F4E NEWS

FUSION FOR ENERGY QUARTERLY NEWSLETTER - **APRIL 2010**

INDEX

IN THE SPOTLIGHT

In mid-February, Frank Briscoe took up duties as F4E Director. He started his scientific career in 1971 and after spending three years with British Gas he then joined the United Kingdom Atomic Energy Authority (UKAEA) to work on fission projects. From 1985, he became increasingly involved in the management of fusion activities and the supply of high technology equipment to third parties. From 1996, he managed all UKAEA operational activities at the Culham Science Centre including the fusion experiments MAST and from 2000 onwards, JET. Frank Briscoe was awarded an OBE in 2007 in recognition of his major contribution to international collaboration in fusion science. After leaving Culham in 2008, he led an independent assessment of the cost estimates of the ITER Organization for the construction of ITER.

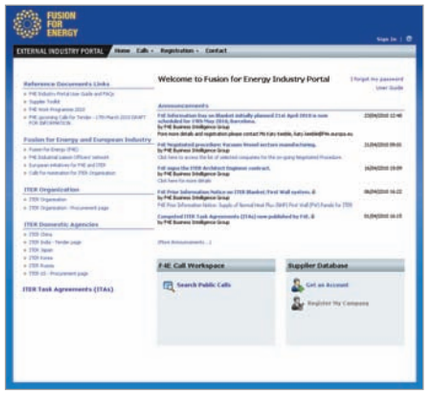
"My aim is to work hand in hand with all ITER parties and with the support of F4E staff make sure that Europe will deliver"

His second day in office was marked by the first official visit of the delegation of the European Parliament's Industry, Research and Energy (ITRE) Committee where fusion was presented as part of a long-term energy mix in response to the increasing global demand and the need for steady supply. The opportunities ahead for European industry and SMEs together with a set of ideas compatible with the Small Business Act were also outlined. "Discussing with policy-makers the scientific and technological progress that we make together with the challenges that we face is an essential part of the dialogue with those who have a say on the European Union's R&D priorities". For Briscoe, the other step that we take through ITER is bringing science closer to industry. "ITER is at the cross-roads of many different technologies which will push forward know-how and foster cross-national collaboration in order to meet the manufacturing of the complex components. Our aim is to get industry involved in the most suitable way in order to feel ownership of the ITER project".

Briscoe's last point is best illustrated through the recent signature of contracts of the PF Coils fabrication building and the superconducting niobium-tin wire. The signature of the Architect Engineer contract together with the launch of the tender for the supply of seven Vacuum Vessel sectors highlight Europe's commitment to ITER and mark the beginning of a productive year. The new industry portal has also come along to offer a new dynamic platform for economic operators who would like to be informed about new calls, find out more about the progress of ongoing tenders and network with other companies.

"My aim is to work hand in hand with all ITER parties and with the support of F4E staff make sure that Europe will deliver" says Briscoe.

F4E LAUNCHES ONLINE INDUSTRY PORTAL



The new F4E industry portal

F4E's new online industry portal is now available. The portal is a one-stop shop for anyone who wants to find F4E operational calls for tender as the search function allows users to search on the title, reference number, stage of procedure or status. F4E's industry portal also includes a supplier database which allows companies to register, thus giving them a greater visibility at F4E. It is also useful for companies looking for partners and wanting to network. In the near future, the database will also give registered companies visibility at other ITER Domestic Agencies.

The industry portal offers links to key reference documents and contacts details to all national ILOs and their F4E/ITER initiatives. Links for ITER procurement pages and contacts for the other ITER Domestic Agencies are available as well. The "Announcement" section of the portal serves as a message board to remind of upcoming deadlines for calls and future procurement related-meetings.

F4E's industry portal will continue to develop - future plans include allowing users to answer calls for tender electronically via the website.

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

F4E SIGNS THE ITER ARCHITECT ENGINEER CONTRACT, ONE OF THE BIGGEST ENGINEERING CONTRACTS EVER IN EUROPE

Worth approximately 150 million EUR, the Architect Engineer contract for ITER buildings and civil infrastructures was awarded to the Engage Consortium.

It represents a total of around 1,700,000 hours of work, spread over the 8 years foreseen for the design and the construction of ITER buildings bringing together 230 engineers and designers.

The Health and Safety Protection Coordination and Legal Inspection Services contract was also signed, worth approximately 9 million EUR and was awarded to Apave.

The Architect Engineer will assist F4E during the entire construction process, from the elaboration of the detailed design to the final acceptance of the works, including the ITER buildings, as well as the site infrastructures and the distribution of the power supplies. At the peak of the design activity, more than 230 engineers and designers will be working under this contract.

While most of these teams will be working in F4E's premises in Cadarache, some specific design tasks will be performed in one of the ENGAGE Consortium's companies' offices in Spain (Empresarios Agrupados), United Kingdom (Atkins) or France (Assystem and Iosis).

In addition to signing the Architect Engineer contract, F4E also signed the Health and Safety Protection Coordination and Legal Inspection Services contract with Apave.

The contract will review the design during conception phase, establish the health and safety plan and follow up the work during the construction phase. The ITER project will comply with French legal requirements regarding the solidity of Nuclear and Non Nuclear buildings.

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It represents a total of around 1,700,000 hours of work, spread over the 8 years foreseen for the design and the construction of ITER buildings

01 F. Briscoe, F4E Director, awards contract to S. Aubarbier, Engage Consortium
02 F. Briscoe, F4E Director, awards contract to A. Feraud, Apave
03 Artist's impression of ITER building and civil infrastructures. © Engage, 2010

CONTRACT FOR PF COIL FABRICATION BUILDING AWARDED

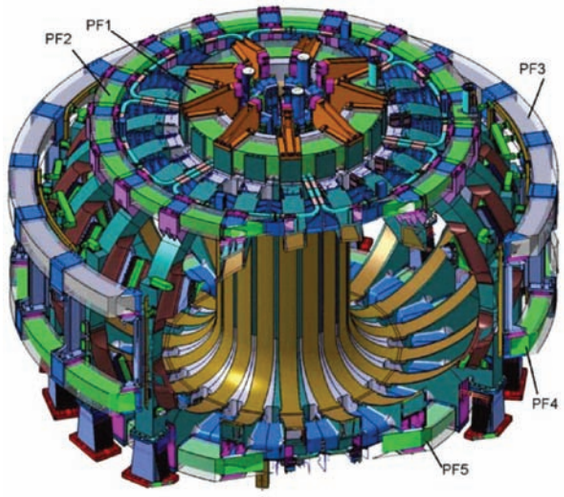
01

F4E awarded the contract for the design and construction of the Poloidal Field (PF) coil fabrication building to the consortium Spie batignolles, Omega Concept and Setec on 16 December 2009. The first of its kind, this contract marks the start of the F4E ITER buildings construction.

The PF coil fabrication building is a non-nuclear building which will measure approximately 250 metres long, 45 metres wide and 17 metres high. It will include regular building services (HVAC, electrical, piping), two large cranes (one standard crane weighing 25 tons, and one special crane weighing 50 tons), a small set of offices, a parking and two docking areas for the unloading and temporary placement of coils.

The Poloidal Field magnets will generate a magnetic field to control the plasma column position, keeping it away from the walls, and contributing in maintaining the plasma's shape and stability inside the Vacuum Vessel. The Poloidal Field coil system consists of six horizontal, circular coils placed outside the Toroidal Magnet structure. Because of their very large size, winding of five of the six PF coils will take place on site in the future PF coil winding building.

The contract for the PF coil fabrication building was signed on 13 January by F4E and François Xavier Cledat, President of Spie batignolles, during a ceremony at the ITER construction site in Cadarache.



02

01 The future PF coil fabrication building
02 The Poloidal Field coil system consists of six independent coils placed outside the Toroidal Magnet structure

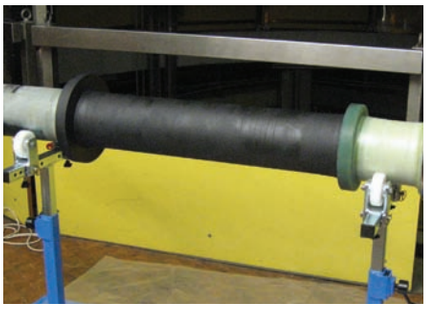
F4E AWARDS 24.5 MILLION EUR CONTRACT FOR SUPERCONDUCTING NIOBIUM-TIN WIRE

Fusion for Energy has awarded a 24.5 million EUR contract for the supply of 37 tons of high-performance superconducting niobium-tin wire to the Bruker EAS GmbH subsidiary in Hanau. The niobium-tin strand wire will be used to make superconducting magnets that will confine the plasma in ITER. The deliveries are foreseen to begin during the second half of 2010, and phased over the next 30 months thereafter.

This contract is the last of several contracts concerning Europe's contribution of conductors to ITER. In total, all these F4E contracts mean the production of 95 tons of niobium-tin wire.

(Image courtesy of Bruker EAS)
Test equipment for final checking of the wires

HTS CURRENT LEADS PROCUREMENT ARRANGEMENT SIGNED

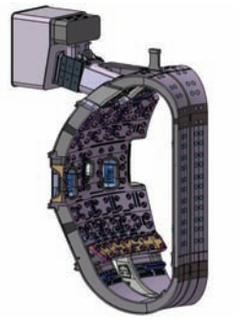


On 1 February, the Procurement Arrangement (PA) between F4E and the Japanese Atomic Energy Agency regarding Europe's contribution of High Temperature Superconducting (HTS) current leads to the JT-60SA project was signed. The JT-60SA project is one of the three projects which are jointly being implemented within the Broader Approach Agreement. This PA defines the terms of delivery of the "in kind" contribution as 26 HTS current leads which will be designed, constructed and tested by the Karlsruhe Institute of Technology (KIT). Delivery of the first current lead to Japan is foreseen for 2014.

The HTS current leads are the vital electrical links between the power supplies and the 18 Toroidal Field coils (in three groups of six), the four modules of the Central Solenoid, and the six Equilibrium Field coils of the JT-60SA tokamak. The HTS current leads allow a significant reduction of the refrigeration requirements.
The HTS current leads for JT-60SA are based on KIT's development of similar current leads for the Wendelstein 7X project at the Max Planck Institut für Plasmaphysik in Greifswald, Germany.

(Image courtesy of KIT) A prototype HTS current lead from the W7-X project. On the left-hand side of the prototype is the warm electrical contact connecting to the power supplies, to the right, the cold electrical contact which connects to the 18 Toroidal Field coils, the four modules of the Central Solenoid, and the six Equilibrium Field coils. The black middle section is the flange used to fix the current lead.

CALL FOR TENDER FOR SUPPLY OF SEVEN VACUUM VESSEL SECTORS LAUNCHED



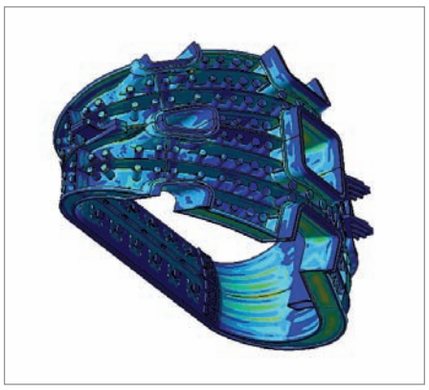
An important milestone in the European ITER project procurement was reached on 12 February when F4E launched the call for tender for the supply of seven Vacuum Vessel sectors. A vital part of the ITER machine, the Vacuum Vessel sectors will join together to form the tokamak-the doughnut-shaped device inside the ITER machine which contains the 150 million degrees centigrade hot, electrically charged plasma necessary to produce fusion.

In total, the tokamak will consist of nine Vacuum Vessel sectors. Additional to the seven that Europe is producing, the remaining two will be contributed by the Korean Domestic Agency.

Further information about this tender which is addressed to the economic operators that were selected via the foregoing restricted procedure can be found under the heading Negotiated Procedures – "F4E-2010-OPE-068 (MS-VV)" (http://fusionforenergy.europa.eu/Procurement_operational.htm).

With this launch, Europe demonstrates its commitment to its procurement responsibilities and the ITER project in general.

A Vaccum Vessel sector



INTRODUCING OUR INDUSTRY PARTNERS NATEC INGENIEROS

Located on Spain's northern coast, NATEC Ingenieros is a firm specialised in engineering through Finite Element Method (FEM) analysis using Ansys, the general-purpose finite element analysis software package. The company provides engineering and advanced simulation services, in the fields of mechanical, thermal, thermo-hydraulic, structural, electromagnetic and CFX engineering. Simulation is an essential tool for design, saving manufacturing time and costs, and making R&D solutions possible.

NATEC Ingenieros has substantial experience in nuclear and non-nuclear components design, mechanical analysis and stress reports preparation according to codes RCC-MR, ASME and EN standards. The company produces cost-optimised designs for manufacture.

NATEC has been providing simulation, engineering and design support to F4E and ITER IO for the past three years. Julio Guirao, Natec Ingenieros' General Manager, says "Our services in advanced and time-competitive welding simulation, distortion predictions and optimisation for welded assemblies are strong points that could play an essential role in the design and manufacture of ITER systems".

Example of the work Natec Ingenieros has carried out for the ITER project: 3D solid Finite Element modelling of a Vacuum Vessel sector

BROADER APPROACH JT-60SA WEBSITE NOW LIVE

The website of JT-60SA is now launched.

The site describes the scientific and technological objectives of JT-60SA, gives a timeline and shows the current progress with procurement and assembly.

JT-60SA is a fusion experiment designed to support the operation of ITER and to investigate how best to optimise the operation of fusion power plants that are built after ITER. It is one of the research and development projects under the Broader Approach Agreement involving Japan and Europe, and is being built in Naka, Japan, using infrastructure of the existing JT-60 Upgrade experiment. SA stands for "super, advanced", since the experiment will have superconducting coils and study advanced modes of plasma operation.

www.jt60sa.org

EU LAUNCHES ITS NEW RESEARCH WEBSITE ON ENERGY

With more than 15,000 hits a month on average and an impressive make over hosting more public-oriented content together with a forum to react with comments and ideas on energy and nuclear research in Europe, the new website of the European Commission's Directorate General for Research promises to bring closer to the citizens ongoing and future research.

A new revamped section on fusion research offers information on the science behind fusion, news and events, the ITER project and the different funding opportunities where F4E is listed as the EU's organisation responsible for Europe's contribution to ITER.

www.ec.europa.eu/research/energy

SPANISH EU PRESIDENCY KICKS OFF

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The new decade kicks off with Spain taking over from Sweden the Presidency of the Council of the European Union and carrying out this responsibility for the fourth time in history.

Spain is asked to offer political leadership at a period when the EU needs to adjust in the new institutional setting of the Lisbon Treaty and offer policy responses to areas that touch Europe's economic growth and jobs. So how do the areas of innovation, research, energy and climate change fit in all this?

It should come as no coincidence that Spain's programme – Innovating Europe – attaches particular emphasis on policies of education, R&D and innovation in order to strengthen Europe's competitiveness and generate quality jobs as a way out of the economic crisis. Strengthening the prospects of a European Research Area and promoting innovation in all its facets will be two cross cutting parameters of the Presidency. With respect to energy, it is envisaged that a new 2010-2012 Action Plan will be approved in order to promote diversification of energy sources and the implementation of a common market. In the area of climate change, the Spanish Presidency will use the outcomes of the Copenhagen Summit as a basis for further regulatory proposals.

The priorities of the Spanish Presidency are expected to gain momentum with the launch of the European Commission's Europe 2020 strategy which confirms the target of the EU to invest 3% of its GDP to R&D and the need to promote smart, sustainable and inclusive growth. "Resource efficient Europe", is one of the flagship initiatives which aim to make Europe stick to the 2020 objectives of the SET plan, where fusion is also mentioned as a long-term solution. The move towards a low carbon economy is expected to save Europe 60 billion EUR in oil and gas imports.

In an attempt to communicate better to citizens the link between the priorities set by the Spanish Presidency and policy-making in action having a direct impact on the daily life of Europeans, F4E together with the Representation of the European Commission in Madrid will be organising a media trip for Spanish journalists to visit the premises of F4E in Barcelona and ITER in Cadarache in order to find out more about the project. The trip is planned to take place in June 2010.

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01 From left to right: Herman van Rompuy, President of the European Council, José Manuel Barroso, President of the European Commission, and José Luis Rodríguez Zapatero, Spanish Prime Minister at the inaugural meeting of the Spanish Presidency of the Council © European Union, 2010

02 José Manuel Barroso, President of the EC on the Communication to the Spring European Council on Europe 2020 © European Union, 2010

EUROPEAN PARLIAMENT'S ITRE COMMITTEE VISITS F4E

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A delegation of the European Parliament's Industry, Research and Energy (ITRE) Committee visited F4E on 17 February to learn more about the organisation and receive an update regarding the progress of the ITER project.

The new term of the European Parliament started in June 2009, where 736 MEPs were elected to represent almost 500 million of Europeans. Historically, the European Parliament has always been a key actor towards the design of the EU's R&D policy and its role is expected to increase under the newly ratified Lisbon Treaty where technological progress has for the first time become a specific objective of the European Union.

Frank Briscoe, Director of F4E, together with Carlos Varandas, Chairman of the F4E Governing Board, and Octavi Quintana-Trias, Director of the European Commission for Euratom, welcomed the members of the delegation and briefed them on a series of topics: the science behind fusion and its contribution towards a sustainable energy mix in line with the Strategic Energy Technology (SET) plan, Europe's in kind contribution to ITER and the opportunities for industry and SMEs and last but not least the knowledge capital together with the technology spin-offs that will boost Europe's competitiveness.

Herbert Reul, Chair of the ITRE Committee and Head of Delegation, asserted that the EP firmly believed in this project because all possible options need to be explored in order to respond to the energy supply crisis that we face. He also referred to the ITER experiment as an opportunity for Europe to be involved in projects of cutting edge technology at the forefront of science.

The briefings triggered off a lively debate where MEPs raised a number of questions regarding tomorrow's energy mix and the contribution of fusion energy, the ITER schedule and cost, measures in place to help SMEs and implement the Small Business Act, and lessons that can be drawn from the ITER experiment. The Delegation of the ITRE Committee confirmed its support for the project bearing in mind the challenges ahead as well as the opportunities that a project like this could offer in times when Europe's economy is in need of a stimulus to get innovation and productivity working hand in hand.

01 left to right: F. Briscoe, F4E Director, C. Varandas, F4E Governing Board Chairman, O. Quintana-Trias, European Commission, Euratom Director

02 left to right: MEPs: R. Bütikofer, P. Rübig, N. Glante, H. Reul

03 left to right: MEPs: C. Trautmann, T. Riera-Madurell, M. Badia i Cutchet, A.F. Correia de Campos

"ITER IS A VITAL ELEMENT FOR SUSTAINABLE ENERGY SUPPLY", SAYS NEW EU RESEARCH COMMISSIONER

Irish national Máire Geoghegan-Quinn took office on 10 February as the new European Commissioner for Research, Innovation and Science after winning the European Parliament's approval the day before. Ms Geoghegan-Quinn is a now a member of the new European Commission, the executive arm of the European Union, which is appointed for the next five years and is led by European Commission President José Manuel Barroso.

Before taking up office, Máire Geoghegan-Quinn appeared before the European Parliament's Industry, Research and Energy Committee where she listed her priorities as completing the European Research Area, addressing major challenges such as climate change, energy efficiency and ageing, and creating an innovation research culture. She stressed that "the EU must become a true innovation union" and that her "task will be to put research, innovation and science at the heart of EU policies". Asked about support for big, important, high-technology projects, Ms Geoghegan-Quinn said that, for example, ITER "is a vital element of a long-term strategy that the Union has for sustainable energy supply and security (...). We have to ensure that this project is working".

Born in 1950, the former teacher has enjoyed a very strong and long political career in Ireland. Geoghegan-Quinn entered into politics in 1975 being elected as member of the Irish Parliament, and from 1979-1981 she served as the first women Cabinet Minister in Ireland since it achieved independence. In addition, she served in several high-ranking governmental posts including Minister of State for Commerce, later for Education, Minister of Tourism, Transport and Communications, Minister of Justice and Minister for European Affairs. Before becoming Commissioner she was a Member of the European Court of Auditors since 1999 and is a member of the Fianna Fáil party who are in the Liberal ALDE group in the European Parliament.

A whole new set of challenges awaits the team of Commissioners during the mandate 2010-14 where the first order of business is to drive economic recovery, curb unemployment and push for financial reforms to avert another crisis. Long-term objectives are set out in the recently unveiled "Europe 2020" strategy which revolves around promoting low-carbon industries, investing in research and development, unleashing a digital economy and modernising education and training.

Máire Geoghegan-Quinn, new European Commissioner for Research, Innovation and Science

F4E BAND MAKES STUDENTS FUSE TOGETHER!

A band of ten percussionists makes its way to the Research in Action pavilion of the Catalan Education Fair. Five of them dressed as deuterium with cymbals and bells enter from the left. The other five dressed as tritium playing the large drums enter from the right. They are heading for a big rhythmic collision and a lot of noise. They turn the beat up, they hit their drums harder and shout one word: FUSION!

01 02

They move, they dance, they fuse and as they carry on dancing they invite students to join them. This year there was something extra in the participation of F4E…our stand was not just seen. It was heard big time!

It's the second time round that F4E takes part to this annual event which is the meeting point for more than 80,000 students trying to choose academic studies and careers. F4E used this opportunity to advertise ITER and direct science students in the fields of energy, climate change and fusion research. EFDA kindly offered the mini-fusion expo which travelled all the way from Slovenia with brand new panels in Spanish about the history of fusion, scientific data on ITER, images and mock-ups. F4E deployed a communications taskforce to be present throughout the event and through different interactive activities about energy, magnets and buzz balls got students interested in the future of this experiment. As expected, the Mellatron fusion experiment got visitors curious not only by its looks but also by its demonstration of laws in physics.

Talking to students was by far the most rewarding part of the exhibition. We had an opportunity to meet those who knew their tokamaks and superconductivity inside out, others who wanted to learn more about the fusion fuel and sustainability and those who heard about fusion for the first time and left wishing to present the ITER project in class.

03

01 Batucada band playing in front of the F4E stand
02 F4E's Ferran Albajar explaining fusion by demonstrating the Mellatron fusion experiment
03 F4E staff with the Batek Batucada band

VISIT OF DIIF TO CADARACHE

The delegation of German companies visiting the ITER site

The F4E Industrial Liaison Office of Germany (dIIF) organised a visit to Cadarache between 17-19 March for a delegation of companies in order to receive latest information on the ITER project. The visit kicked off with a presentation by Norbert Holtkamp, ITER IO Deputy Director General, welcoming the delegation to the ITER site where he presented the project and offered an update on the progress of the work. The rules and procedures that apply to upcoming calls for tender were presented by representatives of the ITER IO Project Office and F4E staff, Philippe Corréa and Benjamin Perier. F4E took this opportunity to outline the different ways that industry could potentially be involved and presented the recently launched industry portal where all relevant information on calls is publicly available. Regarding the construction of the ITER buildings, Laurent Schmieder, on behalf of F4E, explained the current state of play and offered an insight on how the site will develop in the future.

F4E INFORMS SMEs IN WEST FRANCE REGION

With attendance of 150 participants, representatives from F4E's Contracts and Procurement department, were on hand to inform SMEs and industries in the West of France regarding possibilities for these companies to participate in F4E calls for tender, mainly as subcontractors for bigger companies. The meeting, organised by the Chamber of Commerce and industry of Deux-Sèvres and held on 12 March, was an opportunity for SMEs from the West of France to discuss and learn more. F4E identified skilled industries in many fields, in particular in welding, forging, drilling and complex material works and participants were encouraged to register on F4E industry portal (https://industryportal.f4e.europa.eu).

GRAB A COFFEE AND LET'S DISCUSS FUSION

(Photo courtesy of Martin Gallego Cuadros) The panel representing each energy source was happily surprised by the audience's lively questions

Café Cientific (Science Café), organised by the Centre de Regulació Genòmica (CGR) (with help from F4E) in Barcelona during December, brought together different voices to discuss the future of energy. The idea behind the Science Café is to provide opportunities for science to meet society and to promote discussion between these two groups. An event is organised roughly once a month in Barcelona and is always open to the public.

Dr Gabriella Saibene, F4E Plasma Physics Group Leader, participated in the panel of the future of energy discussion, which consisted of a representative for each energy source: nuclear (fission), fossil fuel/gas, renewables, and future energy sources (in this case, fusion).

This open discussion lasted for over two hours and saw interesting and varying opinions on energy issues and solutions. As each panelist had a different background and viewpoint, they were able to give an original and unique perspective in the discussion which was almost entirely driven by the questions from the audience.

SCIENCE DAY: BRINGING SCIENCE TO STUDENTS

Did you know that ITER's Vacuum Vessel (tokamak) will weigh as much as the Eiffel Tower? No? Well then you didn't participate at Science Day, organised every year in Catalonia.

Science Day gives students who soon will be choosing which university course to apply for a taste of what a professional career in the scientific field could be like – sessions are simultaneously organised in 100 Catalan schools. With audiences of around 100 students each, F4E's Ferran Albajar and Jesus Izquierdo brought science to secondary school students by presenting fusion energy and the ITER project. Students participated very actively, showing great enthusiasm and good knowledge of the different energy sources, environmental questions, matter composition and basic principles of fusion technologies. Who knows, these presentations at Science Day, might have sown the seed for a budding future physicist?

FOCUS ON F4E'S ANALYSIS AND CODES GROUP

01

01 F4E's Analysis and Codes Group
02 Example of the A&C Groups' models for analysis: Finite Element Model (FEM) of the Vacuum Vessel, ports and superconducting magnets system

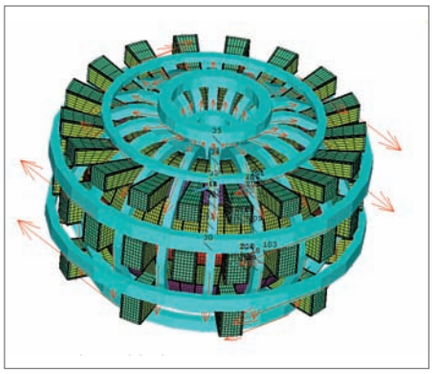
The main mission of the Analysis and Codes Group is to provide expertise and computational analysis support to the ITER department over a broad range of engineering fields during the preparation and the follow-up of the main F4E contracts.

The Group analyses and does technical assessments in the major project engineering fields: electromagnetism, structural analysis of mechanical components and civil engineering structures including earthquake engineering and extreme dynamic loads, neutronics and thermo-hydraulics. These capabilities are essential to quickly identify solutions to the technical problems that F4E faces during the procurement process of the ITER components.

While the Analysis and Codes Group implements the analysis with in-house resources, external suppliers are also used – the Group then has a technical management role towards the external suppliers. The 2010 budget for analysis to be carried out by external contractors is approximately 2.8 million EUR.

The main companies awarded analysis framework contracts are the Iberdrola Consortium (Natec Ingenieros, Elytt) and SRS (mechanical analysis), IDOM (structural analysis in the area of civil engineering), Create and LT Calcoli (electromagnetics) and CCFE and MILLENNIUM (neutronics).

The work within the field of neutronics also includes the improvement and update of nuclear data files, mainly in order to support



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Test Blanket Modules (TBM) and Broader Approach (IFMIF) activities. In addition, nuclear data experiments for validation are carried out and measurement techniques are developed (the budget for 2010 is 0.3 million EUR).

The Analysis and Codes Group is also in charge of following the developments and the application of standard codes (e.g. ASME, RCC-MR) in the design of the key ITER components. With a budget of 0.6 million EUR for 2010, the work focuses on tracking international codes and standards for analyses and design of mechanical systems, assessing and following up of notified body, and inspection entities.

Fusion for Energy
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