ITER ORGANIZATION
2012 Annual Report

> By pooling the knowledge of fusion scientists from all over the world we are making an investment in our common energy future.

ITER construction is on the move. The last seismic pad was installed in 2012, ending 18 months of construction on the ground support structure and seismic foundations for the Tokamak Complex. ITER's switchyard was connected to the French electrical grid and the Headquarters building was completed.

In factories in China, Europe, India, Japan, Korea, Russia and the United States, manufacturing activities have begun to shift from process qualification to real production. In just two years, the first on-site assembly operations will begin.

ITER became the first nuclear installation in France to be licensed under the stringent requirements of the 2006 French law on Nuclear Transparency and Security as a Basic Nuclear Installation in 2012. It is also the first fusion device to obtain nuclear licensing worldwide.

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iter
china eu india japan korea russia usa

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The year at a glance – 2012

February
- Handover of PF Winding Facility
- Building begins on Neutral Beam Test Facility in Italy

April
- Tokamak Complex Seismic Pit completed

June
- Switchyard in place
- First edition of ITER Robots
- IC-10, Washington, D.C.

September
- Unique ITER Team formed
- Second edition, ITER Games

October
- ITER Headquarters completed
- 1,300 visitors for Open Doors Day

November
- Licensing decree for ITER!
- Concrete pouring begins for Assembly Building
- Two-week Fusion Expo in Aix
- IC-11, ITER Headquarters

December
- 80% Procurement Arrangements signed (in value)
- Staff moves to ITER site
- Consortium chosen to build Tokamak Complex

iter
china eu india japan korea russia usa

“In 2012, ITER became the world’s first fusion device to obtain nuclear licensing following a lengthy and rigorous examination of its safety characteristics by the French nuclear regulator.”

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Left Site survey monuments like these provide the coordinate system for civil engineering works and the positioning of the buildings.

FOREWORD FROM THE CHAIR OF THE ITER COUNCIL

In 2012, ITER became the world's first fusion device to obtain nuclear licensing following a lengthy and rigorous examination of its safety characteristics by the French nuclear regulator. This was excellent news for the ITER Project and all of the people working daily towards its successful realization. This milestone, achieved early in the third year of the project's Construction Phase, allows us to pursue our construction and manufacturing efforts.

Over 80 percent of the work packages that define the ITER scope have now been signed over to the ITER Domestic Agencies. To a very large extent, in addition to southern France where hundreds of people are working to erect the scientific facilities, ITER is also taking shape in factories located in China, Europe, India, Japan, Korea, Russia and the United States.

This new geometry of work sharing and work integration between the central ITER Organization and the seven Domestic Agencies is very challenging from a management and organizational point of view. What we are attempting in ITER has never been done before and its complexity should not be underestimated. But by pooling the knowledge of fusion scientists from all over the world we are making an investment in our common energy future.

Mutual understanding must be central to all project decision-making; in my first year as ITER Council Chair, I was pleased to see the international collaboration for ITER strengthened. Under the leadership of the ITER Director-General, the ITER Organization and the Domestic Agencies now meet regularly as a Unique ITER Team. The bonds that are formed between international colleagues as challenges are solved, one by one, will go a long way to sustaining this project in the years ahead.

The most critical issue we face is the schedule. In order to meet the Baseline schedule, the implementation of proactive and forward-looking measures for recovery actions is now and will continue to be the absolute priority. I am confident that solutions will be found through constructive cooperation.

Those of us who have been involved in the ITER Project since the Conceptual Design Activities phase in the late 1980s can measure the progress that has been accomplished. In only a few years we will be assembling the ITER Tokamak. With you, I look forward to those exciting times.

Dr Hideyuki Takatsu
Chair of the ITER Council

"This new geometry of work sharing and work integration between the central ITER Organization and the seven Domestic Agencies is very challenging from a management and organizational point of view."

Left Work begins in 2012 on the complex reinforcement for the Assembly Building basemat.

FOREWORD FROM THE DIRECTOR GENERAL

The traveller to the ITER site in 2009 wouldn't recognize the platform today. The mountains of earth, deep trenches, first-completed buildings and the fully reinforced Tokamak Pit are all testimony to the forward momentum of the ITER Project and progress accomplished since the first groundbreaking operations in the summer of 2010.

Behind the scenes where our scientists, engineers and project administrators are fully engaged in the Construction Phase of ITER, detailed planning has begun for the assembly, testing and commissioning of the ITER machine. ITER is like a huge international train in motion. It is our job at the ITER Organization and the Domestic Agencies, as one Unique ITER Team, to keep this train on track.

We focused our efforts in 2012 on the implementation of schedule and cost strategies. Our schedule objectives are very ambitious; to meet them we are striving to improve the effectiveness of our management tools. A system is now in place to monitor on a monthly basis the project-wide execution of the schedule and to furnish indicators to project management both to identify areas of concern and to provide criteria for the prioritization of corrective actions. As we move forward under tight cost and schedule constraints, the partnership of the ITER Organization and the Domestic Agencies as the Unique ITER Team will be the key pin of success.

We are pleased to report that a major licensing milestone was achieved in 2012. On 10 November, the ITER Organization was granted the decree in France that authorizes the ITER Basic Nuclear Installation and hence the pursuit of construction activities. Significant progress can also be reported in the advancement of our facilities installation in Saint Paul-lez-Durance, where the Tokamak Complex Seismic Pit and the new ITER Headquarters building were completed, the electrical switchyard established on the southeast end of the platform, and substantial site adaptation works carried out during the reporting period.

Manufacturing activities are now in full swing in the Members' factories, where a shift has been operated from process qualification to actual production. At this stage the ITER Organization has signed 80 percent of project in-kind value over to the Domestic Agencies and their industries. The world will be watching as the first-of-a-kind ITER components begin arriving on site in 2014.

It is our role as a maturing organization to foster young generations in the field of fusion science and technology. As part of the steps taken in this direction, we hosted 30 visiting researchers during the year and concluded cooperation agreements on science and technology issues with six leading institutes and laboratories worldwide, adding to a long list of Memorandums of Understanding already in effect.

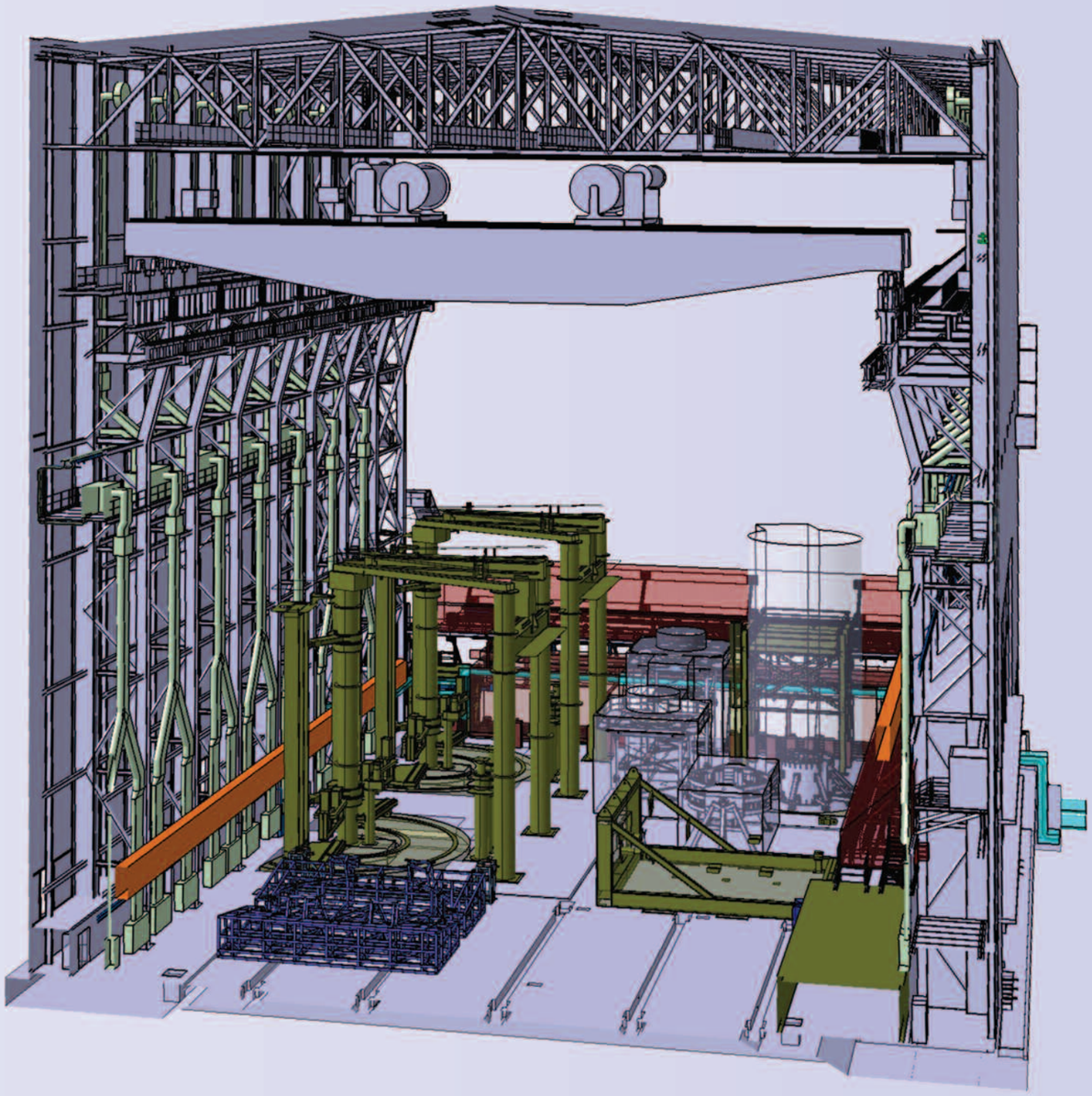
In all of our endeavours, we benefit from the guidance of two subsidiary bodies that report to the ITER Council: the Management Advisory Committee and the Science and Technology Advisory Committee. Their recommendations have kept us on a steady course in the past and we will continue to rely on them in the future.

Whatever our position or job description within the ITER Project, we are all working to shape a better future for our children and our children's children for many generations. We have a large responsibility but, together, I am confident that we can achieve our goals.

Professor Osamu Motojima
Saint Paul-lez-Durance, May 2013

> **The world will be watching as the first-of-a-kind ITER components begin arriving on site in 2014.**

Left Support in the shape of a star for the ITER experimental device: the very device that aims to bring the energy of the stars down to Earth. *Photo: Engage-AP*



EXECUTIVE SUMMARY

“In its fifth full year of activity, the ITER Organization focused on managing design, construction and manufacturing milestones against the project Baseline and on implementing schedule and cost strategies.”

Left The overhead hoists of the Assembly Building will handle loads of up to 1,500 tons during pre-assembly activities for the Tokamak.

EXECUTIVE SUMMARY

ITER construction is on the move. In 2012, Tokamak Complex seismic foundations were completed and a consortium was selected for the construction of the buildings, the ITER Organization was granted the licensing decree in France for the creation of the ITER nuclear installation, and manufacturing activities in Member factories began to shift from process qualification to real production. The momentum is tangible: in just two years, the first on-site assembly operations will begin.

In its fifth full year of activity, the ITER Organization focused on managing design, construction and manufacturing milestones against the project Baseline and on implementing schedule and cost strategies. Coordination, cooperation and communication between the ITER Organization and the Domestic Agencies remain the crux of project success. A new coordination body, the Unique ITER Team, was created in 2012 to respond to the need for ever-closer collaboration.

"The ITER Organization continues to hone and realign its organizational structure for gains in efficiency."

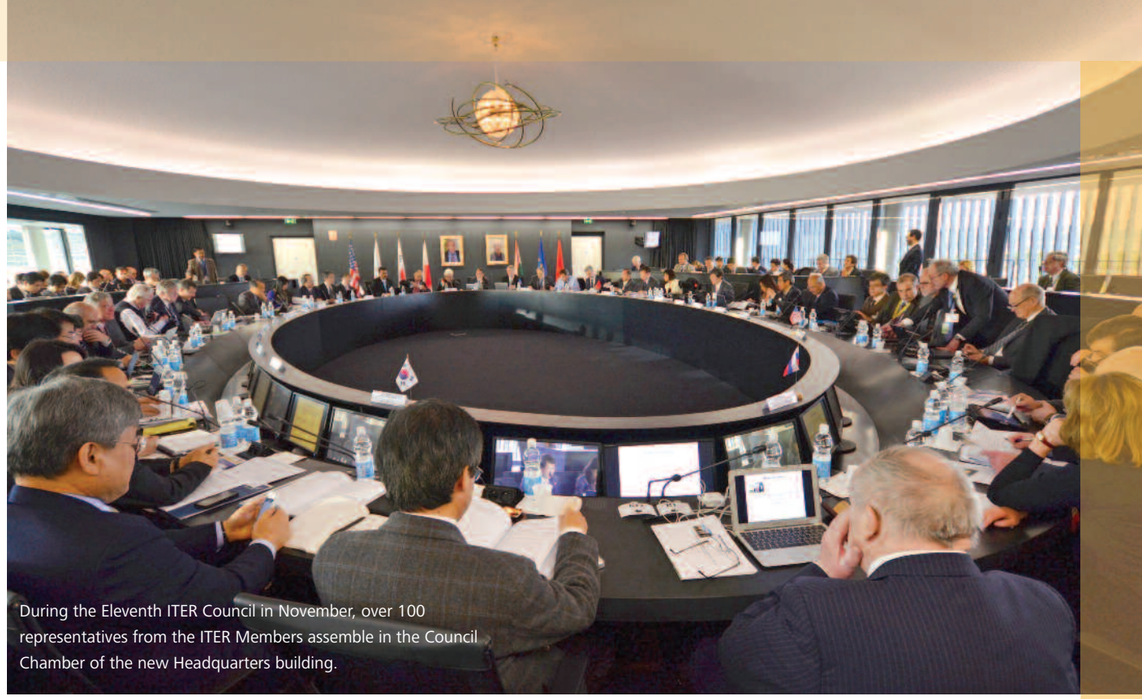
Organization
Tight-knit coordination

As the project evolves and construction activities intensify, the ITER Organization continues to hone and realign its organizational structure for gains in efficiency. In order to strengthen roles and responsibilities in line management, a staffing plan was devised in 2012 that resulted in the creation of new sections, sub-sections and divisions although, overall, the number of divisions was reduced. This reorganization led to the approval by the ITER Council of 65 new positions; recruitment is ongoing through both internal and external competition.

The United States hosted the governing body of the ITER Project for the first time in 2012, organizing the Tenth Meeting of the ITER Council (IC-10) in Washington D.C. from 20-21 June; this was the first meeting for Council Chair Hideyuki Takatsu from Japan. The Eleventh ITER Council (IC-11) took place from 28-29 November in Saint Paul-lez-Durance, France where over 100 representatives from the ITER Members assembled in the Council Chamber of the new Headquarters building. The ITER Council advisory bodies – the Science and Technology Advisory Committee (STAC) and the Management Advisory Committee (MAC) – convened at regular intervals to formulate recommendations to the ITER Council on science, technology and strategic management issues. In August, a special session of the MAC focused on schedule recovery.

To improve collaboration at all working levels between the ITER Organization and the Domestic Agencies, the ITER High Level Coordination Team1 (IHCT) was created as the top decision-making forum for discussion on major project issues and challenges. To further enhance this collaboration, the ITER Organization introduced the Unique ITER Team (UIT) in 2012. By reinforcing the shared ownership of project objectives and by fostering mutual understanding and trust, the UIT aims to create the conditions necessary for more rapid decision-making on critical issues and more efficient decision implementation. The terms of reference and implementation plans for this integrated management approach were endorsed by the ITER Council late in the year. Beginning in 2013, monthly in-person UIT meetings will be organized. Another high-level body, the High-Level Technical Meeting (HTM), was created in 2012 to focus more particularly within the ITER Organization on strategic decision making for technical issues such as design completion and schedule performance.

To promote cooperation on science and technology issues, the ITER Organization concluded Memorandums of Understanding in 2012 with the European Spallation Source, the Max-Planck-Institut für Plasmaphysik (Germany), the Institute for Plasma Research (India), the Ministry of Science and Technology (China), the National Institute for Fusion Science (Japan), and Politecnico di Torino (Italy). Researchers from China, Europe, India, Korea and Russia, 30 in all, also joined ITER for part of the year – this type of exchange enriches the academic atmosphere of the Organization and is concordant with a longer-term objective: that of becoming a scientific and technical Centre of Excellence.



During the Eleventh ITER Council in November, over 100 representatives from the ITER Members assemble in the Council Chamber of the new Headquarters building.

ITER Project Baseline
Tracking schedule milestones

Strong measures were set into place in 2012 to track schedule performance. On the basis of the Strategic Management Plan (SMP) developed last year (a top-level summary defining key milestones) schedule performance was tracked monthly. Detailed Work Schedules (DWS) were completed for nearly all ITER work packages allowing the project team to place emphasis on near-term milestones while also benefiting from a longer-term view. These tools highlighted significant delay in some critical areas; for these, a monthly hit list was introduced to provide management and stakeholders with up-to-date information on schedule performance.

For critical areas potentially affecting the date of First Plasma, specific recovery actions were formulated in close association with the Domestic Agencies. A Schedule Control Task Force introduced in June identified several impediments to schedule performance, including delays in the signature of Procurement Arrangements and contracts, lengthy design review and design change processes, and complex Agreed Notified Body approval procedures for nuclear components. Corrective actions are being closely monitored. The challenge ahead will be to achieve planned milestones while implementing actions to recover delayed milestones.

The ITER Organization continued to work in 2012 within the confines of the ITER Baseline for both schedule and cost. The budget cap for ITER Construction remains unchanged at 4700 kIUA and cost containment activities continue for both the ITER Organization and the Domestic Agencies. The design of the tungsten divertor continued in 2012 as one major cost-saving measure. The final decision on armour material for the non-nuclear phase of ITER – carbon-fibre or tungsten – will be made in late 2013.

The ITER Council made recommendations for the cold testing of toroidal field coils during its June meeting (IC-10). Based on a report submitted by the ITER Organization, and as a risk mitigation measure, Council requested that a common set of specifications be developed for cold testing at 77 K of the first three coils in each series of toroidal field winding packs produced in Europe and Japan.

Below The 20,500-square-metre ITER Headquarters is completed on time in 2012. All ITER staff and contractors are now housed either in Headquarters or in one of two pre-fabricated office buildings on site.

Construction
Seismic foundations in place

The ITER Organization took over full responsibility for the ITER site from Agence ITER France at the beginning of 2012. All staff and contractors were moved from the CEA premises following the finalization and handover in October of the new 20,500-square-metre ITER Headquarters building.

The ground support structure and seismic isolation system for the future Tokamak Complex was completed in April 2012 after 18 months of construction – a reinforced basemat, retaining walls and 493 plinths and seismic bearings now frame the 90 x 130 metre Tokamak Pit. Progress was also made on the nearby site of the Assembly Building where, following some limited excavation, work began on reinforcement and concrete pouring activities. Deep trenches crisscrossed the platform in 2012 as part of work on drainage and critical networks. Development also began on a 3,500 square-metre area with parking areas, modular buildings and storage for building contractors.

The French electricity network RTE completed the four-hectare ITER switchyard and its connection to the 400kV "Boutre-Tavel" power lines. In December, the European Domestic Agency awarded the contract for the civil works of the Tokamak Complex and adjacent structures – building works will get underway in 2013 after the completion of the Tokamak Complex basemat (B2). The Logistics Service Provider for the transport, logistics and insurance of ITER components was selected in 2012. The first practice runs on the ITER Itinerary are planned in 2013 to test physical dimensions and logistics.

In 2012, modifications were made to the design of the cryostat support system. The new support system – a concrete crown – offers advantages from a mounting and constructability point of view as well as from a global structural capacity perspective.

"The ground support structure and seismic isolation system for the future Tokamak Complex was completed in April after 18 months of construction."

Licensing
Green light for ITER

The ITER Organization was granted the official licensing decree in France for the creation of the ITER nuclear installation on 10 November 2012, clearing the way for the pursuit of construction. This is a major licensing step that results from years of procedure and organization-wide effort; the ITER Project now occupies a place in history as the first fusion installation to obtain nuclear licensing worldwide. As part of its obligations, the ITER Organization completed a complementary nuclear safety stress report requested by the French nuclear authorities.

The Nuclear Safety Authority in France (ASN) carried out multiple on-site inspections during the year; as a result of issues raised during one of these visits, the procedure for non-conformance reports was revised. Exemption was requested from French regulations on pressure equipment (ESPN regulation) for the neutral beam injector, the blanket and the ion cyclotron resonance heater. The ITER Organization has also requested compensatory measures relative to In-Service Inspections (the monitoring of ESPN component performance during the lifetime of the machine).

Procurement Arrangements
80% of in-kind value signed

With 22 Procurement Arrangements concluded in 2012, the ITER Organization has committed over 80 percent of the in-kind value of the project. All Members have now signed Procurement Arrangements for diagnostic systems; Procurement Arrangements were also concluded for the first ITER gyrotrons, the divertor cassette body and assembly and the final part of the cryogenic system (cryodistribution components).

The ITER Organization finalized direct procurement contracts for the design, manufacture, installation and commissioning of ITER's three identical liquid helium (LHe) plants and for vacuum vessel welding. On behalf of the seven ITER Members, the Director-General signed a major framework contract for global transport, logistic and insurance services for ITER components and concluded a three-year service contract for the use of the SULTAN facility in Switzerland for the performance testing of ITER conductors.

The pace of Procurement Arrangement signatures is increasing. In this context, new rules were put into place in 2012 to simplify and accelerate the signature process and agreement was reached with three Domestic Agencies on a standard template. Quality assurance and quality control activities were supported by a third-party inspection contract.

From the southern end of the platform, the ITER switchyard will dispatch electricity from the 400kV "Boutre-Tavel" power line to seven transformers connected to the various plant systems.

A 760-metre unit length of toroidal field cable is successfully jacketed at the High Energy Physics Institute in Protvino, Russia. (Here, the lead wire pulls the cable into the stainless steel jacket assembly.)

Manufacturing

First ITER component

The first manufacturing activities on the ITER vacuum vessel marked an important new chapter in ITER history. In Korea, the first cutting and welding operations were carried out in 2012 on ITER vacuum vessel Sector 6 and ports. Pre-manufacturing activities and material procurement were also initiated during the year for the first three European sectors.

Six Domestic Agencies kept up the sustained pace of manufacturing activity for ITER's magnet systems. Europe completed the first component that will be integrated into the ITER machine – a production toroidal field conductor length. Niobium-tin (Nb_3Sn) strand production for the toroidal field magnets surpassed 370 tons globally. Five Domestic Agencies have certified their welding processes, three jacket tube suppliers were qualified, and the last winding lines were completed in Europe and the United States.

Fifty tons of niobium-titanium (NbTi) strand have now been manufactured in Russia for ITER's poloidal field coils and all Phase II cable unit lengths delivered to Europe. Tooling was qualified for the Russian winding line; China completed tube and welding qualification and manufactured its first 800-metre copper dummy. Contracts were awarded in Russia for poloidal field coil 1 (PF1), in Japan for the first toroidal field coil and first two sets of toroidal field coil structures, and in Europe for the radial plates and pre-compression rings of the magnet system. The winding line for ITER's correction coils was commissioned in China.

Issues with the central solenoid conductor were resolved in 2012. A comprehensive R&D program identified the best conductor configuration: among four tested, the "short twist pitch" conductor remained within requirements after 9000 cycles. Japanese samples were tested late in the year at SULTAN with excellent results, enabling the qualification of two additional Japanese strand suppliers for central solenoid conductor production.

Pre-manufacturing activities began in 2012 for ITER's five Tokamak Cooling Water System drain tanks. Following the successful completion of the build-to-print design of ITER's cryopumps, tender actions were launched for the manufacturing of the first full-size cryopumps. The first five pressure relief valves for the vacuum auxiliary systems were delivered to the ITER site by the US.

R&D

Prototype development accelerates

Full scale prototypes of major coil power supply components were built and successfully tested in Russia during the year. In China, contracts were awarded for the principal components of a full-scale converter prototype and a power test facility was set up and commissioned by the main supplier for tests on the ITER AC/DC converter. A test bench was also established for the coil power supply master control system. Major R&D activities were carried out in Korea that demonstrated the manufacturability of elements of the vertical stabilization and correction coil converters.

CODAC technologies successfully demonstrated their adaptability and operability for tokamak control at KSTAR where they were implemented in 2012 in duplications of the fuel and plasma control systems. On site, a building contractor also implemented mini-CODAC for building control with success.

"Activities in Member factories have begun to shift from process qualification to real production."

Construction began on the buildings of the Neutral Beam Test Facility (NBTF) in Padua, Italy and contracts were finalized for SPIDER, the NBTF facility that will test the full-size ITER ion source. Ongoing R&D activities for the ion cyclotron system include tests of radio frequency sources in order to identify the most reliable technology and a test stand completed in the US for the transmission lines. The Russian gyrotron prototype was successfully tested at 1 MW for 1000 seconds in 2012.

Qualification activities for the ITER divertor progressed; manufacturing is underway on the carbon-tungsten outer vertical target and dome full-scope prototypes and contracts were signed for the manufacturing prototypes of the inner vertical target. The high heat flux ITER Divertor Test Facility began operations in October in Russia. In India, a dedicated test laboratory is under construction to validate the design and manufacturing of prototype cryolines.

An R&D task was launched on a new highly tritiated water processing technology. Pilot-scale tritium tests with wet scrubber columns took place and progress was made in Korea on the storage and delivery of tritium. The development of a disruption mitigation system for ITER continues through experimental and modelling collaborations with major fusion facilities and international experts. A potential technology for suppressing edge localized modes (ELMs) at levels nearing the requirements of ITER was demonstrated at the DIII-D tokamak in the US.

Finance

Managing Member contributions

The final total of commitment appropriations for 2012 was EUR 326.49 million to which EUR 10.35 million of de-commitment from previous years' contracts was added and against which commitments of EUR 297.52 million were made, leaving a balance of unused commitment appropriations of EUR 39.32 million to be carried forward to 2013. The payment appropriations for 2012 were EUR 277.45 million. Of this, EUR 189.32 million was paid leaving a balance of unused payment appropriations of EUR 88.13 million (see Financial Tables).

A shortfall in the execution of the 2011 budgets resulted in budget carried over for use in 2012 in cash commitments (EUR 84.19m), cash payments (EUR 25.59m), short-term in-kind commitments (EUR 8.33m), and short-term in-kind payments (EUR 18.35m). These carry-forward amounts were added to the budgets requested for 2012 and formed the total 2012 appropriations available for use during the year.

Due to large carry-overs from 2011 to be managed, which resulted in higher commitment and payment appropriations, the ITER Organization recorded more commitments than any previous year, though payments, which are more closely linked to schedule performance, continued to be delayed. Specific corrective actions were developed during the year for budget recovery.

The Financial Audit Board conducted on-site audits in April and September and confirmed during its first visit that the ITER Organization 2011 Financial Statements gave a true and fair view of the financial situation of the Organization, in compliance with Project Resource Management Regulations and International Public Sector Accounting Standards.

Staffing

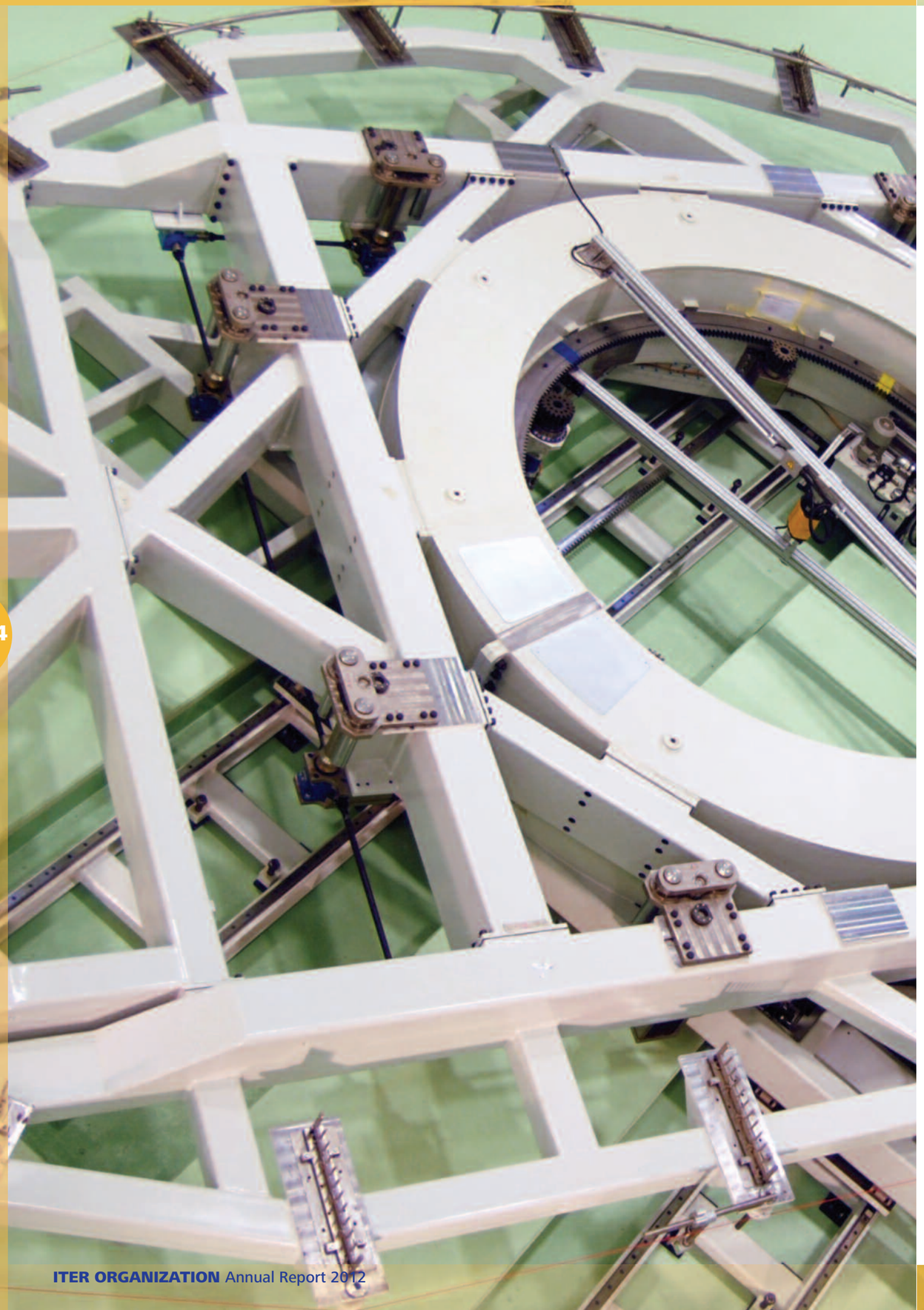
New positions created in 2012

As of 31 December 2012, the ITER Organization employed 477 direct staff: 46 recruitments and 28 departures were recorded during the year (see Staffing Tables). Reorganization in the ITER team structure has created 65 new positions for which recruitment is ongoing. Eighteen new organizational units were created in 2012 and eight removed from the organizational chart; with these changes, line management has been reinforced. By the end of 2013, staff levels will be at 565.

Contract renewal came about for approximately one-third of ITER Organization five-year contracts in 2012. Job classification was reinforced during this process and the possibility of internal staff transfer was added to Staff Regulations. The Staff Committee held its annual elections in February.

The ITER Organization received 30 visiting researchers from China, Europe, India, Korea and Russia in 2012 and welcomed 14 students through its internship program. The third group of Monaco Fellows was also selected during the year for two-year appointments beginning 2013.

Below Through a Partnership Arrangement signed in 2008 with Monaco, support is provided for a new group of postdoctoral researchers at ITER every two years.



HIGHLIGHTS BY DEPARTMENT

“Behind the scenes where our scientists, engineers and project administrators are fully engaged in the Construction Phase of ITER, detailed planning has begun for the assembly, testing and commissioning of the ITER machine.”

Left European toroidal field coil winding will take place at a facility in La Spezia, Italy, where the conductor will be bent into a D-shaped double spiral trajectory.

Office of the Director-General (ODG)

The Office of the Director-General aims to provide effective assistance to the ITER Director-General in the management of the ITER Organization. The Office is responsible for coordinating project policy and monitoring policy implementation; coordinating strategic planning; maintaining external relations (including relations with the Host state and local government); developing and maintaining a comprehensive and integrated communications strategy; and interfacing with the ITER Council.

The Office of the Director-General accompanied the increase in interest in the project generated by construction progress by coordinating a significant number of high-level visits from national and international delegations in 2012 as well as visits from the public and the media. Close to 9,000 press clippings related to ITER were recorded worldwide in 2012; ITER was also showcased abroad through the participation of the Director-General at the International Congress on Energy Security in Geneva and at the 24th IAEA Fusion Energy Conference in San Diego.

With over 13,000 visitors to the ITER site in both 2011 and 2012, and a greater number expected in the coming years, the Office of the Director-General made plans to assume the full responsibility for this strategic activity, hitherto managed by Agence ITER France.

Throughout the year, Communication & External Relations promoted awareness of the project locally. Communication cooperated with the Cadarache-based Institute for Magnetic Fusion Research (IRFM) and Agence ITER France to bring the travelling European exhibition on fusion (the Fusion Expo) to the tourist office in Aix-en-Provence, just 30 minutes from the site – this was a unique opportunity to raise the public's understanding of ITER and fusion science. In addition to the standing exhibition, thematic lectures organized during the three weeks of the event were well received by the public.

The Office also organized second editions of several popular outreach activities in 2012: the ITER Games (350 people) and the Open Doors Day (1,300 people) were both renewed with success. Collaboration resumed with local TV channel TLP late in the year – a seventh program was released on construction progress and an eighth is in the planning stages on the economic benefits of ITER for the region. These programs were broadcasted locally in French and published on the ITER website and YouTube channels.

Recognizing that the morale of ITER Organization personnel is critical to the success of the ITER Project, the Office of the Director-General worked within the Organization to promote communication and foster team spirit. Through regular all-staff meetings – at least one per trimester – top management kept staff abreast of project developments; memos were also drafted and sent to staff members following every Project Board meeting. Three ITER Member Days were held during the year – these lunch-time events were launched to celebrate the diversity of the ITER population and provide an occasion for staff and contractors to meet and socialize. In the same spirit, family outings to local attractions were organized on two occasions.

In accordance with ITER Council directives, the Working Group on Export Control, Peaceful Uses and Non-Proliferation continued to meet by video conference to oversee export control issues. Significant improvements were made during the year to document control handling under the direction of the Export Control Management Board.

The Office of the Director-General is responsible for advising the Director-General on MAC and ITER Council charges as well as project management and technical issues. The Office of the Director-General is strongly involved in reviewing and giving early direction on documents prepared for MAC and Council, including the report of the Cost Containment Task Force – a task requiring the contribution of many stakeholders with regard to new cost avoidance and cost-saving strategies.

As the ITER Organization matures, the Office of the Director-General is striving to intensify the intellectual atmosphere and offer enrichment possibilities to all staff. In addition to the Inside ITER seminars, which feature ITER managers or guest lecturers on wide-interest subjects relating to ITER, fusion and energy, plans are underway to launch a highly scientific and technical lecture series in 2013.

The Office of the Director-General continued to act as the principal interface between ITER staff and the Provence-Alpes-Côte d'Azur International School in Manosque, where approximately 45 percent of the children attending are from ITER families. Through regular meetings of the school's International Advisory Committee, at which all ITER Members are represented, the evolution of the school and the challenge of meeting the scholastic needs of the very diverse ITER population were discussed.

All along the 165 metres of the Headquarters' northwest façade, vertical sunshades create a striking visual effect.

Legal Affairs (LGA)

Legal Affairs advises the Director-General, all departments and directorates, and the governing bodies of the ITER Organization on legal matters. In 2012, it managed important liability issues, in particular nuclear liability issues with the Members, and the ongoing negotiations with the Nuclear Energy Agency concerning the inclusion of ITER in the Paris Convention. Legal Affairs set up delegations of authority, drafted and negotiated Agreements and Memorandums of Understanding, and trained ITER Organization staff on intellectual property and the ITER legal framework. In 2012, the Director-General approved a policy drafted by Legal for the management of service contracts.

In relation to the ITER site in 2012, Legal Affairs led the negotiations on the necessary notarial deeds and site agreements and on the transfer of the Headquarters building from the European Domestic Agency/Agence ITER France to the ITER Organization. IT also provided support for building permits and environmental authorizations.

Legal Affairs contributed to the finalization of the Generic Test Blanket Module (TBM) Arrangement by solving the outstanding intellectual property, liabilities and radwaste issues. It was also instrumental in several outreach activities, organizing a network with the legal advisors of other international organizations and holding the ITER Legal Workshop with the University of Aix-Marseille.

The ITER Intellectual Property (IP) Management Specific Plan was approved by the Director-General and several implementing tools were put in place such as the ITER IP public webpage. Legal Affairs led the process for the ITER Organization to become an Observer at the World Intellectual Property Organization (WIPO) and launched the procedure to have its logo, flag, name and acronym protected under the Paris Convention for the Protection of Industrial Property. A license agreement template for the sharing of intellectual property was drafted and several licence agreements were concluded by the ITER Organization during the year.

Above Construction on the retaining walls, basemat and seismic isolation system of the Tokamak Complex Seismic Pit ends in April. *Photo: F4E*

The fourth IP Contact Persons meeting was held in September in Saint Paul-lez-Durance. The ITER IP Board met every six weeks in 2012 to coordinate the implementation of the ITER IP legal framework.

Internal Audit (IAS)

The work of the Internal Audit Service is aligned to the business goals and objectives of the Organization and audits are conducted according to a comprehensive risk-based plan which is periodically updated. In 2012, IAS carried out audits on the timeliness of payments, the implementation of internal control standards, and the business continuity plan. It also performed advisory services as requested by management and followed up on previous audit findings, including the risk assessment exercise that had culminated in a three-year rolling audit plan for the Organization.

ITER Council Secretariat (ICS)

The ITER Council Secretariat continued to provide the ITER Council and its subsidiary bodies with administrative services throughout the year, in accordance with the Rules of Procedure of the ITER Council. In 2012, it supported the organization of the ITER Council's Tenth Meeting in June and the Eleventh Meeting in November, the Management Advisory Committee's Thirteenth Meeting (MAC-13) on 22-24 May, the Special Meeting (MAC-S1) on 27-28 August, and the Fourteenth Meeting (MAC-14) on 29-31 October. It also provided the Financial Audit Board with administrative support in relation to 2012 financial audit activities.

Bureau of International Cooperation (BIC)

The Bureau of International Cooperation supported the Director-General in all matters related to cooperation and coordination with the Members and their relevant domestic institutions.

In 2012, the BIC facilitated improvements in the visa issuance process for staff members in all ITER Member countries and maintained good relationships with embassies and consulates in France to promote ITER and help solve urgent visa requests. The BIC monitored the ITER Member budget situations as well as critical schedule milestones, following up on slippages when necessary. BIC members were instrumental in organizing the visits of high-level delegations to ITER and the visits of the ITER Organization Director-General to Member countries.

The BIC also played an active role in supporting the implementation of the Unique ITER Team. The Bureau helped to address Member issues during the year related to the international school, including the recruitment of teachers and challenges pertaining to future enrolment. Finally, the BIC helped to prepare the Memorandums of Understanding signed in 2012, and identified the funding for and coordinated three Member Day events at the ITER Organization.

DEPARTMENT FOR ITER PROJECT

The Department for ITER Project (DIP) is composed of six technical directorates that are responsible for the construction of the ITER device. The Department's objective is the timely construction of ITER within the given budgetary framework and in strict respect of all safety regulations.

DIP spearheads the technical directorates by coordinating their work and securing overall technical integration. The Department reports regularly to the ITER Director-General and also interfaces with the Domestic Agencies. At all times, the Department tracks cost-saving and cost-containment solutions throughout its Directorates.

Directorate for Central Integration & Engineering (CIE)

The Directorate for Central Integration & Engineering is responsible for the assembly and operation of the ITER machine; the management of schedule, cost and risk activities; the updating of Computer-Aided Design (CAD) files and design activities for all components; technical integration; and systems analysis and systems standards.

The Project Controls Division, which joined the CIE Directorate in 2012, is responsible for monitoring the project schedule and schedule recovery actions. In an important project-wide campaign, Detailed Work Schedules (DWS) were fully completed for components and systems. The Division integrated schedules from the ITER Organization and the Domestic Agencies to verify alignment with budget and resources and uploaded them directly into the scheduling tool Primavera to facilitate the management of labour resources.

The Division established coordination groups to track milestones for critical components against the Baseline. The number of milestones for critical systems was increased to improve the level of detail and traceability – some 3,000 top-level Strategic Management Plan milestones were defined as well as 165,000 individual DWS milestones categorized by ITER Member. A schedule milestone "hit list" was created to flag critical milestones for all stakeholders with two months of visibility; this hit list demonstrated its effectiveness in 2012 as a schedule management tool.

A Schedule Control Task Force met for the first time in June to tackle slippage in the Schedule Performance Index and to define milestone achievement plans to reverse this trend. An important effort was made in 2012 to streamline design review processes – with 48 design reviews held during the year, this area was identified as one of the potential causes of schedule slippage.

The Assembly & Operations Division worked to define the detailed strategy for ITER assembly 2013-2020. A task force was formed to investigate ways to simplify the assembly plan and absorb negative float for critical systems; proposals include the acceleration of on-site assembly, the overtaking of some assembly tasks by the ITER Organization, and deferrals. Discussions also began late in the year on the management of logistics and storage related to the arrival of components on site. The Operations Section prepared DWS for every plant system to ensure compatibility with the assembly schedule and established cost estimates for every Directorate for the Operation Phase, verifying that these estimates do not exceed the budget.

Major contracts were signed in 2012 to prepare for ITER assembly: a machine and assembly framework contract was negotiated and the first three Task Agreements signed for machine assembly engineering support; a five-year software contract was concluded for the detailed management of assembly and installation activities; and, in December, the contract for the on-site welding of ITER's nine vacuum vessel sectors and fifty-four port structures was signed – this assembly activity is expected to require four years and a workforce of 150.

After nearly one year of in-house development, the Engineering Database was successfully launched in February. This tool will facilitate the management and control of ITER technical data for an estimated 7,000

"Major contracts were signed in 2012 to prepare for ITER assembly."

Copper dummy conductor fabricated by the Italian consortium ICAS is delivered to La Spezia in May for the commissioning of the European winding line.

users and – in its final version – hold complete lifecycle documentation for the ITER Project. Through direct links to the Enovia database that stores CAD models for the project, updates to the design are immediately documented in the database.

The ITER Organization signed the Procurement Arrangement for In-Vessel Divertor Remote Handling Equipment with Europe in October. This was an important achievement as this industrialized equipment, which will provide for the remote exchange of the ITER divertor, has been the object of R&D in Europe for more than 15 years. In 2012, the Remote Handling Section also held the conceptual design review for the neutral beam remote handling system.

The standardization of remote handling tasks was successfully demonstrated in 2012 in a model control room work cell, implemented through a R&D support contract signed last year. The three remote handling tasks that were executed – maintenance tasks for the neutral beam, the Hot Cell Facility and the divertor – confirmed the viability of standard parts and demonstrated a workable layout, an important proof-of-principle for ITER remote handling. In November, STAC commended the comprehensive ITER Organization report on remote handling and its strategy for installation, maintenance and repair of the first wall and divertor components.

Assembly & Operations participated in the very first ITER Robot contest for local junior high school students in 2012, which challenged them to build and program a Lego robot to perform a simplified ITER remote handling task. Co-organized by Agence ITER France, this outreach program will be renewed in 2013.

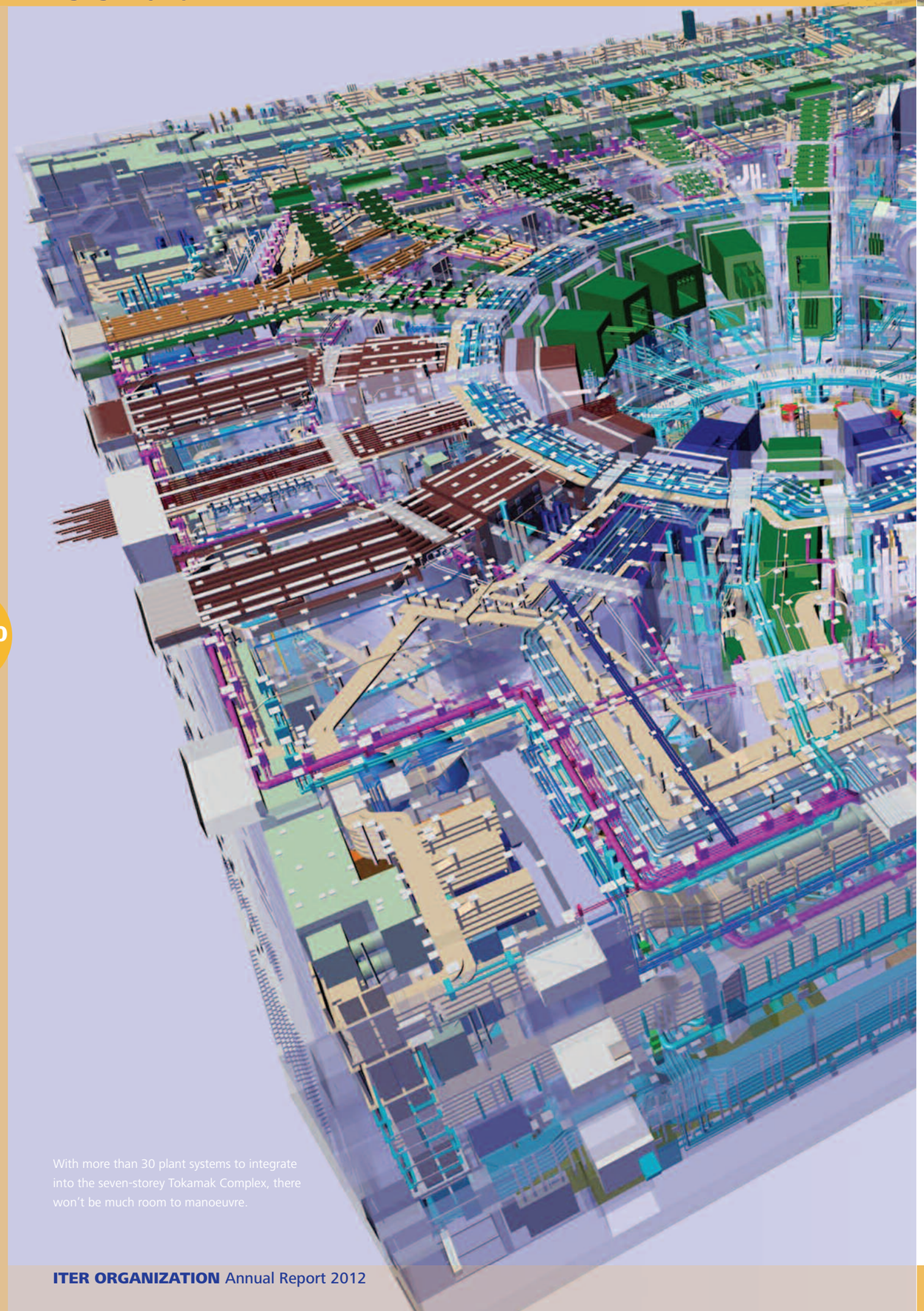
The Design Office pursued the administration and development of the ITER CAD platform. With over 300 users at ITER and approximately 220 at the Domestic Agencies, this platform is now extensively deployed – in particular Catia and Enovia for 3D models and drawings and SEE System Design for multi-discipline process schematics. Efforts continue to promote, implement and coordinate CAD database sharing by Domestic Agencies and suppliers through regular contact and training.

In collaboration with IT, improvements were implemented on the CAD infrastructure including an upgrade of CAD software, the development of automated functions, further development of the CAD catalogues for 3D mechanical and plant standard parts (about 400,000 standard parts are now included in the ITER design), and interfaces with the Engineering Database. Approximately 2,000 Design Office support tickets were processed during the year. A Context Branch process supported by IT tools was developed to allow all CAD users to quickly and clearly access valid interface CAD data. Design coordinators worked with industry to provide in-design and software support and CAD quality control (associated with invoice certification), and to verify coherence with configuration models and Detailed Work Schedules. Active support was also provided to the Building Integration Task Force. Following an international call for tender launched last year, three framework contracts were concluded for the engineering and CAD support of the project.

The Design Office was reorganized early in the year to improve support to the Directorates and implement cost containment. Two new sections – Mechanical Design & CAD Infrastructure and Plant Design – will focus on CAD schedule monitoring and corrective actions, CAD resource flexibility and weekly progress follow-up and reporting.

The Technical Integration Division participated in a ten-month review of cryostat support, analyzing load compliance and assembly space issues, and meeting with the French Nuclear Regulator. A concrete crown has replaced the steel columns as cryostat support – a more robust solution that does not affect vacuum vessel design and has limited impact onto the cryostat and magnet feeder design.

A design integration review was held for Tokamak Complex level L3. The Building Integration Task Force delivered the data for the B20 slab, B2 wall, and



With more than 30 plant systems to integrate into the seven-storey Tokamak Complex, there won't be much room to manoeuvre.

ceiling in July and examined shielding issues at the vacuum vessel ports. The Division reviewed approximately 150 changes to the buildings proposed by the Architect Engineer, mainly to penetrations.

Since July 2012, the Division has monitored the completion of the load specifications for each system and the timely completion of interface load specifications between equipment and nuclear buildings. The number of system load specification documents uploaded into the ITER document management system IDM from July to December doubled to 68, and about 50 interface load reports were prepared to allow the sizing of supports and anchoring points.

Key specification documents for ITER mechanical components and the structural design criteria for in-vessel components were updated and included in the Baseline. Environmental maps describing environmental conditions and electromagnetic fields inside the Tokamak Building are now available through the Engineering Database. Powerful software for the visualization of the radiation map inside the Tokamak Complex was developed.

The 7th ITER Neutronics Meeting was held in July with good attendance from worldwide fusion institutes. The aim of the meeting is to ensure an increased level of coordination between the ITER Organization and the Domestic Agencies to deliver the required neutronic analyses.

Directorate for Tokamak (TKM)

The Directorate for Tokamak is responsible for completing the design, preparing procurement documentation, and monitoring hardware procurement and testing for the magnets, the vacuum vessel and the internal components.

In 2012 the Directorate for Tokamak continued work on the development of the full-tungsten divertor that had been proposed in 2011 as a candidate for non-nuclear as well as nuclear operation. A Tungsten Divertor Task Force was set up to coordinate the development of the design and to focus R&D activities; qualification R&D is now underway in Europe, Japan and Russia. The final decision on divertor armour material for ITER's initial Operation Phase will be made late in 2013.

In May, the Cassette Body and Assembly Procurement Arrangement was signed with Europe covering 60 divertor cassette bodies plus the integration of components and diagnostic systems. This called for a major effort on the part of the Directorate in order to provide integration input for each of the divertor cassettes with diagnostics. Important qualification activities were carried out during the year for the inner vertical targets (Europe), the outer vertical targets (Japan) and the divertor dome (Russia): contracts were signed for the manufacturing prototypes of the inner vertical target; manufacturing is underway on the carbon-tungsten (CFC/W) outer vertical target and the dome full scope prototypes; and the first outer vertical target units were shipped for high heat flux testing at the ITER Divertor Test Facility in Russia that began operating in October.

The Blanket Integrated Product Team met regularly to converge toward the final design of the blanket system, including the normal and enhanced heat flux first wall panels, the shield blocks, the mechanical attachments and the manifolds. The schedule was finalized with the Domestic Agencies for both the blanket and the divertor and the Detailed Work Schedules uploaded – an activity that represented a significant amount of work for the Directorate. Work is underway to request exemption for the blanket from French Nuclear Pressure Equipment regulations. Under a Task Agreement signed with Europe, the fabrication and testing of full-scale prototypes of normal heat flux first wall panels is about to begin.

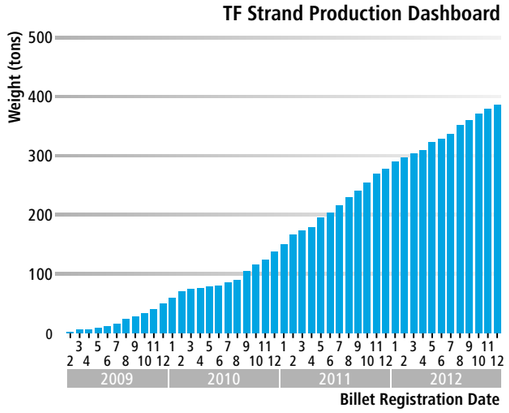
Manufacturing of the Korean sectors of the vacuum vessel and ports began in 2012. The first cutting operations were carried out on Sector 6 segments at Hyundai Heavy Industries in February; this successful milestone was achieved thanks to comprehensive pre-fabrication qualification works. A series of important meetings with the Agreed Notified Body, ANB (a company authorized by the French Nuclear Regulator to assess the conformity of components in the category of Nuclear Pressure Equipment) were held before welding operations could begin in Korea in October. The ITER Organization received notification of ANB approval of the design of the lower ports and the bolted ribs of the in-wall shielding during the year.

Europe, with responsibility for seven of the nine vacuum vessel sectors, delivered a Detailed Work Schedule for the vacuum vessel in September. Pre-manufacturing activities and material procurement for the first three sectors are now underway. In other positive news, Russia awarded the contract for the manufacture of the vacuum vessel upper ports.

Early in the reporting period, the design of the cryostat support system was analyzed in order to answer questions from the French Nuclear Regulator related to its robustness. The Directorate participated in these studies, which resulted in the development of an alternative concrete crown support system instead of columns. The supply contract for the manufacture and assembly of the ITER cryostat was awarded in August by the Indian Domestic Agency.

Detailed design work progressed on in-wall shielding: the CAD models were approved and the ITER Organization received the first round of manufacturing drawings for review. The final design of the thermal shields (main body) was approved in October and the manufacturing call for tender has been launched. Design work on the vacuum vessel

"The first manufacturing activities on the ITER vacuum vessel marked an important new chapter in ITER history."



Above Niobium-tin (Nb3Sn) strand production for the toroidal field magnets surpassed 370 tons globally. The ITER Organization has pioneered reporting, document handling and quality assurance procedures to ensure that strands produced by eight different suppliers achieve the same required performances.

pressure suppression system (VVPSS) advanced during the year with the help of engineers from the Indian Domestic Agency and the Procurement Arrangement is now scheduled to be signed in mid-2014.

For the ITER magnet systems, 2012 was the year that saw an important industrial shift from process qualification to real production. Europe completed the fabrication of the first component that will be integrated into the ITER machine – a production toroidal field conductor length. One-third of cable-in-conduit unit lengths have now been completed and shipments began between producing Domestic Agencies for winding operations. The global production of niobium-tin (Nb3Sn) superconducting strands for the toroidal field magnets surpassed 370 tons (approximately 77,777 kilometres of wire).

Five of six Domestic Agencies have certified their welding processes, three jacket tube suppliers were qualified, and the last winding lines were completed in Europe and the United States. Russia registered 50 tons of niobium-titanium (NbTi) strand for ITER's poloidal field coils in the Conductor Database and delivered all Phase II cable unit lengths to Europe for jacketing. Tooling was also qualified for the Russian winding line, while China completed tube and welding qualification and manufactured its first 800-metre copper dummy. During the year, Russia awarded the contract for the manufacturing of poloidal field coil 1 (PF1) to the Efremov Institute. The winding impregnation tools, assembly station and transportation equipment have been supplied and preliminary winding, impregnation and joint tests performed.

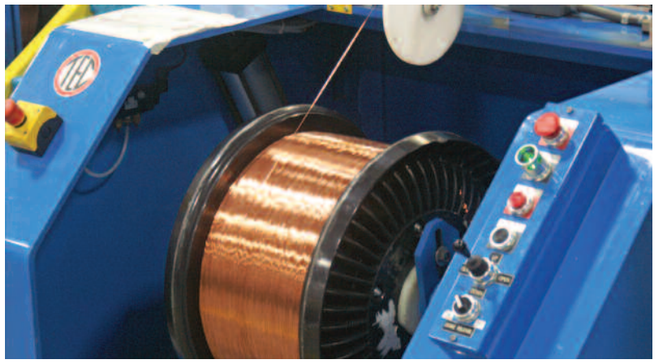
A comprehensive R&D program for the central solenoid conductor, launched in early 2010 with the support of the US Domestic Agency and Oxford Superconducting Technology (US), was successfully concluded in 2012. Among the four conductor configurations tested, the "short twist pitch" conductor remained within requirements after 9000 cycles. Samples procured by the Japanese Domestic Agency were tested late in the year at SULTAN with excellent results, enabling the qualification of two additional Japanese strand suppliers for central solenoid conductor production. In order to guarantee the availability of the SULTAN facility for the performance testing of ITER's superconducting magnets, a three-year service contract was signed in 2012 by the ITER Organization, with costs distributed among the Domestic Agencies according to usage.

The Toroidal Field Coil Working Group continued to play a key role in resolving common issues such as interfaces and tolerances. Progress was made on critical path items during the year: in August, the Japanese Domestic Agency signed contracts for their first toroidal field coil and the first two sets of toroidal field coil structures. Europe concluded contracts for the radial plates and for the pre-compression rings of the magnet system, completed the winding facility for toroidal field coils and started the installation of tooling. A Magnet Manufacturing Database was launched during the year on the model of the Conductor Database for the monitoring of quality control processes for coils, structures and feeders.

In October, the Tokamak Directorate organized a conceptual design review on the safety-class quench detection system which validated ITER's design, as well as the preliminary design review for central solenoid assembly and installation – work can now proceed toward the final design review. The winding line for ITER's correction coils was commissioned in China and the manufacturing process qualification started. In September the ITER Organization was present to witness welding trials.

At the end of the year, a Tokamak Integration Section was created to manage and coordinate all integration activities. This includes defining and coordinating interfaces, resolving conflicts, assisting with space allocations, coordinating the development of operational instrumentation and assisting with the expertise in manufacturing technology.

Below Six Domestic Agencies kept up the sustained pace of manufacturing activity in 2012 for ITER's magnet systems. *Photo: US ITER/Oxford Superconducting Technologies*



Directorate for CODAC, Heating & Diagnostics (CHD)

The Directorate for CODAC, Heating & Diagnostics has responsibility for three systems essential to the correct and safe operation of the ITER Tokamak and the execution of the ITER physics program: control, data access and communication (CODAC), which gathers and analyzes data and sends signals to other Tokamak systems in order to control the plasma; heating and current drive, which adds heat and current to the plasma so that fusion conditions can be initiated and maintained; and diagnostic systems, which measure and allow optimization of the plasma performance.

The drive forward in the procurement of ITER's diagnostic systems continued in 2012 with the signature early in the year of the first Diagnostic Procurement Arrangements with India and Japan. One Procurement Arrangement has now been signed with each of the seven ITER Domestic Agencies – a significant achievement for the Diagnostics Division. The overall diagnostic packages for each Member are divided into multiple Procurement Arrangements: in 2012, second-round agreements were signed with Korea and Russia, and second-, third- and fourth-round agreements with the US, including the first Procurement Arrangement for port integration which will now serve as a model for other port integration agreements.

Conceptual design reviews were held for many diagnostic systems as well as for the in-vessel electrical services required by diagnostics. A Memorandum of Understanding was concluded with the European and Korean Domestic Agencies for the purchase of diagnostic port plug structures from a common manufacturer; this cooperation – and consequential cost savings – will be extended to all diagnostic port plugs.

In 2012, the Heating & Current Drive Division concluded the Neutral Beam Power Supply Procurement Arrangement with Japan and an amendment to the agreement signed in 2009 with Europe for the Heating Neutral Beam Power Supply (low voltage). In an important project milestone, the first two Procurement Arrangements were signed for the ITER gyrotrons with Russia and India. The ITER Tokamak will be equipped with 26 of these powerful 1MW microwave sources procured by four ITER Domestic Agencies. During the year, the Russian prototype was successfully tested at 1 MW for 1000 seconds.

Procurement Arrangements were also signed for the Electron Cyclotron High Voltage Power Supply with India and Europe. Modifications proposed to STAC to increase the current drive capabilities of the electron cyclotron launcher at mid-radius were favourably received and design work is ongoing. The final design of the electron cyclotron equatorial launcher was completed; now both launchers are advancing on the final design. The overall electron cyclotron system preliminary design review was performed and closed in 2012.

For the ion cyclotron system, preliminary design reviews were held for the antenna (Europe) and high voltage power supplies (India); a final design task for the antenna will be launched with Europe in 2013. Several R&D actions – on the Faraday shield elements, the RF vacuum window and low power electrical mock-up studies – are progressing in parallel. The Indian Domestic Agency launched two R&D contracts for ion cyclotron radio frequency sources in order to identify the most reliable technology: two amplifier chains are under construction and fabrication and high power (continuous wave) CW results are expected mid-2014. The US Domestic Agency completed a test stand for the demonstration of continuous 6MW operation for the transmission lines during the year and performed a system-level design review that will be followed by a series of component-level design reviews in 2013.

Construction began on the buildings of the Neutral Beam Test Facility in Padua, Italy in 2012, following a groundbreaking ceremony in February. The European Domestic Agency finalized contracts for the fabrication of the SPIDER beam source and vessel, for the cooling plant system, and for the design and fabrication of the gas injector and vacuum system. The Indian Domestic Agency signed the contracts for the SPIDER 100k V PS and the beam dump. The Neutral Beam Section participated in the conceptual design review for the neutral beam remote handling system and held the preliminary reviews for the heating neutral beam and diagnostic neutral beam front-end components, beam source and beam line components.

The Control System Division continued to update its system developer and software tools in 2012, issuing the CODAC Core System version 3. Hands-on, four-day training sessions were offered to all users (in-house, Domestic Agencies, industry) who contribute to the development of ITER instrumentation and control (I&C) systems. In total, 100 people were trained during the year. A number of CODAC contracts were set in place and the first tasks launched for core system support and network infrastructure design. The Division organized a workshop in June to open discussions on the CODAC archiving system for raw scientific data from the machine; this system must be ready for First Plasma with well-proven scalability.

The first I&C integration kit was supplied to Korean industry in 2012. ITER CODAC technologies successfully demonstrated their adaptability and operability for tokamak control at KSTAR where they were implemented in duplications of the fuel and plasma control systems. On site, a building contractor

"Work continued on the development of the full-tungsten divertor, which has been proposed as a candidate for non-nuclear as well as nuclear operation."

Work advances in 2012 on overflow drainage networks, critical networks and the galleries around the future Tokamak Complex. *Photo: F4E*

also implemented mini-CODAC for building control with success. All ITER buildings will be equipped with network infrastructure to ensure communication between distributed plant systems and the central control systems; the contract concluded during the year with the Korean firm KEPCO E&C for the detailed design of this infrastructure was an important step in this direction.

The prototype for slow interlock controllers started in 2012 and contract negotiations were launched for fast controllers. A roadmap is under development for the central safety functions, including nuclear safety instrumentation and occupational health and safety. The preliminary design review was held for the central interlock system at the end of the year with the participation of CERN, which collaborated on the design as part of the ITER-CERN collaboration launched in 2010. CERN also began to collaborate with the ITER Organization on quench detection requirements.

Directorate for Buildings & Site Infrastructure (BSI)

The role of the Directorate for Buildings & Site Infrastructure is to ensure that all ITER Project facilities are designed and constructed according to ITER Organization requirements in a timely and cost-efficient manner. BSI works closely with the Nuclear Safety, Licensing & Environmental Protection Division to implement processes and procedures necessary to ensuring compliance with the 1984 Quality Order and recommendations coming from the French Nuclear Regulator. The BSI Directorate also interacts with the European Domestic Agency, responsible for the detailed design and construction of the site infrastructure and buildings.

In a major milestone for project construction, the installation of the last seismic pad in April heralded the end of work on the Tokamak Complex Seismic Isolation Pit. The ground support structure and seismic isolation system – basemat, retaining walls, and 493 seismic plinths and pads – took just over 18 months to complete.

Work also progressed as planned on the new ITER Headquarters building in 2012, which was completed in August and officially handed over to the ITER Organization on 5 October. The BSI Directorate managed the office allocation plan; the move for approximately 900 staff members and contractors; and contracts for removal, furniture, canteen and catering, and the new ITER bus and shuttle service.

The rotogate linking the CEA and ITER sites was closed off in November, a small but quite symbolic event for the project: after five years, all ITER Organization employees are now housed on the ITER site in either the Headquarters building or in one of two pre-fabricated office buildings. Projections for the Construction and Operation Phases of ITER place manpower requirements at between 1,000 and 1,100 desk spaces; for this reason a proposal to extend the Headquarters building for a further 350 desk spaces was submitted to the ITER Council in June 2012 and endorsed.

Under the management of Agence ITER France, the French electricity network RTE completed the four-

> **Building activities for the Tokamak Complex will begin in late 2013, after the completion of the B2 foundation slab.**

hectare ITER switchyard and its connection to the 400kV "Boutre-Tavel" power lines in June. Within the framework of the site adaptation works contract signed in 2011, work advanced on overflow drainage networks, critical networks, and the galleries around the future Tokamak Complex. Work also began on Contractors Area 2 – the 3,500 square-metre area dedicated to site contractor parking areas, modular buildings and storage. Finally, after the excavation of 10,000 m³ of soil and rock, reinforcement activities and concrete pouring began during the second half of the year on the site of the future Assembly Building.

The Building Integration Task Force worked under tight deadlines during 2012 to finalize designs and reduce the number of design change requests affecting the buildings. BSI continued to collaborate with other ITER directorates to finalize the level-by-level data for the Tokamak Complex (Levels B2, B1, L1 and L2 were transferred to the Architect Engineer during the reporting period) as well as data for the Tokamak Complex basemat, the B2 slab. As part of this work, the Task Force identified thousands of steel plates that will be embedded into the concrete of the floors, walls and ceilings of the Tokamak Complex to support heavy loads.

Late December, the European Domestic Agency awarded the contract for the civil works of the Tokamak Complex to the Franco-Spanish consortium VFR. The five-year, EUR-300-million contract covers the construction of the three principal buildings (Tokamak, Diagnostic and Tritium) and adjacent structures including the Assembly Building. Building activities for the Tokamak Complex will begin in late 2013, after the completion of the B2 foundation slab.

The Directorate was closely associated in 2012 with a ten-month collaborative effort to investigate an alternate solution for cryostat support, after simulations revealed that under certain operational conditions the load transfer to the basemat by way of planned columns was not totally satisfactory. The new cryostat support system – a concrete crown – offers advantages from a mounting and constructability point of view as well as from a global structural capacity perspective. BSI collaborated with the Department for Safety, Security & Quality on a support robustness report that must be submitted to the French Safety Authority ASN in early 2013.

Following the selection in February of European company DAHER as Logistics Service Provider (LSP),

with responsibility for the transport, logistics and insurance of ITER components, BSI managed the LSP contract, including planning activities for the passage of test convoys along the ITER Itinerary. Coordination of the ITER Itinerary will be managed by Agence ITER France, with the involvement of the ITER Organization, the Logistics Service Provider, and local governmental and police agencies.

The modalities of the CEA Site Support Agreement were adapted during the year to reflect the departure of all ITER staff from the CEA site and the takeover of some services, such as bus transportation and the cafeteria, by the ITER Organization. Other services will continue to be requested from CEA according to a five-year forecast that ITER has established. The Site Support Agreement Liaison Committee remained an effective forum for issues pertaining to licensing, customs, and CE marking (a mandatory conformity mark for goods such as ITER components imported into Europe).

The overall management of the ITER site was taken over from Agence ITER France on 1 January 2012: facilities management, safety coordination and site security is now the shared responsibility of BSI and the Department for Safety, Quality & Security.

Directorate for Central Engineering & Plant (CEP)

The Directorate for Central Engineering & Plant provides a fully qualified range of services and facilities required for the operation of the ITER Tokamak. The Directorate is responsible for the Procurement Arrangements, fabrication, and testing of a large number of systems: cooling water, cryogenics, hot cell, radwaste, fuelling and wall conditioning, tritium, vacuum, steady state and pulsed electrical power supplies, and magnet coil power supply.

Excellent progress was made in the design of ITER plant systems in 2012 resulting in the signature of six Procurement Arrangements: Cryolines Late Delivery and Cryodistribution Components with India; Gas Injection System and Pulsed Power Electrical Network (PPEN) with China; Water Detritiation System Tanks with Europe; and Steady State Electrical Network (SSEN) with the United States. Cryodistribution was the fourth and last in-kind Procurement Arrangement for ITER's cryogenic systems.

The ITER Organization also concluded a direct procurement contract for the design, manufacture, installation and commissioning of ITER's three identical liquid helium (LHe) plants with Air Liquide Advanced Technologies (France) in December 2012 – a significant milestone for the Cryogenic Systems Section.

Pending issues for ITER's cooling water system were resolved during the year which allowed the design of this crucial system – interfacing with nearly all other systems and facilities – to leave the conceptual phase. Preliminary design reviews were held for the Tokamak Cooling Water System (TCWS), the Heat Rejection System (HRS), the Component Cooling Water System (CCWS), and the Chilled Water System (CHWS). Pre-manufacturing activities for ITER's five TCWS drain tanks began in the third quarter of 2012 in the US following a successful Manufacturing Readiness Review.

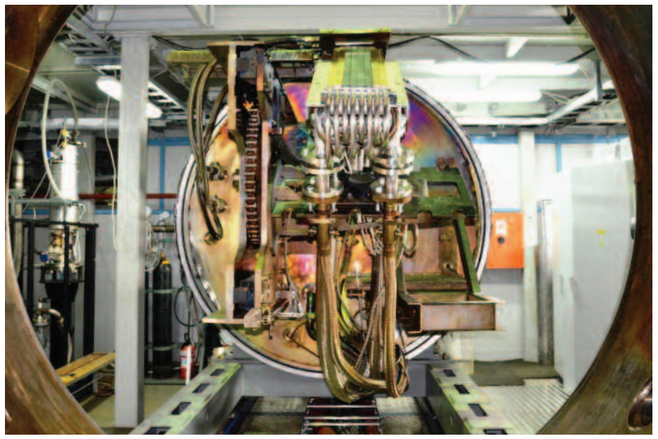
Subsequent to the signature of the Cryolines Procurement Arrangement in January, the Indian Domestic Agency launched the design of the prototype cryolines to validate the design and manufacturing of this complex system. A dedicated test laboratory is under construction at the Institute of Plasma Research in Gandhinagar and contacts were initiated with potential industrial suppliers.

The Tritium Plant Section successfully held the conceptual design review on the radiological and environmental monitoring system in 2012. A Hot Cell workshop was organized in July to investigate the possibility of deferral of this procurement to a later date.

Hazard and Operability (HAZOP) studies were completed on the Gas Injection System and the Glow Discharge Cleaning system in 2012; following the signature of the Gas Injection System Procurement Arrangement, tendering began in China. A fuelling Disruption Mitigation System workshop was held in San Diego early in the year. The first draft of the system requirement document for the Disruption Mitigation System was sent to the US for review in July.

A kick-off meeting was held in February in Karlsruhe for the R&D task on a new and effective highly tritiated water processing technology. The results presented in the draft reports look very promising. The design of the Tritium Building is advancing: during the year the design of the building's steel frames was assessed; three new fire sectors were created in the vacuum pumping room to comply with safety requirements; and the conceptual design of the automated control system was completed. Following the preliminary design review for the water detritiation system tanks, the Procurement Arrangement for this system was signed in December with Europe. An important meeting on wet scrubber technology in Moscow contributed to the simplification of the detritiation system. Later in the year, pilot-scale tritium tests with wet scrubber columns took place in Japan for detritiation systems. Strong R&D progress was made in Korea on the storage and delivery of tritium: the Korean Domestic Agency has built different scale storage vessels (getter beds) and has tested their performance against the challenging ITER requirements.

Below At the ITER Divertor Test Facility in Saint Petersburg, Russia, the plasma-facing components of the ITER divertor are tested at the same heat loads they will face inside the ITER vacuum vessel.



On 18 April 2012, the 493rd – and final – seismic pad is installed.

Building upon many years of development, the Vacuum Section successfully completed the build-to-print design of ITER cryopumps. Tender actions were issued for the manufacturing of the first full-size cryopumps by both the ITER Organization and the European Domestic Agency; once completed these cryopumps will be tested at the Karlsruhe Institute of Technology (Germany). Improvements in the design of the cryopumping system have permitted the number of ITER cryopumps to be reduced from eight to six – an important cost-saving measure for the ITER Organization. In July, a preliminary design review was held for cryopump front end distribution warm generation lines.

The US Domestic Agency delivered its first completed components to ITER in September – five pressure relief valves that are part of the Vacuum Auxiliary Systems (early delivery). An important conceptual design review was held for Vacuum Auxiliary Systems (main delivery) in November that covered ten systems and approximately 400 vacuum pumps.

The first order for leak detection equipment was placed by the US Domestic Agency. Leak detectors have been delivered and are safely stored on site, ready for use.

The production of cable diagrams was an important activity for the Electrical Engineering Division during 2012 that contributed to the identification of data for the ITER Cable Database. By year end, data for approximately 40,000 cables was precisely recorded, representing 30 percent of expected ITER needs. The ITER Organization signed a contract with the Korean company KEPCO in May for cable engineering support services including detailed execution drawings for 200 km of cable trays, routing of over 10,000 km of cables, and seismic analysis of cable structures. Preliminary cable routing design (~2,800 km) was completed for the Tokamak Complex B2, B1 and L1 levels and for other plant buildings and galleries.

The Electrical Design Handbook was updated incorporating, among other important guidelines, the conceptual design for the lightning protection of the Tokamak Complex. For the static magnetic field, the Electrical Engineering Division prepared a draft of the electromagnetic compatibility procedure for electrical equipment which is now under review by worldwide experts.

The tender design review took place for electrical power distribution in May. In July the Division participated in the joint ITER Organization/European Domestic Agency workshop on buildings and power supplies. Procurement activities began in China for PPEN components and in the US for SSEN materials: China awarded the post-engineering contract to ASIPP and began assessing potential suppliers; the US concluded a contract to prepare the purchasing specifications of SSEN materials including the long-lead high voltage step down transformers, for which a call for tender was launched in December.

Key elements of ITER's magnet coil power supply system were reviewed by experts: preliminary design reviews were held for switching networks and fast discharge units with Russia; and for poloidal field AC/DC power converters and reactive power compensators & harmonic filtering with China. The preliminary engineering design review was also completed with Korea for the AC/DC magnet power converters, a key milestone in the procurement of this system.

The Chinese Domestic Agency awarded contracts in October for the major components of a full-scale converter prototype; manufacturing and testing will be executed during 2013. A power test facility was set up and commissioned by the main supplier (ASIPP) for tests on the ITER AC/DC converter.

Major R&D activities were carried out in 2012 by the Korean Domestic Agency and a main supplier, Dawonsys Co. A short circuit test was performed and manufacturability demonstrated on the thyristor bridges and bypass switches of the vertical stabilization and correction coil converters. A test bench was also set up for the coil power supply master control system to verify the topology and measure performance of this complex I&C system.

In Russia, full-scale prototypes of major coil power supply components, including the DC bus bar, fast disconnector switch, fast open switch and extra protection make switch, were built and successfully tested in the Efremov Institute. These R&D activities will continue in 2013 to demonstrate the final design of this system.

Directorate for Plasma Operation (POP)

The Directorate for Plasma Operation supports ITER construction and operation in all matters related to physics performance projection and plasma control requirements, the assessment of plasma-related specifications for engineering systems, and the coordinated implementation of the Test Blanket Module Program.

The Directorate for Plasma Operation furthered the development of the ITER Research Plan in 2012 taking into account planned system deferrals and the detailed plan for assembly phase two.

During the joint International Tokamak Physics Activity (ITPA) Coordinating Committee/International Energy Agency meeting in December, the Directorate presented the ITER physics R&D issues that remain critical to the Research Plan. Among these priorities are the understanding and control of Edge Localized Modes (ELMs); disruptions and runaway electrons (and their mitigation); H-mode accessibility; the use of all-metal plasma-facing components; the behaviour of tungsten impurities; tritium retention; dust; and the power scrape-off layer (SOL) thickness.

In close collaboration with the Tokamak Directorate and experts, POP continued to support the design of the tungsten divertor and completed the full thermal load specifications in 2012. Important experimental results on the behaviour of tungsten were reported during the year on Alcator C-Mod (US), ASDEX-U (Germany), and JET (Europe) which have significantly increased confidence in proceeding directly with a tungsten divertor for the initial Operation Phase of ITER. These results include the observation of decreased hydrogen retention, the ability to operate with limited melting, and more reliable discharge breakdown and ramp-up, even following major disruptions. In addition, the initial news from technology R&D undertaken by the European and Japanese Domestic Agencies to develop tungsten mono-blocks is encouraging. The Directorate will continue to support this research until a decision is taken on the ITER divertor.

Agreement was reached during the year on the generic text for the Test Blanket Module (TBM) Arrangement. This is a significant step forward for the ITER TBM program, since it also allowed issues such as the sharing of intellectual property and liability within the TBM program to be resolved. This generic agreement, approved by the Tenth ITER Council in June, will serve as a template for the individual TBM Arrangements that will govern the relationship between the ITER Organization and each Member during the development and construction of the Test Blanket Systems. In May, Korea became the sixth TBM Leader with a specific Test Blanket System concept that it will test in ITER. To address the important question of the management of Test Blanket System radwaste, a working group was established with the participation of Agence ITER France – the official entity in charge of future ITER radwaste management on behalf of the Host state. Work has also begun on the Preliminary Safety Report for each Test Blanket System.

“Among the physics R&D issues that remain critical to the ITER Research Plan: understanding and control of Edge Localized Modes… the use of all-metal plasma-facing components…”

A significant step was made in the development of the ITER Plasma Control System (PCS) with the organization of the conceptual design review in November. The conceptual design was developed through an international collaboration between the POP Directorate, the Control System Division, the Domestic Agencies and experts from the Member fusion communities.

A second Task Order was signed in 2012 for the development of integrated modelling system architecture. During the fourth Integrated Modelling Expert Group meeting in September, fusion community experts assessed ITER integrated modelling and provided a list of recommendations for further development. The Group also commended the ITER Members for the progress made within their domestic programs to develop computationally efficient and validated modelling tools.

The physics requirements for the disruption mitigation system (DMS) were finalized as a result of close collaboration between POP and experts from the international fusion community. These requirements were presented during the conceptual design review for the DMS organized by the Central Engineering & Plant Directorate in December. POP staff members are continuing to support the development of DMS through experimental and modelling collaborations with major fusion facilities and international experts.

In 2012, researchers at the DIII-D tokamak in the US demonstrated a potential technology for suppressing ELMs at levels nearing the requirements of ITER. Pellets fired into the plasma at a rate of 60 per second from the cryogenic deuterium pellet injector were able to repetitively trigger small edge instabilities that both protect material surfaces from potentially larger energy pulses and help to keep the plasma free of impurities. POP analyzed the results of these experiments using a 3-D nonlinear magnetohydrodynamic (MHD) code to investigate optimum conditions for the triggering of ELMs by pellet injection. Extensive experimental and modelling work also continued on the use of magnetic perturbations to suppress ELMs. In other positive news, eleven months of tests at JET to simulate the environment inside ITER – with a wall made of beryllium and tungsten – showed excellent results, resulting in reliable plasma operation and greatly reduced fuel retention. These results are very encouraging for ITER.

The sun rises in late December over the Tokamak Pit. Next year, civil work will begin on the 360,000-ton Tokamak Complex.

The Directorate coordinated the preparations for two STAC meetings during the year and contributed significantly to the input documents. Eight visiting researchers from Russia joined ITER under the coordination of the Plasma Operation Directorate in 2012; their performance and contributions were highly appreciated. The third generation of Monaco Fellows – a very strong group chosen from about 70 applicants – took up their appointments late in the year. The Directorate organized ITER participation in the 24th Fusion Energy Conference, held in San Diego in October, and presented a significant number of papers.

DEPARTMENT FOR SAFETY, QUALITY & SECURITY (SQS)

The Department for Safety, Quality & Security supports the Director-General in all matters related to safety, quality assurance and security, regulatory requirements, and compliance with respect to Host country safety and security regulations.

On 10 November 2012, the French Prime Minister signed the official decree that authorizes the ITER Organization as a Basic Nuclear Installation (Installation Nucléaire de Base) in France. ITER is the first nuclear installation in France to be licensed under the stringent requirements of the 2006 French law on Nuclear Transparency and Security; it is also the first nuclear fusion device to obtain nuclear licensing worldwide. The ITER Organization now has a binding contract with the Nuclear Safety Authority (ASN) and its safety culture will be the object of permanent scrutiny.

Regular on-site inspections are part of the contract. In 2012, the ASN audited the supervision carried out by the ITER Organization on construction work and concluded that ITER's quality system is robust and in consistency with the French 1984 Quality Order. Nevertheless, the authorities requested that the notification of non-conformances by the sub-contractors be improved. In April, ASN inspected the civil engineering of the Tokamak Complex seismic foundations.

As a licensed nuclear operator, ITER has the obligation to undergo a complementary safety assessment, known as a stress test, decided by the European Union in the aftermath of the 2011 Fukushima nuclear accident. These tests are designed to test safety margins against a set of extreme situations, such as earthquake, flooding or a combination of both. The SQS Department carried out this stress test evaluation in 2012 and provided a nuclear safety stress report to the French authorities in September.

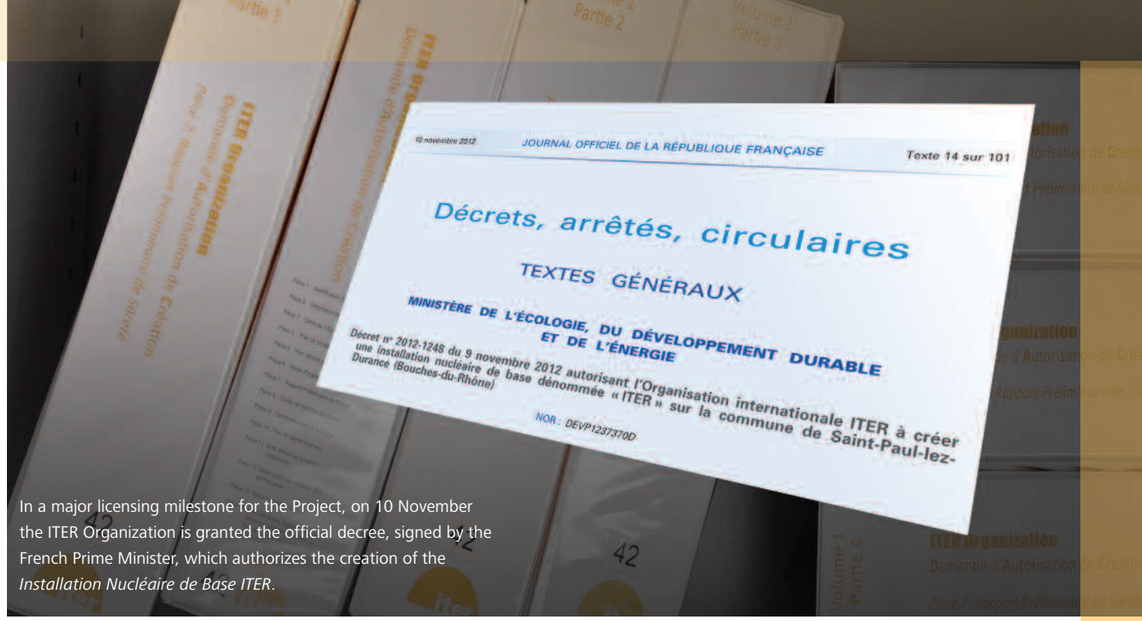
In October, SQS submitted reports to the nuclear regulator for the possible exemption of key ITER components – the neutral beam injector, the blanket, and the ion cyclotron resonance heater – from French regulations on pressure equipment (ESPN regulation). This exemption has already been granted for the ITER divertor. Relative to In-Service Inspections (the monitoring of ESPN component performance during the lifetime of ITER), the ITER Organization has requested compensatory measures.

The ITER Local Information Commission (CLI) continued to be active in its role as interface between the ITER Organization and the public. The SQS Department provided regular reports to the CLI and responded to demands for information throughout the year.

The ITER Organization issued a top-level Integrated Safety, Quality and Security Management Policy in 2012. Development and improvement of the Management & Quality Program (MQP) continued and the dedicated MQP web page was continually updated. A new document procedure now governs the creation, revision and obsolescence of MQP documents and includes an electronic request system to control all changes to MQP documents.

The Quality Assurance Division supported the ITER technical divisions and Domestic Agencies in all procurement activities; additional support continued to be provided through a third-party inspection contract signed in 2011. The ITER Organization-Domestic Agency Safety and Quality Assurance Working Group (SQAWG) met four times during the year, including two live meetings, to identify quality issues and seek efficient paths to resolution. As a result, the document review process at the ITER Organization has been modified and measures initiated to improve the efficiency of working with the Agreed Notified Body. The procedure for non-conformance reports was also revised during the year to address issues raised by the French Nuclear Regulator during site visits. In collaboration with IT, the Quality Assurance Division is developing an electronic database for deviations and nonconformities.

Three buildings – Diagnostics, Tokamak and Tritium – will share a common foundation in this vast space, and also share the protection of 493 seismic pads.



In a major licensing milestone for the Project, on 10 November the ITER Organization is granted the official decree, signed by the French Prime Minister, which authorizes the creation of the *Installation Nucléaire de Base ITER*.

Revised Domestic Agency quality programs were reviewed and accepted during the year; the Division conducted surveillance audits to check compliance with quality programs, Task Agreements and Procurement Arrangements. Quality audits were also carried out internally to verify the effectiveness of ITER Organization processes.

Since 1 January 2012 – the date on which the ITER Organization took over the management of the site – the Health & Safety Control Division has been responsible for health, safety and environment in the ITER buildings and on the worksite. The Division established a protocol for security with the French authorities and has put a dedicated team into place to ensure that regulations are respected. Training will be delivered to all staff and contractors.

Following a period of adaptation, the security contract is now fully operational on site. Access procedures to ITER Headquarters were formalized in a new procedure in 2012; the Division also assessed the global protection of the ITER site including the new Headquarters area and began work on a new access control system and a dedicated protection plan for people and premises. Preparations began on a medical services contract that will be signed in early 2013.

Security personnel followed up on works related to contract for design, procurement assistance and support of access control and security for site support systems. In October, a new security contract was implemented that includes 24-hour guards and a reception service in the ITER Welcome Building. Policy and procedures for handling and protecting ITER information were approved to deal with sensitive information inside and outside the site.

DEPARTMENT FOR ADMINISTRATION (ADM)

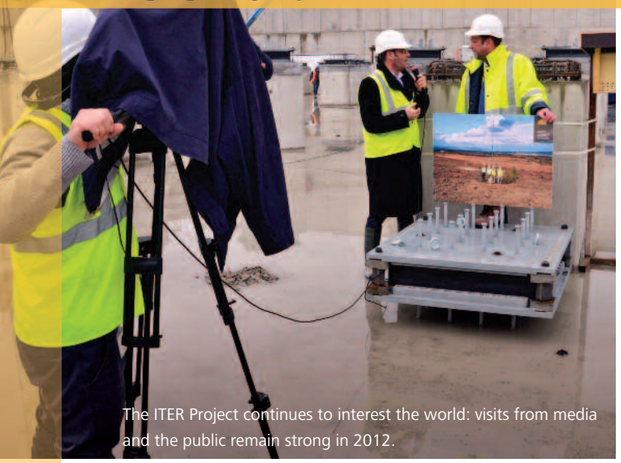
The Department for Administration provides services in the fields of human resources, procurement in-kind and in-cash, finance and budget, information technology, organizational efficiency and document control. It comprises the Directorate for Finance, Budget & Management Systems and the Directorate for General Administration.

Directorate for Finance, Budget & Management Systems (FBM)

The Directorate for Finance, Budget and Management Systems is in charge of ensuring sound financial and budget management; preparing the lifecycle resource estimate of ITER; developing and maintaining information tools; and evaluating and improving the efficiency and effectiveness of management systems.

In 2012, the Finance & Budget Division managed ITER Organization lifecycle budget plans in collaboration with the Directorates: for the first time annual and lifecycle budgets were managed as a unified system, improving the transparency between the yearly budgets and the overall cost baseline. Division members collaborated closely with the Project Controls Division, now part of the Central Integration & Engineering Directorate, in order to ensure budget alignment with the new scheduling system and to develop an integrated approach to cost cycle, earned value and budget management.

Early in the year, Finance & Budget produced the ITER Organization 2011 Financial Statements. The Financial Audit Board, which carried out two on-site visits in 2012, declared during its April visit that the 2011 Financial Statements gave a true and fair view of ITER Organization financial activities. The Division held a training session on International Public Sector Accounting Standards (IPSAS) in September to address ITER-specific accounting issues and to continue to optimize the way IPSAS standards are applied in the yearly Financial Statements. It also collaborated with


The ITER Project continues to interest the world: visits from media and the public remain strong in 2012.

the ITER Members to streamline financial regulations and implementing measures.

The ITER Organization began the year with large carry-overs from 2011 to be managed, which resulted in higher commitment and payment appropriations. In 2012, the ITER Organization recorded more commitments than any previous year, though payments, which are more closely linked to schedule performance, continued to be delayed. Budget recovery was one of the year's top priorities – to address it the Division worked with each Directorate to more closely track the budget process, conduct variance analysis, and develop specific corrective actions. A combined commitment and procurement plan was developed that should improve budget planning in 2013.

At the end of the year, due to the need for increased efficiency, the sampling approach for the verification of the invoices and claims was introduced based on a study performed mid-2012 by a large international audit firm.

The Project Information System Section (IT) continued to transition from build-up to maintenance activities in 2012 and successfully implemented a planned reduction in its budget while delivering improvements for end users. The Section introduced an upgraded version of SharePoint, ITER's web application platform, and refinements to document management in IDM. Through the introduction of an integrated data management solution, key data can now be exchanged between different applications. IT created more than 1,000 "business intelligence reports" in 2012, linking elements from Procurement & Contract, Finance & Budget, and Project Controls.

The ITER Collaborative Platform ICP, which stores all ITER data, uploaded its ten-millionth object in June, a ten-fold increase in three years. With the 2012 launch of the Engineering Database – a tool developed in-house to store all ITER technical data – ICP will continue to grow and is now managed by IT on multiple servers. The CAD database replication (Enovia V5) is fully operational at six Domestic Agencies: over 150 Domestic Agency users and 150 ITER Organization users are now connected. The computational cluster introduced in 2011 for physics and neutronics calculations was doubled to 1,000 cores, allowing ITER physicists to perform calculations on site that had previously only been possible through outside facilities at high cost.

In 2012, IT accompanied the completion of the new Headquarters building, installing the technical architecture for the offices and meeting rooms and successfully migrating ITER Organization users out of units on the CEA Cadarache site.

The System Management Section, formed in late 2011 to improve organizational efficiency, began the year by establishing an Ideas Network to build on the knowledge and experience of ITER Organization staff members. Suggestions for simplified practices and improvements to the work environment were registered and followed up on – an example of process owners and users working together to improve efficiency.

A number of Task Forces were initiated by the System Management Section to investigate potential improvement in key areas of the project such as design integration and design review, procurement process streamlining, and ITER Organization-Domestic Agency cooperation. Improvement recommendations made by the Task Forces were presented to senior management for final implementation decisions. In addition, the communication of senior management decisions was improved in 2012 by the introduction of a Team Talk process, and performance objectives for managers were linked to organizational priorities.

Directorate for General Administration (GEA)

The Directorate for General Administration is in charge of the preparation of in-kind Procurement Arrangements in close collaboration with the Domestic Agencies; the placement of in-cash contracts through competitive way; staffing policy and management (recruitment, training, appraisal, salary, travel and social insurance); and document management.

The ITER Organization successfully concluded 22 Procurement Arrangements in 2012 (including three Amendments), up from 18 in 2011 and 17 in 2010. In order to further simplify and accelerate the Procurement Arrangement process, the Procurement & Contract Division initiated discussions with the Domestic Agencies on a standard template for the Main and Annex A documents. Discussions progressed well: by year's end the first agreements had been reached with Korea, Russia and the US. Through 84 Procurement Arrangements (plus three Amendments), the ITER Organization has now committed over 80 percent of the in-kind value of the project.

Regarding in-cash contracts, the Division concluded 724 contracts (including Task Orders and amendments), a record number of Task Agreements (87) and 763 purchase orders for a total value of EUR 525.9 million and a total commitment value of EUR 228.6 million. To better assess the evaluation of financial offers for large contracts, the Procurement & Contract Division introduced cost estimates in preparing instructions to tenderers. Also, in response to a recommendation from the Financial Audit Board, a training course was initiated for ITER Organization line management and Responsible Officers to further develop awareness of the procurement process, in particular contract management and control in the execution of contracts.

In February, the Director-General signed the Global Transport, Logistics and Insurance Service Provider framework contract with the European company DAHER on behalf of the ITER Organization and the seven ITER Members. In another important joint effort, a three-year service contract was signed in April on behalf of six Domestic Agencies with the École Polytechnique Fédérale de Lausanne (EPFL) for the use of the SULTAN facility in the performance testing of ITER conductors.

Complex negotiations on vacuum vessel welding and the supply of the ITER Tokamak's three cryogenic liquid helium (LHe) plants were brought to a successful conclusion in 2012 on time and within budget, clearing the way to contract signatures in December. A major contract was also concluded for cable engineering through competitive dialogue: significant cost savings realized through this procurement process were favourably noted by the Financial Audit Board. Contracts were placed to ensure the continuity of CAD and engineering support for the Directorates, to prepare for the occupation of the new ITER Headquarters (canteen, furniture, removal), and to select companies for security and guard services and facility management.

The Human Resources Division supported top management in 2012 in the implementation of the new ITER Organization management structure, with the creation of 18 new organizational units and the cancellation of 8. The team managed 46 staff recruitments (34 newcomers to the ITER Organization) and 28 departures, as well as the contracts for interim staff, visiting researchers, experts and interns. There were 477 ITER Organization staff members at the end of the year – a number that is projected to rise to 565 with the recruitment of approximately 150 staff in 2013.

In 2012, ITER staff members who had signed their five-year contracts in 2008 were nearing the end of their contractual term (approximately one-third of ITER staff). Human Resources managed this transition period, working with each Directorate to define business and staffing needs, revise approximately 150 job descriptions, develop an ITER job classification in support of contract renewal, establish a Talent Evaluation Committee, and manage contract renewals (180) and terminations. Individual performance interviews were organized for all staff during the year and manager performance objectives were strengthened. The possibility of internal staff transfer has now been introduced into the Staff Regulations.

Training sessions in safety culture, export control and intellectual property, and contract management benefitted 366 staff members in 2012 for a total of 5,080 hours. The Human Resources Division worked to ensure good social dialogue within the ITER Organization by facilitating relations with the Staff Committee and the Committee for Health & Safety and by coordinating relations with the French Labour Administration. Early in the year, the team worked closely with management to implement the ITER Organization rules related to the roles and responsibilities of line managers as well as to delegation of authority, in particular on human resource, procurement and contract matters. A detailed list of responsible persons was developed that resulted in simplified approval processes and a gain in organizational efficiency.

The ITER Organization received 30 visiting researchers from China, Europe, India, Korea and Russia in 2012 and welcomed 14 students through its internship program. The third group of Monaco Fellows was also selected during the year for two-year appointments beginning 2013.

The Document Control Section spearheaded improvements to ITER's document management system IDM, improving the user interface, search capabilities and security as well as providing IDM training and support. Plans were made and realized during the year for the new 200-square-metre ITER library located at Headquarters. Significant archival space was also fitted out by the Document Control Section – in 2013 ITER archives stored off site will be repatriated and an internal scan-on-demand service established.

The Section managed the organization and exchange of important project documentation in IDM, including Baseline, quality program, Procurement Arrangement, and intellectual property (IP) documentation. IP management activities in 2012 included the maintenance of and enhancements to the ITER IP database and participation in IP meetings both within ITER and with the Domestic Agencies.

The Document Control Section also participated in the implementation of the Publication Board; composed of technical representatives from every Directorate, its aim is to ensure that all material released by the ITER Organization has undergone appropriate review and approval procedures. The Publication Board also coordinates joint ITER Organization-Domestic Agency review boards for the selection and submission of papers to major conferences.

"The ITER Organization received 30 visiting researchers from China, Europe, India, Korea and Russia in 2012 and welcomed 14 students through its internship program."

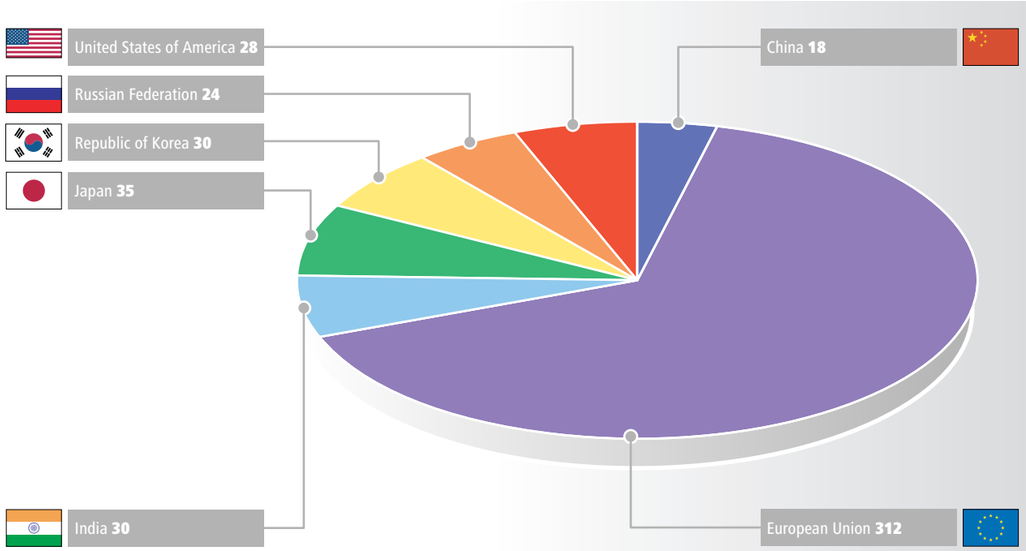
STAFFING & FINANCIAL TABLES

“Whatever our position or job description within the ITER Project, we are all working to shape a better future for our children and our children’s children for many generations.”

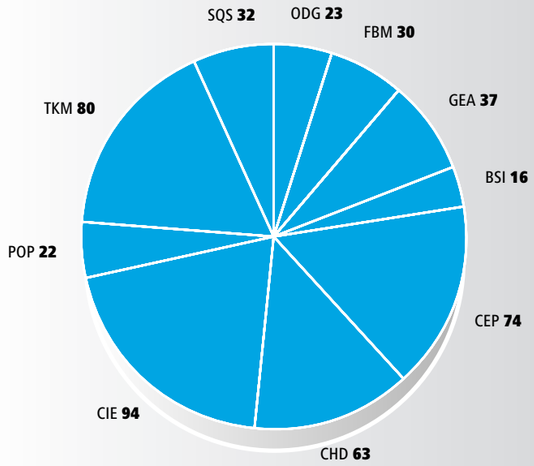
Left The large bay windows of the upper floors of the Headquarters building offer a spectacular and unobstructed view of construction works.

Staffing tables

Staff by Member	31/12/2011	31/12/2012
China	20	18
Euratom	304	312
India	29	30
Japan	35	35
Republic of Korea	26	30
Russian Federation	23	24
United States of America	34	28
Total	**471**	**477***



Staff by Department as of 31/12/2012	Professional	Support	TOTAL
ODG	**14**	**9**	**23**
ADM**	**34**	**35**	**69**
FBM	12	18	30
GEA	21	16	37
DIP**	**244**	**109**	**353**
BSI	13	3	16
CEP	51	23	74
CHD	43	20	63
CIE	56	38	94
POP	19	3	22
TKM	59	21	80
SQS	**21**	**11**	**32**
TOTAL	**313**	**164**	**477**



** The Human Resources Division managed 46 staff recruitments (of which 34 were newcomers to the ITER Organization) and 28 departures during the year.*

*** ADM and DIP totals include Department-level staff plus the Directorate totals.*

Financial tables

Commitments Execution – Cash and In-Kind Task Agreements and Secondments

Amount in KEUR

		Total Commitment Appropriations	De-commitments and Transfers of previous years' Commitments	Total Commitments 2012	Unused Commitment Appropriations carried forward to 2013
Title I	**Direct Investment (Fund)**	**158,428**	**1,231**	**152,851**	**6,807**
Title II	**R&D Expenditure**	**19,791**	**3,239**	**17,204**	**5,826**
Title III	**Direct Expenditure**	**132,647**	**5,881**	**127,466**	**11,061**
Total commitments		**310,866**	**10,351**	**297,521**	**23,694**

Without the IO reserve

Payments Execution – Cash and In-Kind Task Agreements and Secondments

Amount in KEUR

		Total Payment Appropriations	Write-offs and Transfers of Special Account items	Total Payments 2012	Unused Payment Appropriations carried forward to 2013
Title I	**Direct Investment (Fund)**	**85,074**	**-**	**48,573**	**36,501**
Title II	**R&D Expenditure**	**26,312**	**-**	**15,483**	**10,829**
Title III	**Direct Expenditure**	**150,444**	**-**	**125,262**	**25,182**
Total payments		**261,830**	**-**	**189,318**	**72,512**

Without the IO reserve

Contributions from Members

Amount in KEUR

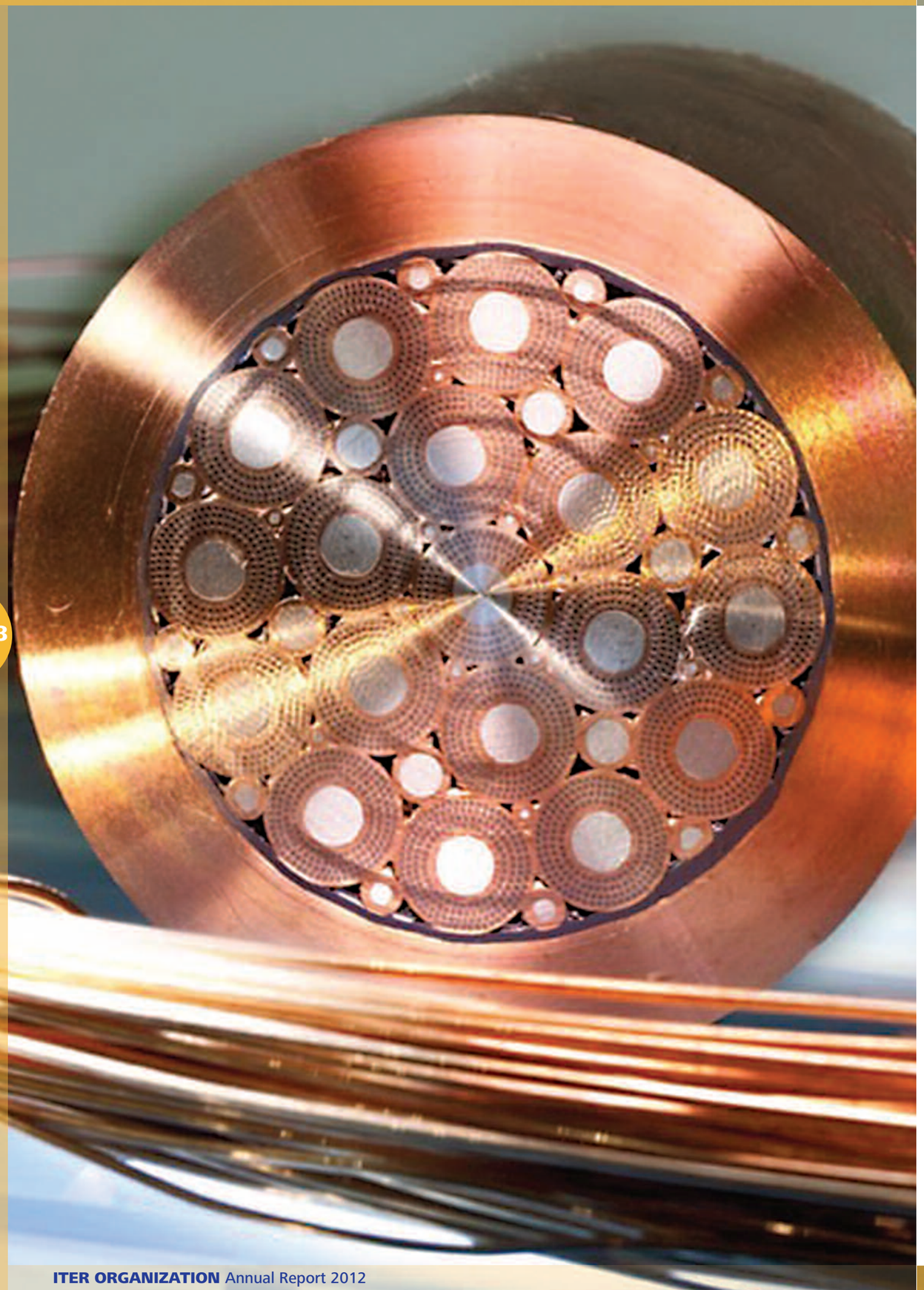
	Cash		Procurement Arrangements	TOTAL
	Money	Task Agreements and Secondments		
Members				
Euratom	53,900	10,525	13,119	77,544
China	24,488	486	3,903	28,877
India	18,961	312	3,725	22,998
Japan	20,540	-	30,877	51,417
Republic of Korea	20,252	1,096	2,105	23,453
Russian Federation	22,380	465	4,049	26,894
United States of America	9,450	4,044	9,475	22,969
Total income	**169,971**	**16,928**	**67,253**	**254,152**

Cumulative In-Kind Payments through 31 December 2012

Total in-kind

	Payments IUA				Payment in million EUR			
	Secondments	Task Agreements	Procurement Arrangements	TOTAL	Secondments	Task Agreements	Procurement Arrangements	TOTAL
Total In-Kind Member								
Euratom	15,466	15,612	39,270	70,348	23.69	24.71	62.17	110.57
China	-	1,703	2,410	4,113	-	2.69	3.90	6.59
India	-	2,764	4,600	7,364	-	4.31	7.32	11.63
Japan	594	-	44,234	44,828	0.87	-	70.13	71.00
Republic of Korea	271	3,921	2,800	6,993	0.40	6.17	4.44	11.01
Russian Federation	-	1,365	2,500	3,865	-	2.16	4.05	6.21
United States of America	1,531	9,740	8,350	19,621	2.31	15.39	13.36	31.05
Total income	**17,863**	**35,106**	**104,164**	**157,133**	**27.27**	**55.42**	**165.37**	**248.07**

These tables show tabulations in million Euros which could cause minor differences due to rounding.



DOMESTIC AGENCY PROCUREMENT HIGHLIGHTS

“Over 80 percent of the work packages that define the ITER scope have now been signed over to the ITER Domestic Agencies in China, Europe, India, Japan, Korea, Russia and the United States.”

Procurement Highlights key

R&D and manufacturing milestones

Major contracts

IO-DA milestones

Abbreviations

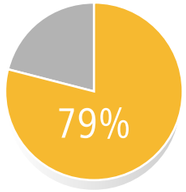
CDR Conceptual Design Review
DA Domestic Agency
FDR Final Design Review
I&C Instrumentation & Control
IO ITER Organization
PA Procurement Arrangement
PDR Preliminary Design Review

Left With one-third of cable-in-conduit unit lengths completed, shipments have begun between producing Domestic Agencies for winding operations.

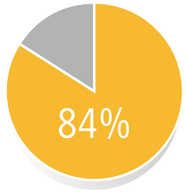
ITER China (CN-DA)

Procurement Arrangements

Eleven PAs signed since 2007, representing…

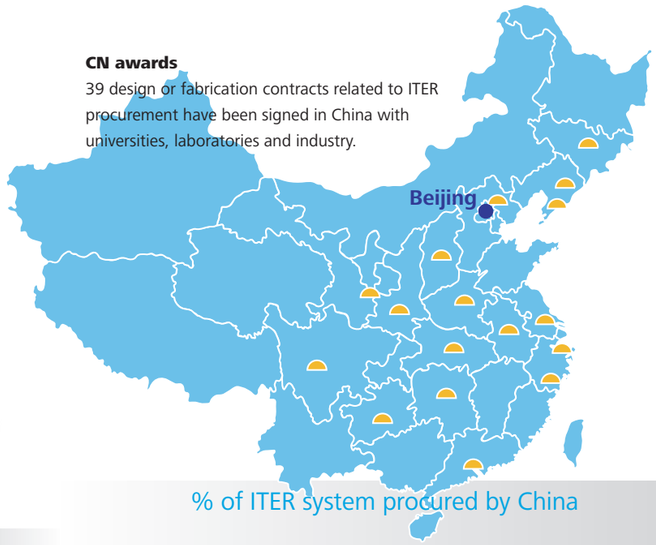


In number
…79% of CN work packages



In value
…and 84% of the total value of CN in-kind contributions

CN awards
39 design or fabrication contracts related to ITER procurement have been signed in China with universities, laboratories and industry.



Chinese procurement highlights 2012

% of ITER system procured by China

Magnet Systems

Toroidal Field Conductor — 7.5%
- Qualification phase completed
- Shipped to JA-DA: 660m TF dummy conductor and 68m TF superconductor
- Shipped to EU-DA: 100m TF dummy conductor and 32m TF superconductor

Poloidal Field Conductor — 62%
- Tube and welding qualification completed
- 737-metre copper dummy conductor for Poloidal Field Coil 5 (PF5) manufactured

Magnet Supports — 100%
- Test facility completed

Feeders — 80%
- Feeder conductor qualification phase completed
- High temperature superconductor (HTS) current lead prototype completed and key techniques qualified
- Top plate prototypes for the coil terminal box (CTB) and S-bend box (SBB) thermal shields fabricated
- In-cryostat feeder prototype for Poloidal Field Coil 5 manufactured
- Joint review of feeder manufacturer drawings for Phase II
- Shipped to another CN facility: copper dummy CB (corrector busbar)
- Shipped to another CN facility: copper dummy MB (main busbar)

Correction Coils — 100%
- Manufacturing line completed at ASIPP (tooling qualification underway)
- Assembly of laser welding system and vacuum pressure impregnation equipment completed
- Conductor qualification phase completed
- Shipped to another CN facility: 916m CC copper dummy conductor
- Shipped to another CN facility: 200m CC superconductor

Power Systems
- Joint IO-DA workshop in February on instrumentation and control for the coil power supply system

Pulsed Power Electrical Network — 100%
- PA signed in June

AC/DC Converter — 55%
- Contract signed for design and integration in February
- PDR for the poloidal field AC/DC power converters
- Contracts awarded for major components of a full-scale converter prototype in October
- Power test facility set up and commissioned by supplier ASIPP to test the AC/DC converter

Reactive Power Compensation — 100%
- Contract signed for design and integration in February
- PDR for the reactive power compensation and harmonic filtering system

Blanket
- FDR for the ITER blanket held in April

Blanket First Wall — 12.6%

Blanket Shield — 50.2%

Fuelling

Gas Injection System — 100%
- PA signed in February

Glow Discharge Cleaning — 100%

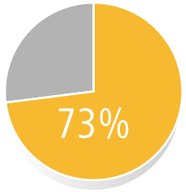
Diagnostics

Diagnostics — 3.22%

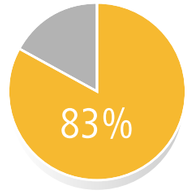
ITER Korea (KO-DA)

Procurement Arrangements

Eight PAs signed since 2007, representing…

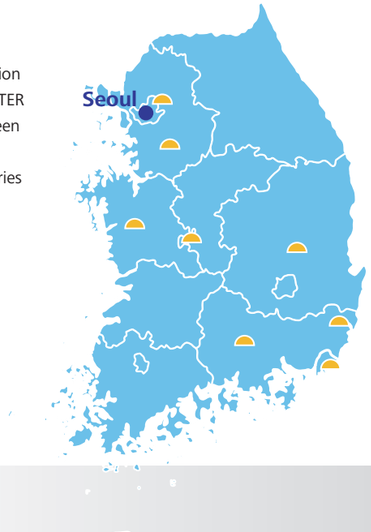


In number
…73% of KO work packages



In value
…and 83% of the total value of KO in-kind contributions

KO awards
35 design or fabrication contracts related to ITER procurement have been signed in Korea with universities, laboratories and industry.



Korean procurement highlights 2012

% of ITER system procured by Korea

Vacuum Vessel

Main Vessel (2 of 9 segments) — 21.3%
- First manufacturing activities for the ITER vacuum vessel (cutting/welding operations on Sector 6 and ports)
- 633 stainless steel forgings for the vacuum vessel delivered from Germany

Equatorial Ports — 100%

Lower Ports — 100%
- Design of lower ports approved by Agreed Notified Body

Blanket

Blanket Shield Block — 49.8%
- FDR for the ITER blanket held in April

Power Systems
- Joint IO-DA workshop in February on instrumentation and control for the coil power supply system

AC/DC converter — 37.3%
- Manufacturability of elements of the vertical stabilization and correction coil converters demonstrated at Dawonsys Co.
- Test bench set up for coil power supply master control
- Preliminary engineering design review completed for AC/DC magnet power converters

Magnet Systems

Toroidal Field Conductor — 20.18%
- 7 of 19 right double pancakes and 5 of 8 side double pancakes produced
- Authorization To Proceed Point (ATPP) granted by the ITER Organization for the last batch of toroidal field conductor jacket sections

Thermal Shield

Vacuum Vessel Thermal Shield and Cryostat Thermal Shield — 100%
- Final design approved for the thermal shields and manufacturing call for tender launched.

Assembly Tooling

Machine Assembly Tooling — 100%
- Mockups for sector sub-assembly and sector assembly tools manufactured
- Third package of assembly tooling manufacturing contracts awarded

Fuel Cycle

Tritium Storage & Delivery — 81.5%
- R&D progress on the storage and delivery of tritium: storage vessels tested
- Contract placed for second-stage design

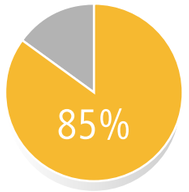
Diagnostics

Diagnostics — 3.2%
- Diagnostic amendment signed for VUV Core Survey Spectrometer and Divertor VUV Spectrometer
- Memorandum of Understanding signed for the purchase of port plug structures from a common manufacturer

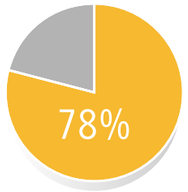
Russian Federation ITER Project Center (RF-DA)

Procurement Arrangements

Eleven PAs signed since 2007, representing…

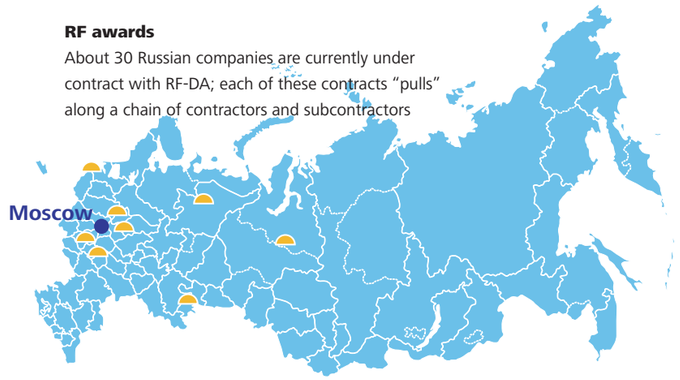


In number
…85% of RF work packages



In value
…and 78% of the total value of RF in-kind contributions

RF awards
About 30 Russian companies are currently under contract with RF-DA; each of these contracts "pulls" along a chain of contractors and subcontractors



Russian procurement highlights 2012

% of ITER system procured by Russia

Power Systems

- Joint IO-DA workshop in February on instrumentation and control for the coil power supply system
- **Switching Network, Fast Discharge Units, DC Busbar and Instrumentation** — 100%
- PDR held for switching networks and fast discharge units held in February
- Full-scale prototypes successfully tested (DC busbar, fast disconnector switch, fast open switch…)

Magnet Systems

- **Toroidal Field Conductor** — 19.3%
- 760-metre niobium-tin (Nb3Sn) cable manufactured in Podolsk
- First jacketing operations at Protvino completed successfully
- Nine unit lengths completed
- Full-size sample test of conductor (with bronze route strands) performed at SULTAN
- Shipped to EU-DA: Copper dummy unit length
- Shipped to EU-DA: 100-metre qualification conductor
- Contract placed for strand verification and conductor global leak test
- **Poloidal Field Conductor** — 20%
- Tooling qualified for poloidal field winding line
- 100-metre copper dummy completed
- 40-metre niobium-titanium (NbTi) dummy completed
- Shipped to EU-DA: delivery of all Phase II cable lengths completed
- **Poloidal Field Magnet No.1** — 100%
- Manufacturing contract for PF1 placed with the Efremov Institute

Blanket

- FDR for the ITER blanket held in April
- **Blanket First Wall** — 40%
- **Blanket Module Connectors** — 100%

Divertor

- **Dome** — 100%
- Qualification activities successfully completed
- Contract signed for R&D on dome plasma-facing components with NIIEFA (St. Petersburg)
- **Plasma-Facing Component Tests** — 100%
- ITER Divertor Test Facility begins operations in October, testing the outer vertical target from JA-DA
- Contract signed for high heat flux testing of the full-tungsten inner and outer vertical targets

Vacuum Vessel

- **Upper Ports** — 100%
- Contract awarded for the manufacture of vacuum vessel upper ports

Diagnostics

- **Diagnostics** — 17%
- Diagnostic amendment signed for the Neutral Particle Analyzer System
- Memorandum of Understanding signed for the purchase of port plug structures from a common manufacturer

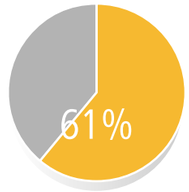
Heating & Current Drive Systems

- **Radio Frequency Power Sources (Electron Cyclotron)** — 31%
- PA signed for Electron Cyclotron gyrotrons in June (for 8 gyrotrons out of ITER's 26)
- Russian prototype gyrotron successfully tested at 1 MW for 1000 seconds

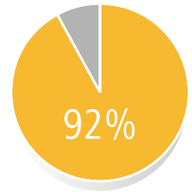
US ITER (US-DA)

Procurement Arrangements

Eleven PAs signed since 2007, representing…

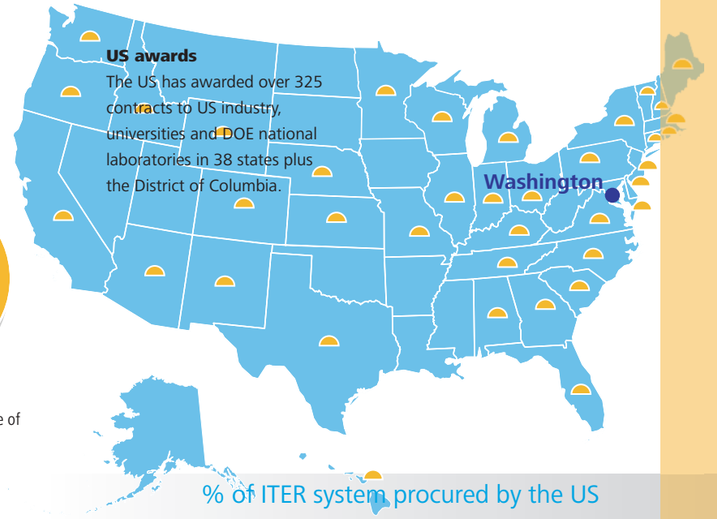


In number
…61% of US work packages



In value
…and 92% of the total value of US in-kind contributions

US awards
The US has awarded over 325 contracts to US industry, universities and DOE national laboratories in 38 states plus the District of Columbia.



US procurement highlights 2012

% of ITER system procured by the US

Cooling Water System

- **Tokamak Cooling Water System** — 100%
- Produced stainless steel plates for drain tank heads
- Began drain tank fabrication
- PDR held for Tokamak Cooling Water System

Magnet Systems

- **Central Solenoid Modules and Associated Structure** — 100%
- Central Solenoid Module Fabrication Facility completed
- Tooling final requirements established
- Fabricated one-piece and multi-piece tie-plate prototypes for support structure
- Contract placed for winding stations
- PDR held for central solenoid assembly tooling
- **Toroidal Field Conductor** — 8%
- Completed all strand production in base contracts
- 100-metre and 770-metre dummy conductor cabling completed
- 100-metre dummy jacketing and integration completed

Diagnostics

- **Port-Based Diagnostic Systems** — 14%
- Diagnostic amendment signed for Low Field Side Reflectometer
- Diagnostic amendment signed for Visible/Infrared cameras
- Diagnostic amendment signed for Toroidal Interferometer Polarimeter

Heating & Current Drive Systems

- **Ion Cyclotron Transmission Lines** — 88%
- Test stand operated at 6 MWs for >1500 seconds
- PDR held for complete system
- Contract awarded for capacitor cooling water system
- **Electron Cyclotron Transmission Lines** — 88%
- Preliminary design for main transmission line sent to the ITER Organization
- Subcontract awarded for fabrication of high-precision straight waveguide prototype sections

Fuel Cycle

- **Vacuum Auxiliary and Roughing Pump Stations** — 100%
- Shipped to ITER Organization: first vacuum acceptance test components
- Contracts awarded for full-size prototype cryogenic viscous compressor and vacuum acceptance testing equipment
- **Tokamak Exhaust Processing System** — 88%
- **Pellet Injection System** — 100%
- Pellet extruder and pellet pacing tested at DIII-D
- Test loop developed for the pellet injection gas recirculation system
- **Disruption Mitigation System** — 100%
- CDR held for Disruption Mitigation System

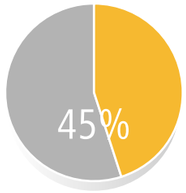
Power Systems

- **Steady State Electrical Network** — 75%
- PA signed for Steady State Electrical Network in September
- Contract awarded for engineering support subcontractor

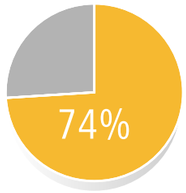
ITER Japan (JA-DA)

Procurement Arrangements

Nine PAs signed since 2007, representing…

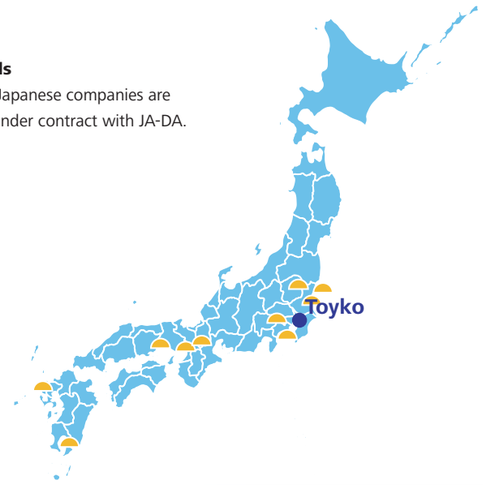


In number
…45% of JA work packages



In value
…and 74% of the total value of JA in-kind contributions

JA awards
About 15 Japanese companies are currently under contract with JA-DA.



Japanese procurement highlights 2012

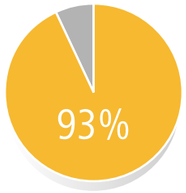
% of ITER system procured by Japan

Magnet Systems		
Toroidal Field Conductor (33 of 133)	25%	
24 toroidal field conductor fabricated		
12 conductor hold points cleared by the ITER Organization and their credits obtained		
Toroidal Field Windings (9 of 19)	49%	
Process Qualification Phase-II a completed		
Contract awarded for first toroidal field coil		
Toroidal Field Structures	100%	
Contract awarded for first set of toroidal field coil structures		
Optimization of manufacturing processes		
Central Solenoid Conductor	100%	
Two new strand producers qualified after successful tests of samples at SULTAN (Switzerland)		
Contract awarded for strands and cables		
Contract awarded for jacket sections		
Contract awarded for central solenoid conductor		
Heating & Current Drive Systems		
ITER & Neutral Beam Test Facility (NBTF) High Voltage (HV) Bushing	100%	
Two contracts awarded for HV bushing		
Power Supply System for ITER and NBTF	59%	
PA signed in February		
Contract signed for neutral beam power supply		
Electron Cyclotron Radio Frequency Gyrotron (for 8 gyrotrons out of ITER's 26)	31%	
5 kHz full power modulation experiment demonstrated		
Electron Cyclotron Equatorial Launcher	71%	
Mockup fabricated		
Blanket		
In-Vessel Blanket Remote Handling Equipment	100%	
Contract signed for Preliminary Design phase		
Divertor		
Outer Target	100%	
Qualification activities for outer vertical targets successfully completed		
Fuel Cycle		
Atmosphere Detritiation System	50%	
Pilot-scale tests with wet scrubber columns on going		
Diagnostics		
Diagnostics	14.2%	
PA for first element of overall JA diagnostics (Micro Fission Chambers) signed in April		

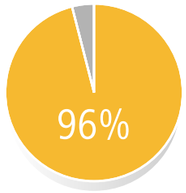
ITER India (IN-DA)

Procurement Arrangements

Fourteen PAs signed since 2007, representing…

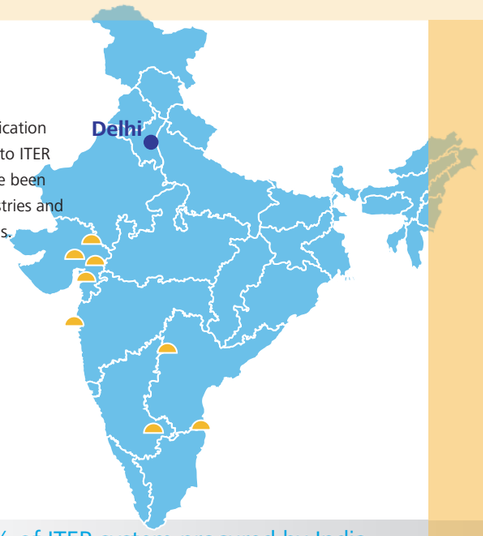


In number
…93% of IN work packages



In value
…and 96% of the total value of IN in-kind contributions

IN awards
15 design or fabrication contracts related to ITER procurement have been signed with industries and R&D organizations.



India procurement highlights 2012

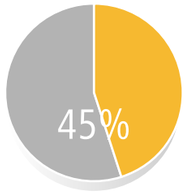
% of ITER system procured by India

Cryostat and Vacuum Vessel Pressure Suppression		
Cryostat	100%	
Contract awarded for manufacture and assembly (including temporary on-site workshop)		
Manufacturing drawings underway		
Vacuum Vessel Pressure Suppression System	100%	
Design support provided to the ITER Organization		
Cryogenic Systems		
Cryolines	100%	
PA signed for Cryolines Late Delivery in January		
Design of prototype cryolines completed		
Test laboratory constructed, equipment installation underway		
Contract signed for prototype cryoline (PTCL) test facility infrastructure		
PTCL Test Facility Infrastructure Manufacturing Readiness Review carried out		
Cryodistribution	100%	
PA signed for Cryodistribution Components in April		
Heating & Current Drive Systems		
Dedicated 22kV feeder facility under procurement for ITER power supplies		
PDR held for diagnostic neutral beam front-end components, beam source and beam line		
PDR held for ion cyclotron resonance heating system		
Diagnostic Neutral Beam Power Supply and Beam Line	100%	
PDR held for diagnostic neutral beam drift duct		
PDR held for diagnostic neutral beam power supply		
R&D carried out on material and processes (electron beam welding, deep drilling)		
Neutral Beam Test Facility components	2%	
Contracts signed for the SPIDER 100kV power supply and beam dump		
Ion Cyclotron Radio Frequency Power Sources	100%	
Two R&D contracts signed for the development of driver & final stage amplifiers		
Internal R&D work initiated for pre-driver stage, low power RF section and local control unit		
Ion Cyclotron Heating & Current Drive Radio Frequency Power Supply (8 out of 18)	44%	
PDR held for Ion Cyclotron High Voltage Power Supply		
Full-scale industrial prototype developed		
Electron Cyclotron High Voltage Power Supply	30%	
PA signed for Electron Cyclotron High Voltage Power Supply in October		
Electron Cyclotron Radio Frequency Gyrotron	8%	
PA signed for Electron Cyclotron gyrotrons in October (for 2 gyrotrons out of ITER's 26)		
Design, procurement and development activities underway for the IN-DA gyrotron test facility		
Cooling Water System		
Heat Rejection System, Component Cooling Water System, Chilled Water Systems	100%	
PDR completed for Heat Rejection System		
PDR completed for Component Cooling Water System and Chilled Water System		
Vacuum Vessel		
In-Wall Shielding Block Assemblies	100%	
First manufacturing drawings sent to the ITER Organization		
Pre-manufacturing and testing activities underway		
Inspection of materials carried out at production site (~60% material received at manufacturer site)		
Diagnostics		
Diagnostics	3.2%	
PA for first element of overall IN diagnostics (Edge Imaging X-Ray Spectrometer) signed in March		

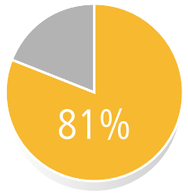
Fusion for Energy (EU-DA)

Procurement Arrangements

Twenty-two PAs signed since 2007, representing…

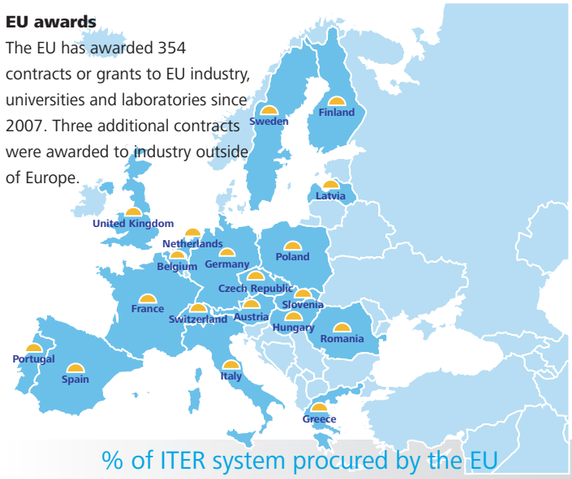


In number
…45% of EU work packages



In value
…and 81% of the total value of EU in-kind contributions

EU awards
The EU has awarded 354 contracts or grants to EU industry, universities and laboratories since 2007. Three additional contracts were awarded to industry outside of Europe.



EU procurement highlights 2012

% of ITER system procured by the EU

Buildings

Buildings Construction, Architect Engineer Services, Tokamak Pit Excavation and Drainage, Seismic Isolation Pads	100%
Tokamak Complex ground support structure and seismic isolation system (including 493 anti-seismic columns and bearing) completed	
Contract awarded for civil and finishing works for the Tokamak Complex	
Poloidal Field Coils Winding Facility handed over to EU-DA	
Contract awarded for site infrastructure works	
Architect Engineer Services	45%
ITER Headquarters	53.5%
Headquarters building completed	

Magnet Systems

Toroidal Field Conductor	20.18%
68.3 tons of toroidal field niobium-tin strand produced	
Jacketing line completed in Chivasso	
First production toroidal field conductor length produced	
Toroidal field conductor samples TFEU7 and TFEU8 tested at SULTAN	
Toroidal Field Magnet Windings (10 of 19)	53%
Successful completion of side radial plate and regular radial plate prototypes	
Contract awarded for radial plate series production	
Winding line in La Spezia completed and tooling commissioned, installation and commissioning of heat treatment furnace	
Pre-Compression Rings	100%
Manufacturing contract awarded	
Poloidal Field Conductor	18%
Qualification activities for poloidal field conductor jacket weld	
Poloidal Field Magnets 2-6	100%

Heating & Current Drive Systems

PDR held for heating neutral beam core components and front-end	
ELISE test facility in Germany entered operations	
Ex-Vessel Neutral Beam Remote Handling	100%
Power Supply Heating Neutral Beam	35%
Amendment to 2009 PA for Heating Neutral Beam Power Supply (low voltage) signed	
Neutral Beam Test Facility	64%
Construction began on the buildings	
Component procurement contracts signed	
Neutral Beam Test Facility components	56%
Contract signed for the SPIDER beam source and vessel	
Neutral Beam Assembly, Testing, Active Compensation & Correction Coils	100%
Neutral Beam Beam Source and High Voltage Bushing	41%
Neutral Beam Pressure Vessel, Magnetic Shielding	76%
Ex-Vessel Neutral Beam Remote Handling System	100%
CDR held for neutral beam remote handling system	
Ion Cyclotron Antenna	57%
PDR held for ion cyclotron antenna	
Contract awarded for high heat flux testing of Faraday screens	
Electron Cyclotron High Voltage Power Supply	62%
PA for Electron Cyclotron HV Power Supply signed in May	
Electron Cyclotron Upper Launchers	75%
Electron Cyclotron Radio Frequency Gyrotrons (8 out of ITER's 26)	31%

Fusion for Energy (EU-DA) continued…

Vacuum Vessel

Main Vessel (7 of 9 segments)	80%
Pre-manufacturing activities and material procurement initiated	
Ex-Vessel Remote Handling Transfer Cask System	100%
In-Vessel Remote Handling Viewing and Metrology	100%

Divertor

Inner Vertical Targets	100%
Qualification activities carried out	
Two contracts signed for the manufacturing of full-size prototypes	
Cassette Body and Assembly	100%
PA signed for Divertor Cassette Body and Assembly in May	
In-Vessel Remote Handling Divertor	100%
PA signed for In-Vessel Remote Handling Divertor in October	
Divertor Rail	100%

Blanket

Blanket First Wall	47.4%
Contract awarded for normal heat flux and enhanced heat flux first wall mockups and semi-prototypes	
Blanket Cooling Manifolds	100%

Power Systems

Joint IO-DA workshop on buildings and power supplies	
Steady State Electrical Network (SSEN), Pulsed Power Electrical Network (PPEN) and Detailed System Engineering Design	100%
SSEN and PPEN Installation	100%
Emergency Power Supply	100%
SSEN Components	25%

Cryogenic Systems

Cryoplant, LN2 Plant and Auxiliary Systems	50%
Optimization of the system configuration (in particular for helium storage)	
Front End Cryo-Distribution: Warm Regeneration Lines	100%
PDR held for cryopump front-end distribution warm generation lines	
Design progress for cold valve boxes	
Front End Cryo-Distribution: Front End Cryopump Distribution	100%

Fuel Cycle

Water Detritiation System	100%
PA signed for Water Detritiation System Tanks in December	
Kick-off meeting on new highly tritiated water processing	
Hydrogen Isotope Separation System	100%
Leak Detection	100%
Cryopumps, Torus (8) and Cryostat (2)	100%
Tender actions launched for the manufacturing of first full-size cryopumps	

Diagnostics

Diagnostics	25%
Memorandum of Understanding signed for the purchase of port plug structures from a common manufacturer	

Radioactive Materials

Waste Treatment & Storage	100%
Radiological Protection	100%
CDR completed for radiological and environmental monitoring systems	
Framework contract signed for engineering support for radiological and environmental monitoring systems and for radwaste	

Organizational Structure

Financial Audit Board

Science and Technology Advisory Committee

ITER Council

Management Advisory Committee

Test Blanket Module Program Committee

- **Office of the Director-General**
  - IO Strategic Planning
  - External Relations
  - Communication
- **ITER Council Secretariat**
- **Internal Audit Service**
- **Legal Affairs**

Director-General Osamu Motojima

- **Project Board**
- **Bureau of International Cooperation**
- **IO-DA Coordination**

Administration

General Administration

- **Human Resources**
- **Procurement & Contract**
- Document Control
- General Services

Finance, Budget & Management Systems

- **Finance & Budget**
- Project Information System
- System Management

ITER Project

Plasma Operation

- **Science**
  - Divertor & Plasma Wall Interactions
  - Integrated Modelling
  - Plasma Confinement
  - Plasma Stability
  - Plasma Operations
- **Technology**
  - Test Blanket Modules

Tokamak

- **Internal Components**
  - Blanket
  - Tungsten Divertor
- **Magnets**
  - Torodial Field Coil
  - Poloidal Field Coil
  - Central Solenoid & Correction Coil
  - Superconductor Systems & Auxiliaries
- **Vessel**
  - Vacuum Vessel Ports & Thermal Shield
  - Cryostat & Vacuum Vessel Pressure Suppression System

Central Engineering & Plant

- **Electrical Engineering**
  - Coil Power Supply
  - Electrical Power Distribution
- **Fuel Cycle Engineering**
  - Tritium Plant
  - Fuel & Wall Conditioning
  - Vacuum
- **Plant Engineering**
  - Cooling Water System
  - Cryogenic System
  - Hot Cell & Radwaste Services Integration
  - Radwaste Treatment & Storage

CODAC, Heating & Diagnostics

- **Control System**
  - CODAC
  - Plant Control & Instrumentation
- **Diagnostics**
  - Port Based Systems
  - Divertor Systems
  - In Vessel & Distributed Systems
  - Diagnostic Engineering & Generic Components
- **Heating & Current Drive**
  - Electron Cyclotron
  - Ion Cyclotron & Lower Hybrid
  - Neutral Beam

Buildings & Site Infrastructure

- Building Systems
- Site Management & Logistics
- Nuclear Buildings
- Non Nuclear Buildings

Central Integration & Engineering

- **Assembly & Operations**
  - Machine Assembly & Installation
  - Operations
  - Remote Handling
- **CAD & Design Coordination**
  - Design Configuration & Control
  - Mechanical Design
  - Plant Design
- **Project Controls**
- **Technical Integration**
  - Design Integration
  - Systems Analysis & Standards
  - Systems Engineering & Configuration Management

Safety, Quality & Security

- **Health & Safety Control**
- **Nuclear Safety & Analysis**
- **Quality Assurance**
- Licensing Cell
- Security Coordination

The symbol of the year: a completed Tokamak Pit. Next year, the seismic columns and pads will be hidden from view by the floor slab of the Tokamak Complex. *Photo: Engage-AP*