Star power: Troubled ITER nuclear fusion project seeks new path

22 May 2015, by Pascale Mollard

The construction site of the International Thermonuclear Experimental Reactor (ITER) in Saint-Paul-les-Durance, southern France, on May 18, 2015

In 1985, then Soviet leader Mikhail Gorbachev and US president Ronald Reagan launched one of the unlikeliest ideas of the Cold War.

Under it, the Soviet Union would team up with United States and other rivals of the day to develop nuclear fusion: the same limitless energy source that powers the Sun.

Today, 30 years on, their dream is still a long and agonising way from reality.

Launched in 2006 after years of wrangling, the International Thermonuclear Experimental Reactor (ITER) project is saddled with a reputation as a money pit.

It has been bedevilled by technical delays, labyrinthine decision-making and cost estimates that have soared from five billion euros ($5.56 billion) to around 15 billion. It may be another four years before it carries out its first experiment.

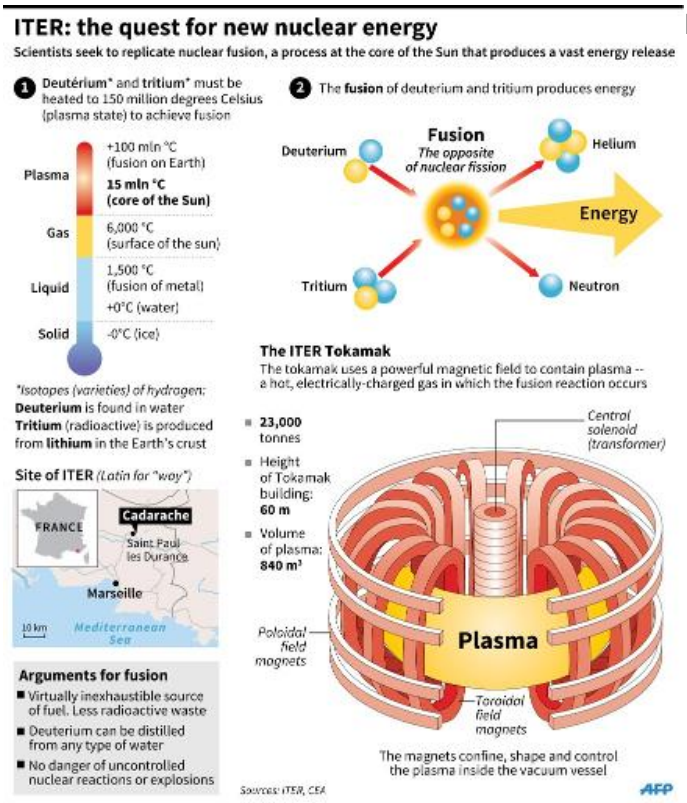
But, insists its new boss, a page has been turned.

"There has been a learning process," said Bernard Bigot, 65, a scientist and long-term chief of France's Atomic Energy Commission (CEA) who was named ITER's director general in March, replacing Japanese physicist Osamu Motojima.

"Today, there's a real awareness among all the partners that this project has to have a dimension of strong management to it."

ITER's job is to build a testbed to see if fusion, so far achieved in a handful of labs at great cost, is a realistic power source for the energy-hungry 21st Century.

Fusion entails forcing together the nuclei of light atomic elements in a super-heated plasma, held by powerful magnetic forces in a doughnut-shaped chamber called a tokamak, so that they make heavier elements and in so doing release energy.



Graphic explaining the workings of ITER, the International Thermonuclear Experimental Reactor

The principle behind it is the opposite of nuclear fission—the atom-splitting process behind nuclear bombs and power stations, which carries the risk of costly accidents, theft of radioactive material and dealing with dangerous long-term waste.

Despite the long haul, buildings are now emerging from the dry, yellowish soil near Aix-en-Provence, in the Mediterranean hinterland of southern France.

"The tokamak building is scheduled to be finished in 2018 and all 39 buildings by 2022," Laurent Schmieder, in charge of civil engineering, told journalists during a press tour of the site.

The tokamak—a word derived from Russian—by itself is an extraordinary undertaking: a 23,000-tonne lab, three times heavier than the Eiffel Tower.

"This is a project of unprecedented complexity... a real challenge," said Mario Merola, in charge of ITER's internal components division.

Management tangle

Part of ITER's problems lie in a diffuse managerial structure and decision-making among its partners: the 28-nation European Union, which has a 45-percent stake, the United States, Russia, Japan, China, India, South Korea and Switzerland.

The partners are providing their contributions mostly in kind, which has been a cause of messy, protracted debate about who should provide what, when and how. It has been further complicated by the role of national agencies, which in turn deal with their own suppliers.

In some cases, said Bigot, discussions have dragged on for six whole years without resolution.

Bernard Bigot, head of France's Atomic and Alternative Energies Authority (CEA) and ITER director-general nominee, pictured at the International Thermonuclear Experimental Reactor (ITER) in Saint-Paul-les-Durance, southern France, on May 18, 2015

He said that he told ITER's board he would only take the top job if everyone agreed there was a need for change.

"A CEO has to have the power to make a decision and to have it applied," he said.

Bigot has named his first priority as getting a fix on where the project stands overall.

By November, there will be a new progress report, with the likelihood of a further increase in the price tag. The project has no reserve fund to deal with the unexpected—something that Bigot hopes to change.

Journalists visit the construction site of the International Thermonuclear Experimental Reactor (ITER) in Saint-Paul-les-Durance, southern France, on May 18, 2015

In 2010 ITER abandoned its goal of obtaining the first plasma in 2018 and set a new date for a year later, but Bigot said that this deadline "clearly isn't feasible".

So far around seven billion euros have been contractually committed to the thousand or so companies working on the scheme. Every year of delay adds 200 million euros to the bill.

Technicians work at the construction site of the International Thermonuclear Experimental Reactor (ITER) in Saint-Paul-les-Durance, southern France, on May 18, 2015

"There have been difficulties, but we still have total faith in nuclear fusion as being worthy of the investment," said Bigot.

"But clearly if we can't manage this project correctly, if undertakings are not kept... (the project) could be in danger."