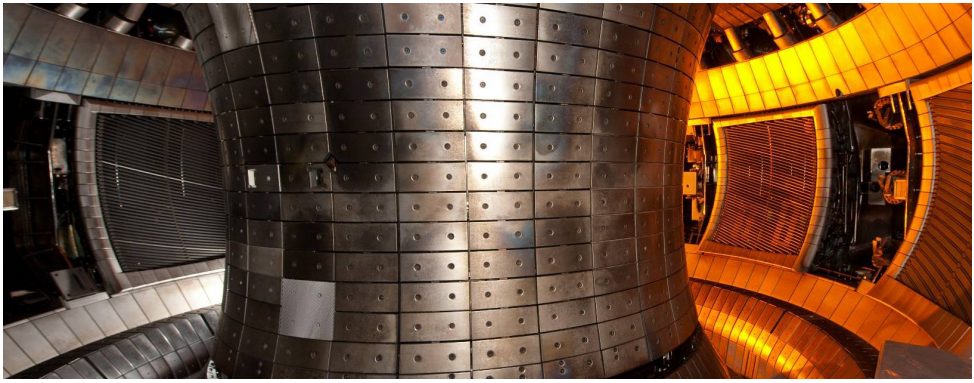
The Sun in a Box - The ITER Dispute Board by Murray Armes[1]

The Structure of Dispute Boards

A dispute board is a tribunal of experts that is independent, impartial, proactive and judicial. The real success of DBs is the way they can proactively assist the parties in avoiding disputes, saving the time and cost of arbitration or litigation and allowing the project to proceed in a collaborative manner. The standing DB, which is appointed at the commencement of the contract, does that by carrying out regular site visits and holding meetings to enable difficulties to be discussed or by proactively making enquiries if the parties are reluctant to discuss them. The board may help in finding solutions and if that cannot be done may, if the procedural rules permit, and both parties agree, give a non-binding recommendation to guide the parties to a solution. If still unresolved the matter can be formally referred to the DB for a decision under the contract.



Most procedural rules provide for a DB of one, three, or an odd number of larger members. An odd number is important to prevent split decisions. Single member boards are frequently used for smaller projects (and some very large ones) because they are more economical. In the case of the three member board, the procedure is normally that one party will select a member, the other party will do the same and the two members will nominate the chairperson[2]. Although a three person board is more expensive, the advantage is the greater diversity and expertise of the board.

The ideal DB consists of members with varying expertise, for example technical (engineering, architectural, tunnelling, etc), legal and possibly programming or quantum. If the DB comprises a single member, of whichever discipline, they are unlikely to have all the expertise required to assist the parties over the entire life of the contract[3]. With three DB members it is possible to have a wider range of expertise, but even so, for very complex projects the DB may not have all the specialist expertise required to avoid and resolve the disputes that arise.

The ITER Project

ITER is one of the largest and most important energy projects currently under construction in the world. Translated from Latin, "iter" means "the way" and the acronym, ITER, in this case stands for "International Tokamak Experimental Reactor", the aim of the project being to construct the world's largest experimental nuclear fusion reactor, the challenge being described by a Nobel Laurete with the words: *'We say that we will put the sun into a box. The idea is pretty. The problem is, we don't know how to make the box.'*[4]

Nuclear fusion essentially replicates the physical processes at the centre of our sun. Atoms of tritium an isotope of hydrogen) and deuterium (an isotope of water), are heated to 10,000m°C and by being contained in a strong magnetic field, are fused together, producing enormous amounts of energy. A city of one million inhabitants might consume about 250,000 tonnes of oil, or about 400,000 tonnes of coal but 60kg of fusion fuel would provide the same amount of energy. The process leaves very few waste products and those that are produced have a half-life much less than that of spent fission fuel. Neither is there a problem with the process getting out of control and causing a meltdown, the challenge with fusion is keeping the process going and in the event of failure the process simply stops.

ITER is purely a research tool, albeit a very large and impressive one, and not intended to provide electricity for the grid. The experiment aims to generate 500Mw of power from 50Mw of fuel, in other words a gain factor of ten. From start to finish the project will have taken some 35 years of commitment by the members[5]. The collaboration of 35 nations that comprise ITER began in 2007 and the members are drawn from China, EU, India, Japan, Korea, Russia and the USA. Many nations are providing technology rather than money for the project: that is they are supplying components, such as the superconductor coils from the USA, the cryosphere[6] from India, with Korea and China providing high voltage electrical transformers and switchgear. The EU's contribution is the civil infrastructure and the organisation set up to deliver that is Fusion for Energy, or F4E[7]. F4E is an agency of the EU, created by the Council of the European Union on 27 March 2007 as a joint undertaking under Article 45 of the EURATOM Treaty and based in Barcelona.

The ITER Dispute Board

The standing Dispute Board (DAB) was first convened in February 2014, just as the seismic foundations were being completed. The DAB members are drawn from the UK and France, although the selection process was EU wide.

Ideally, both parties to the contract are involved in selecting the DB but that was not possible in this case, where a multi member DAB was unilaterally appointed by Fusion for Energy (F4E), primarily due to EU procurement rules but also because the way the works have been procured. This means there are multiple joint venture consortia, making the conventional method of appointment impossible. If every consortia was to nominate a DAB member it is likely the DAB would not have been constituted. Therefore, the DAB has been "imposed" on the contractors. This has been challenging for the DAB which has had to work hard to get the trust and cooperation of the contractors, some of whom were initially sceptical of its role, to

ensure all parties are comfortable that it is truly independent and neutral and will deal with both employer and contractors equally.

Although the six members comprise what is called a Panel of Adjudicators, its primary role is to visit the site on a regular basis, meet the parties and assist them in avoiding disputes. The DAB is made up of a barrister who is the chair, a nuclear engineer, a dual qualified lawyer and engineer, a nuclear services engineer and two architects. All six attend the meetings and site visits and the project participants therefore benefit from the wide range of experience the board is able to contribute.

The works are let in packages under either modified FIDIC Red or Yellow Book contracts with specific insurance provisions that allow for decennial liability under French Law. The seismic foundations contract was bespoke and in addition to the construction contracts there is a services contract with the architect/engineer, and health and safety and inspection services which are also under bespoke contract forms. Every contract between a party and F4E has provision for avoidance and resolution of disputes by the DAB. Due to their size, value and complexity the contract packages are let to consortia of European contractors, rather than individual entities and there are always several consortia working on site at the same time, often in close proximity to each other. At the outset there were eleven packages to be let in stages and each contract has an interface agreement with contracts for all other adjacent works with each of the interface agreements having provision for the avoidance and resolution of disputes by the DAB.

As you might imagine the construction techniques are challenging, requiring great precision and high quality construction. There is little opportunity to correct mistakes later because the nuclear safety authorities will not allow adaptation of work already constructed and once concrete has been cast it is not possible to just drill and cut it to enable fixing of services and machinery. Every mechanical and electrical service and very piece of machinery has to be fixed to metal plates embedded in the concrete and there are literally hundreds of thousands of them of different sizes and capacity. Each one is located in a BIM model and given a unique reference which extends to its manufacture, storage on site and then placement in the works either by fixing to reinforcement or temporarily to the shuttering until the concrete is finally placed. There is no room for error, because mistakes are almost impossible to correct later.

One challenge that has arisen is that the ITER Organisation is capable of developing the complex and novel technology which the civil works will accommodate, at a faster rate than the civil works can be constructed. There is a potential for variations that have the ability to change the design of the works and cause delays and increases in cost. Change management and programming has a crucial place in this project and is reflected in complex scheduling requirements. There are also some instances in which the construction techniques, which are already challenging, have led to techniques that have never been used previously and one specific challenge in the nuclear buildings in particular is the sheer amount of reinforcement which can be up to ten times greater as a proportion of the overall volume, than in normal

Project Facts

• Location:	Cadarache, Southern France, north of Aix-en-Provence
• Site Area:	180 hectares Project with a Platform Area of 42 hectares
• Number of Buildings & Technical Areas:	39
• Construction materials:	250,000 cu m of reinforced concrete, 190,000 of which are for the nuclear buildings
• Building Footprint:	21,000 sq m concreter framed, 29,000 sq m steel framed
• Building Volume:	750,000 cu m
• Tokamak Building:	7 storeys, mainly of concrete, 13m of which is below ground floor level, the roof is 60m above it, includes the largest nuclear rated cranes in the world with a capacity of 1500t
• Programme:	Site cleared and levelled in 2007-2009 Ground support structures and seismic bearings in 2010-2014 Civil Works complete in 2012 Machine assembly and installation in 2018-2025 “First Plasma” in 2025

concrete. Every contract was competitively tendered, also F4E has to comply with, and is constrained by, EU financial regulations and procurement rules. All this might sound like a recipe for a large number of disputes, but despite challenges arising, no disputes have been referred to the DAB in the last four years.

The DAB meets on site about every four months or so. The actual requirement is a minimum of once per year and a maximum of four times per year. The visits have to be carefully scheduled and include a walk around the site, as well as presentations by F4E and any of the contractors that wish to meet the DAB.

If an issue arises it will firstly be determined by the Engineer as is normal under FIDIC contracts. The dispute can then be referred to Senior Representatives who have between 30 and 45 days to discuss the matter. If it still remains unresolved the dispute can be referred to the Panel of Adjudicators by giving notice to the Chair. The chair and two others with the most relevant experience are chosen to decide a dispute. The parties may propose the other two DB members but the final selection will be made by the chair. Following receipt of the Respondent's written submissions, the DAB has 25 days in which to issue a Decision. The process has not been tried yet, but given the value and potential complexity of a claim and the likely need for a hearing, this timetable is likely to be very challenging. The Decision is final and binding unless referred to the European Court in Luxembourg within 45 days of the date of the decision.

There is sometimes scepticism about the need for a DAB. However, on this project the parties concede that it has been a good thing and our periodic visits provide an incentive for them to try to work out problems for themselves in advance of our visits. If there was ever a project with so many uncertainties that might lead to disputes this is it, but so far none have been referred. This is due in no small measure to the huge efforts and dedication all of the participants in this project, all of whom are involved in making this very large "box" in which to put a small earth-bound sun.

Murray Armes

1 *Chartered architect, chartered arbitrator, adjudicator, mediator and dispute board member and founder of Sense Studio Ltd in 2012, he is also the current international president of the Dispute Resolution Board Foundation and one of the DB members for ITER,* ***2*** *See for example, FIDIC 1999 Red Book, Sub Clause 20.2,* ***3*** *DBs are normally empowered to appoint experts to assist them if required, provided the parties agree,* ***4*** *Pierre-Gilles de Gennes, French Nobel laureate in physics,* ***5*** *Much more information regarding the project can be found on the ITER website https://www.iter.org/,* ***6*** *This is the container in which the temperature is reduced to close to absolute zero,* ***7*** *More information about F4 E can be found on the website http://fusionforenergy.europa.eu/,* ***8*** *Of which some of the concrete comprises a special mix that includes boron for shielding areas within the Tokamak Building.*