

### FUSION REACTOR

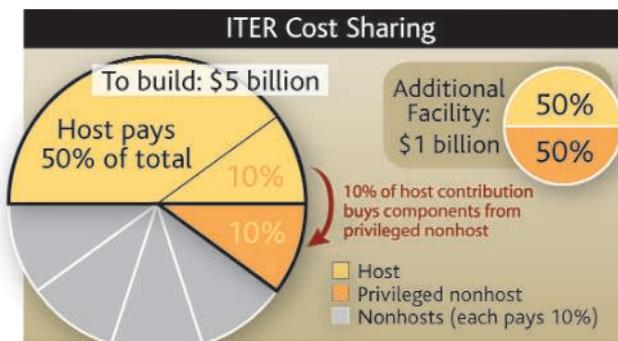
## ITER Rivals Agree to Terms; Site Said to Be Cadarache

CAMBRIDGE, U.K., AND TOKYO—The contenders to host the \$11 billion ITER fusion project—Japan and the European Union—finally appear to have made a deal. After 16 months of negotiations, the two parties have agreed on a package to compensate the runner-up. The only thing left is to name the winner, which must be done by the end of June. And if European politicians and Japanese newspapers are to be believed, the most expensive science experiment on Earth will be built in France.

The original schedule for building the International Thermonuclear Experimental Reactor (ITER) called for a siting decision to be made in December 2003 between Cadarache in southern France or Rokkasho in northern Japan. But the project's six partners split down the middle: The United States and Korea supported the Japanese site, whereas Russia and China backed the E.U. site in France. Technical studies early last year failed to produce a clear favorite. Since then, European and Japanese officials have been chalking up frequent-flyer points in lobbying their partners.

The aim of ITER is to recreate the power

of the sun on Earth. Hydrogen isotopes in a superhot plasma fuse rapidly enough to generate roughly 10 times more heat than the reactor needs to keep running. This would



**Rebaking the pie.** To compensate the runner-up, ITER's host will place 10% of its contracts there. The host will also pay for half of a new facility in that country.

ensure that a future fusion power plant will produce excess electricity. Building such a reactor is a huge undertaking: Construction costs alone are projected at \$5 billion over 10 years, and another \$6 billion will be spent

on operating the reactor and decommissioning it at the end of the 30-year project.

Much of this money will be spent in the host country, so the competition for this prize has been fierce and protracted. But during an E.U. delegation visit to Tokyo on 12 April, the two sides resolved to settle the site issue before the 6 July start of the G8 economic summit of industrialized nations in Scotland (*Science*, 15 April, p. 337). After an apparently productive discussion between Japanese Prime Minister

Junichiro Koizumi and E.U. officials at a 2 May meeting in Luxembourg, *The Yomiuri Shimbun*, one of Japan's leading daily papers, quoted government sources as saying Japan might be willing to give up its bid for ITER if it won a lucrative role in building the reactor. And late last week, at a meeting on earth observation in Geneva, Japanese and E.U. officials finally worked out a formula that was acceptable to both sides.

The details have not been made public, but E.U. officials have told *Science* that ITER's host will be expected to foot 50% of the bill. The other five partners would contribute 10% each. Of these contributions will be in the form of components built in their own countries and shipped to the site. But the unsuccessful contender will have a "privileged" position in the project, producing 20% of ITER's components but only paying for 10%, with the extra funding coming from the successful host. E.U. sources say the payment will be low-key, made through industrial contracts.

That's not all the runner-up will get. Its nationals will be guaranteed a minimum share of ITER's staff—20%, according to Japanese newspapers. And it will get to host a new parallel research effort to help commercialize fusion, with one possibility a materials testing center to assess whether reactor linings can stand up to decades of neutron bombardment. E.U. sources say that this facility could cost as much as \$1 billion, divided evenly between Japan and the E.U.

The formula must still be approved by all six ITER partners. Shuichiro Itakura, head of the Office of Fusion Energy at Japan's education ministry, says the formula is simply a "common view" between the two negotiators. "It still needs to be reviewed within the [Japanese] government," he adds. But in ▶

SOURCE: ITER

### STEM CELL RESEARCH

## California Institute Picks City by the Bay

After a heated competition akin to selecting a venue for the Olympics, San Francisco has been chosen as headquarters for the California Institute for Regenerative Medicine (CIRM).

Ten California cities vied to host the 50-person managerial hub of the \$3 billion, 10-year research program created by passage of Proposition 71 last November. Bidders offered a splendid array of perks from free office space to health club memberships to access to private jets.

A search committee accorded points to each city on the basis of qualities such as research environment, office space, and conference facilities. San Francisco led Sacramento and San Diego in the technical rankings that went to the 29-member oversight committee, which chose San Francisco over

San Diego by a vote of 16 to 11.

Some observers worried about regional bias on the oversight panel, headed by Bay Area financier Robert Klein. Indeed, the committee was split almost equally between northern and southern Californians, and all voted accordingly except for two members from Los Angeles, notes Jane Signaigo-Cox of the San Diego Regional Economic Development Corporation. But she thought the vote was "fair."

Pushed aggressively by Mayor Gavin Newsom, San Francisco's bid was worth about \$18 million. Delayed by lawsuits alleging conflict-of-interest violations and inadequate state oversight, CIRM hopes to award its first research grants by November.

—CONSTANCE HOLDEN

**940**  
Orphan diseases go corporate



**943**  
Centers of attention



**945**  
Mirror, mirror, in the brain



Europe, some are boldly predicting that ITER will be built in France, in line with the E.U.'s position that it's Cadarache or nothing. Going even further, President Jacques Chirac said on French television on 4 May that France was "on the verge of getting ITER sited at Cadarache."

E.U. officials are more reticent than the French. One senior official says he is "confident of a resolution," but it is still "a very delicate situation." Japan's Ministry of Education put out a statement strongly denying it

has given up trying to bring ITER to Rokkasho. Researchers are staying quiet for fear of jeopardizing the deal, but the politicking appears to have added a fusion development facility that was not originally on the negotiating table. "I think it's important that an additional facility is now included, because ITER alone is not going to provide all the data we need to move toward commercialization," says Yoshikazu Okumura of the Japan Atomic Energy Research Institute.

Politicians from the six ITER partners

are now looking to wrap things up at a late June meeting in Moscow. The venue is symbolic: It was here in 1985 that Soviet researchers persuaded President Mikhail Gorbachev to approach Western leaders with the idea of working together on a global fusion research project that would benefit society and reduce international tensions. For a while, ITER seemed more likely to do the opposite. But the injured feelings may soon pass into history.

—DANIEL CLERY AND DENNIS NORMILE

NASA ASTRONOMY

## New Space Telescope May Be Scaled Back

Faced with a \$1 billion cost overrun, NASA managers last week began to search for cheaper designs for the \$3.5 billion James Webb Space Telescope (JWST). But astronomers say the initial attempt to scale back the complexity of the spacecraft and its instruments is a nonstarter for the mission slated for a 2011 launch as a follow-on to the Hubble Space Telescope.

The crisis comes just as the decision not to send a space shuttle servicing mission to Hubble seems likely to be overturned by NASA's new chief Michael Griffin. Some scientists worry that extending the life of Hubble into the next decade could add to the pressure to scale back Webb, which is the top priority in the astronomy community's decadal plan put together under the auspices of the National Academies.

Named for one of NASA's first administrators, Webb will use its 6.5-meter mirror and four major instruments to observe primarily the infrared portion of the spectrum, peering back in time to the era of galaxy formation and piercing interstellar dust to get close-up views of other planetary systems. It may also provide clues to the elusive nature of dark matter. The telescope's science team includes Europeans, Americans, and Canadians.

Until just a few weeks ago, astronomers thought the telescope was on track despite a budget request this year from NASA to trim \$55 million from its account over the next 5 years. That's before its prime contractor, Northrop Grumman, wrote NASA that the telescope would cost \$309 million above the previous estimate, according to John Mather, NASA's JWST project director. The largest chunk of that increase was a shift in the spacecraft testing from a facility oper-

ated by NASA's Lewis Research Center in Cleveland, Ohio, to Johnson Space Center in Houston, Texas. The Lewis facility proved inadequate for handling the full spacecraft, and alterations would have been too costly. Additional technical changes to the design have added nearly \$100 million to the cost.

It's also going to cost more to launch the telescope. It was originally slated to fly on a U.S. rocket before the European Space Agency (ESA) offered an Ariane 5 as its major contribution to the program. The offer provoked complaints from U.S. industry and other government agencies, but after months of wrangling, the White House has given Griffin authority to use the European rocket, which he is expected to do shortly. Accommodating Webb on Ariane, combined with a likely 1-year launch delay, bumps up its price, as does an increased reserve fund ordered by NASA. New rules that require NASA projects to include all costs associated with the program mean another \$100 million. When you add it all up, according to JWST program scientist Eric Smith, the total overrun is approximately \$1 billion.

To reduce JWST costs, NASA managers last week suggested returning to a scaled-back version proposed in the mid-1990s. Under that plan, JWST's mirror would be only 4 meters in diameter, and its ability to detect certain wavelengths would be significantly reduced. As a result, data on some objects would take as much as 25 times longer to gather than with the current design. The telescope's expected lifetime also would be halved, to 5 years.

"It would not be scientifically sensible to fly that mission," says Peter Jakobsen, ESA's study scientist for JWST. Other scientists



**Webb woes.** NASA's next-generation telescope has suddenly gotten \$1 billion more expensive.

agree. In a meeting last week with NASA officials, the JWST science team rejected the alternative as unacceptable. "It is clear to scientists that almost all science would be lost" in this plan, says Mather.

NASA managers have given scientists a couple of weeks to come up with a better alternative. But their job won't be easy. "If the funding is not compatible with breakthrough science, then [more] money needs to be moved to JWST, or it should be canceled," says George Rieke, an astronomer at the University of Arizona in Tucson who is a co-principal investigator on one instrument. Adds Mather: "It's a scary moment."

—ANDREW LAWLER

With reporting by Govert Schilling.