

3. Cooling Water Systems and Centralized Piping

Cooling Water Systems

TCWS in Tokamak complex



3. Cooling Water Systems and Centralized Piping

Centralized Procurement and Preassembly Piping Systems

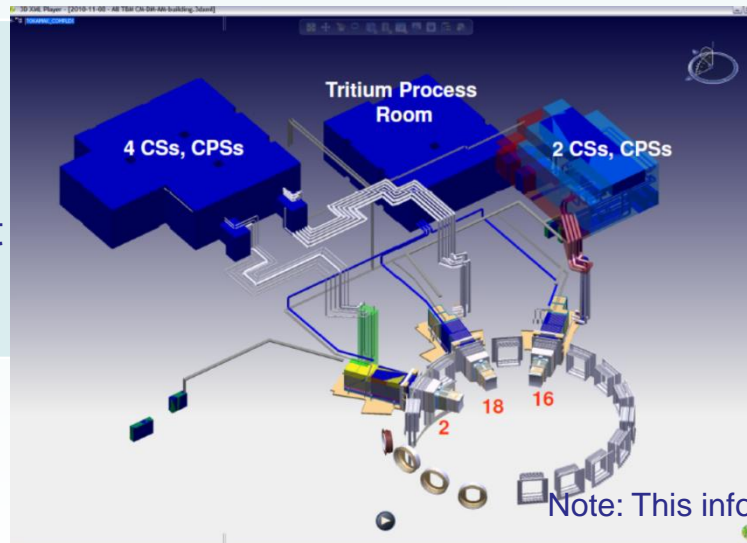
Cooling Water Systems

Part 1: The purpose of this Contract is the Centralized Procurement and Preassembly of Piping Systems for ITER. The major ITER piping system is the Cooling Water System (CWS). The ITER Cooling Water System (CWS) consists of the Tokamak Cooling Water System (TCWS), the Component Cooling Water System (CCWS), the Chilled Water System (CHWS), and the Heat Rejection System (HRS)

Q4-2013

Test Blanket Modules Piping (Transfer of Responsibility From all DAs involved to the IO)

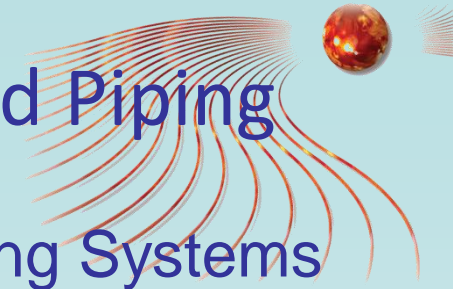
Part 2: The purpose of this Contract is the piping required for the Test Blanket Modules (TBMs).



Q4-2013

Note: This information is indicative

3. Cooling Water Systems and Centralized Piping



Centralized Procurement and Preassembly Piping Systems

Vacuum System pipework preassembly fabrication

Part 3: To provide and preassemble the Vacuum System pipework. ITER will have one of the world largest and most complex vacuum systems composed of the several subsystems. A network of vacuum pipework of approximately 6kms length is designed to interconnect between vessels, vacuum pumps and vacuum services. The pipework is all stainless steel (304L) schedule 10 or 20 and of size DN25 to DN300. Due to the pipework servicing ultra high vacuum systems, confining radioactivity, transporting hydrogen isotopes, and being critical for the ITER machine operability high quality, cleanliness and integrity requirements are required in all stages of production.

Q4-2013

Atmosphere Detritiation System

Part 4: To provide pipework preassembly fabrication for the Detritiation System (DS). ITER safety system includes the largest and most complex atmosphere detritiation system yet to be built. It consists of piping networks for Tokamak Complex and Hot Cell Facility. DS has a total pipework length of about 11.4 kms and includes about 340 of valve spools distributed throughout the Tokamak Complex and Hot Cell Facility.

Q4-2013

Note: This information is indicative

3. Cooling Water Systems and Centralized Piping

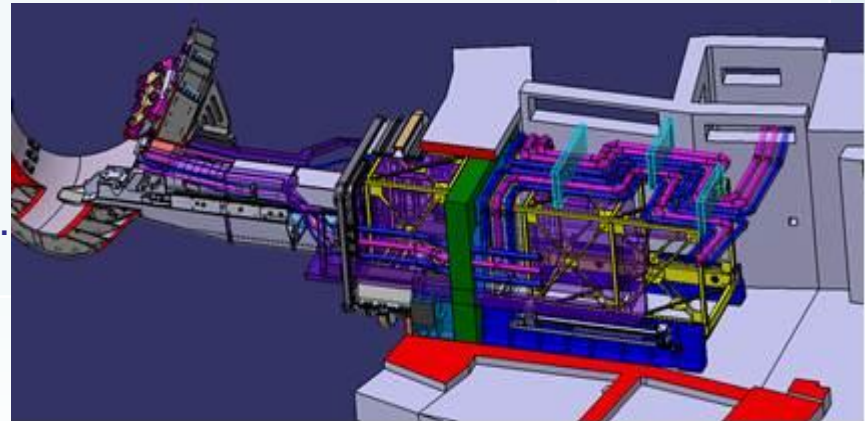
Centralized Procurement and Preassembly Piping Systems

Diagnostic Systems Piping

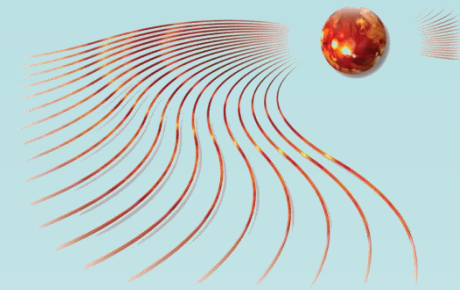
Part 5: To provide and assemble the piping required for the Diagnostic Systems that are required to ensure the operation of ITER throughout all campaigns and will be installed in multiple locations. In particular, many diagnostic systems will be installed in the Upper (10), Equatorial (8) and Lower (3) ports. It is also likely that several diagnostics may be allocated in 4 Upper ports above NB Cell. The assembled port plugs and diagnostic racks

in the Lower ports themselves, as well as several diagnostics inside port plugs, will require active cooling during operation and will have to be baked before operation.

Q4-2013



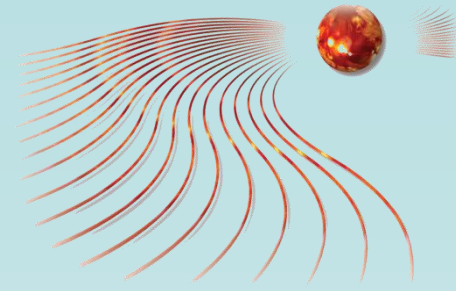
Details of Piping network in the typical Diagnostic Lower port.
Note: This information is indicative



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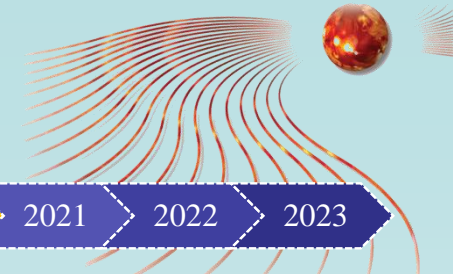
4. Integrating the Machine



Assembly Scope – ITER Organization

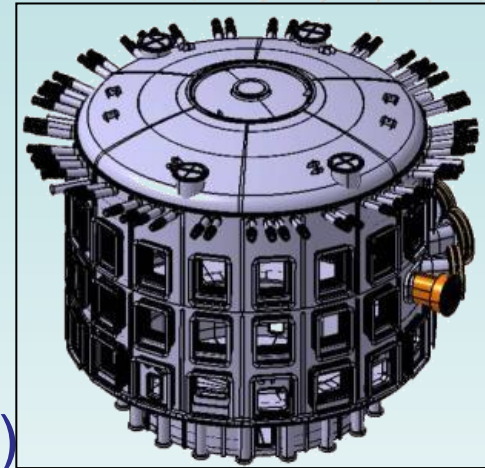
- Construction Management
- Machine Assembly
 - Mechanical, structural steel
- Tools
 - Lifting, handling, standard tools, welding, access equipment
- Piping installation
 - Nuclear and non-nuclear cooling water systems
 - Vacuum piping
 - Site networks, buried pipes
- Cryogenic Plants – Liquid Helium
- CODAC, Central Interlock and Safety Systems
- Electrical, High Voltage, cabling

Phased Assembly Strategy – Phase 1

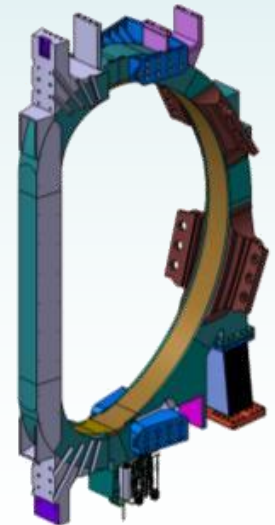
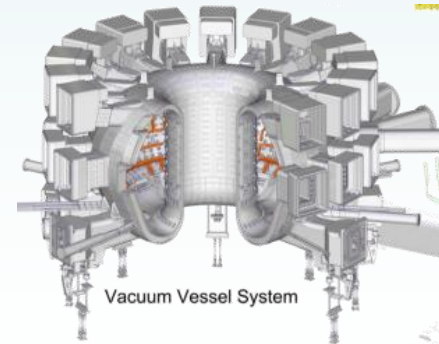
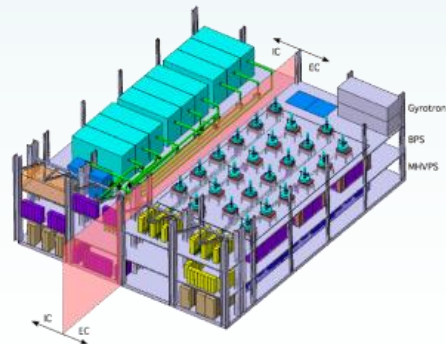


2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

- Cryogenic, cooling water & electrical plant
- Vacuum Vessel, Cryostat, Thermal Shield
- Superconducting magnets
- In-vessel magnetic control coils
- Diagnostics (many systems or components)
- Limited Electron Cyclotron (EC) heating
- Large “captured components” in buildings



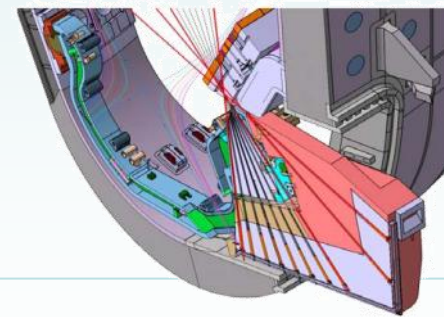
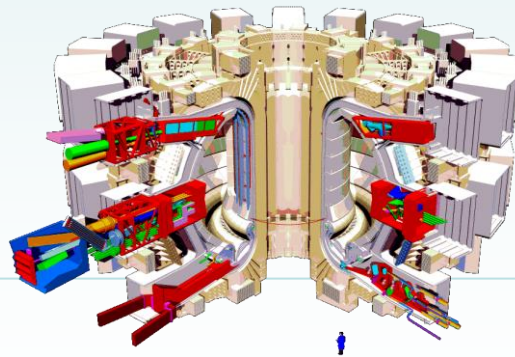
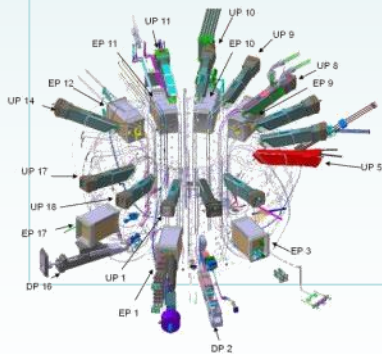
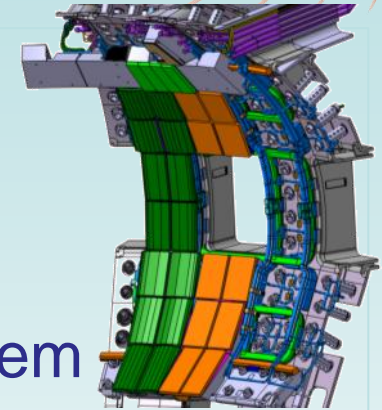
- ***Now to 2020***



Phased Assembly Strategy – Phase 2

2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

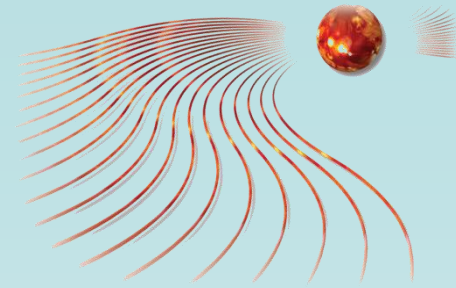
- In-vessel components: blanket, divertor
- Remaining diagnostics
- Remaining Heating (IC and Neutral Beam)
- Pellet Injection & Disruption Mitigation System
- Tritium Plant to be installed and commissioning leading up to pre-nuclear shutdown



4. Integrating the Machine

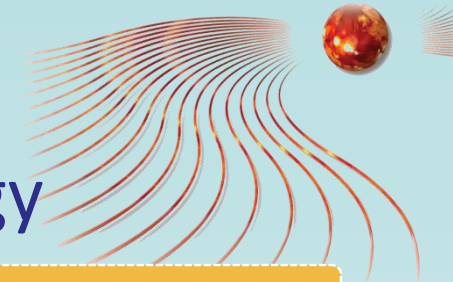
Construction Management Highlight

- ITER site is split into geographic areas:
 - Groups of work with common scope
 - Each group represents a construction project:
 1. Machine sub-assembly and main assembly
 2. Tokamak Building Plant
 3. Tokamak Complex Buildings
 4. Cryoplant and Cooling Water
 5. Power supply buildings
 6. Site works

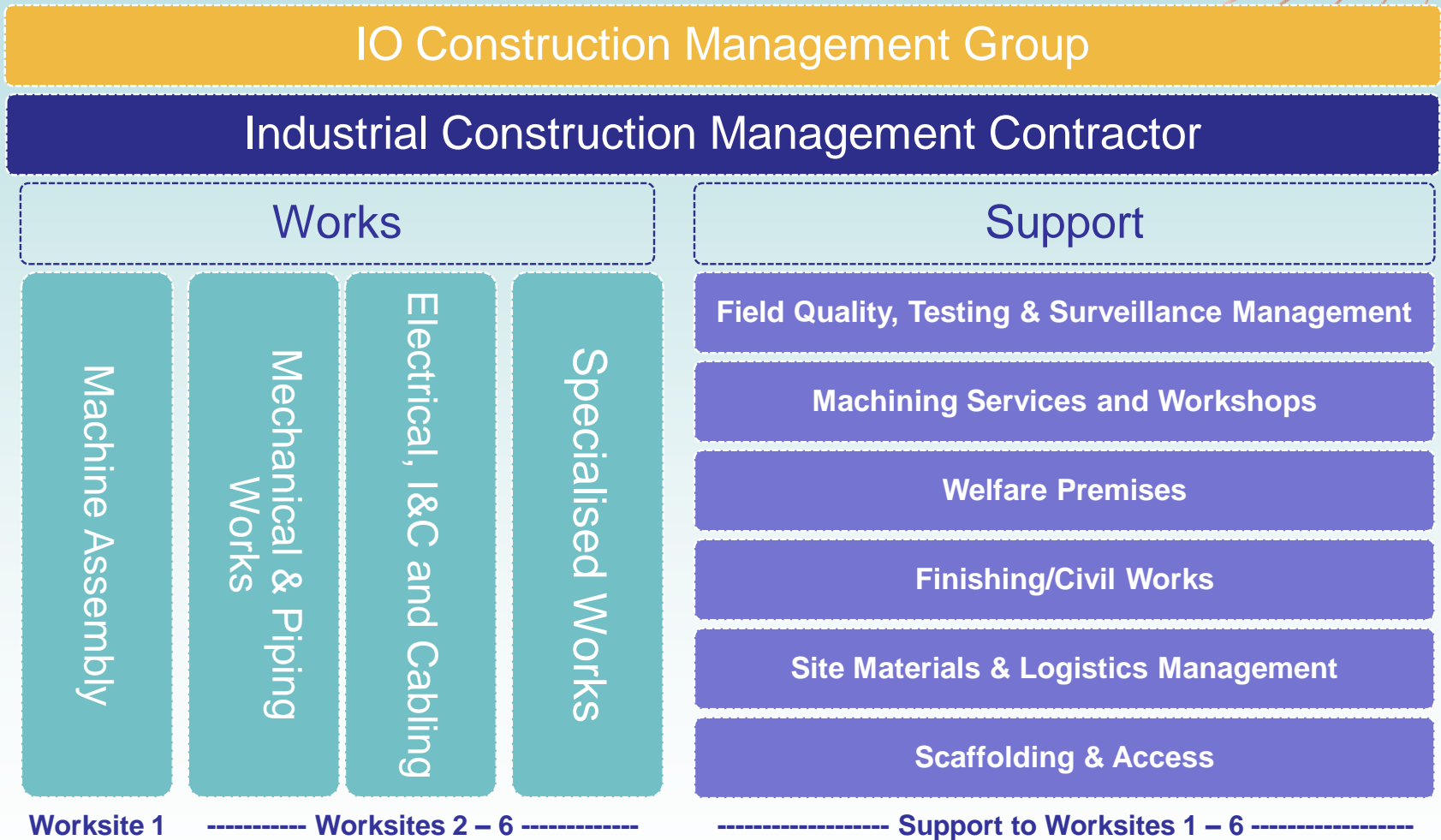


Note: This information is indicative

4. Integrating the Machine

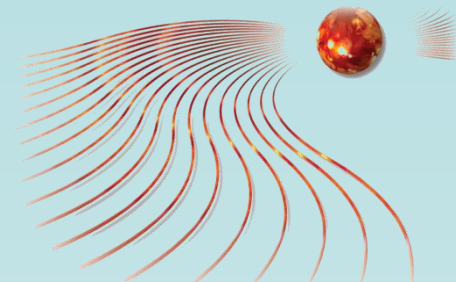


Overall Assembly Contract Strategy



Note: This information is indicative

4. Integrating the Machine



Assembly and Operations

Supply Contract: Metrology Laboratory

Design and construction of pre-fabricated modular structure to house metrology equipment and workspaces, to be installed inside Assembly Building.

Q2 2014

Supply Contract: Metrology Laboratory Equipment

Supply of standard metrology equipment including laser scanners, photogrammetry and other measurement equipment.

Q3-2014

Supply Contract: Vacuum Vessel access and ventilation System

Design and supply of a personnel access and ventilation system for the vacuum vessel. Experience with such facilities for confined spaces and atmospheric control of beryllium will be required.

Q3-2015

Supply Contract: Standard Tools and Equipment

Framework contract for procurement and rental of common, off-the-shelf construction tools and equipment, access equipment, lifting equipment, personal protection equipment

Q3-2014

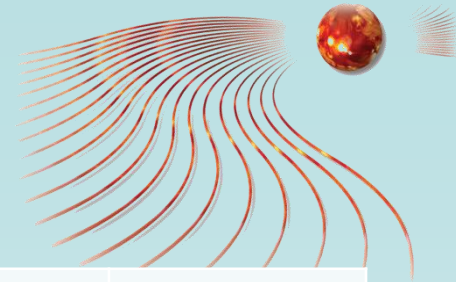
Supply Contract: Purpose built tools, equipment & platforms

Framework contract for the design and supply of the purpose built tools including heavy lifting beams, personnel access platforms, specific installation tools, transport trolleys and equipment.

Q2-2014

Note: This information is indicative

4. Integrating the Machine

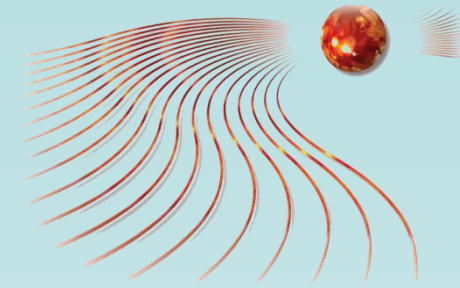


Assembly and Operations

Services: Engineering support for maintenance and Remote handling Framework contract for engineering support to the analysis, design, manufacture and operation of remote handling and hands on maintenance equipment, associated software and tools. Experience in maintenance of nuclear systems is required.	Q1-2014
Services: Construction Management support framework To support the preparation, planning, coordination and supervision of plant and tokamak assembly and installation works on the ITER site. Requires expertise in the construction of large scale nuclear facilities.	Q3-2014
Works: Mechanical & Piping Framework contract to execute site erection works of mechanical, process and piping systems, including vacuum, cooling water, tritium processing systems and associated mechanical structures. Experience in nuclear systems will be required.	Q3-2014
Works: Machine Assembly Framework contract to execute assembly works for the ITER tokamak, including large scale mechanical assembly works and installation of related cooling water and vacuum piping, specialised cabling and sensor systems, including related lifting and handling. Experience in construction of nuclear plant will be required.	Q3-2014
Works: Electrical, Instrumentation and Control, and Cabling Framework contract to execute site installation works of electrical, instrumentation & control systems and cabling. Experience in nuclear systems will be required.	Q3-2014

Note: This information is indicative

4. Integrating the Machine



Assembly and Operations

Works: Finishing/Civil Works

Framework contract to execute civil and finishing works required during assembly and installation of installation of plant, including concrete closure of temporary openings, sealing of penetrations, back-filling, painting and repairs. Experience of concrete works in nuclear buildings will be required.

Q3-2014

Services: Site Materials & Logistics

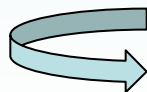
Contract to provide construction site materials management and logistics support including warehouse management, good inwards, site transport and handling.

Q3-2014

Scaffolding & Access Equipment

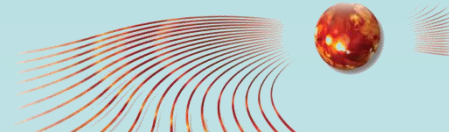
Framework contract for the services and supply of scaffolding and access equipment, including design, erection, alteration, dismantling of scaffolding, mobile towers, powered access equipment, podium platforms, pop-up platforms and safety netting. Experience in relevant safety legislation will be required.

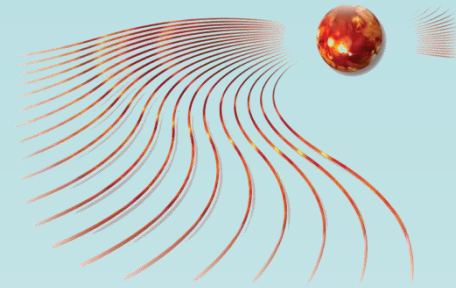
Q3-2014



More on the IO Procurement Portal

Note: This information is indicative





Thank you for your attention