

## ITER project to solve global energy problems

15/11/2005 18:29

MOSCOW. (RIA Novosti commentator Tatiana Sinitsyna). --

The International Thermonuclear Energy Reactor (ITER) is a joint international project, which involves countries conducting extensive research on controlled thermonuclear fusion. If successful, ITER would provide mankind with an unlimited source of energy. Some people compare this reactor to an artificial sun, whose internal temperature will reach 150 million degrees centigrade. However, the Sun that shines for all of us has a temperature of only 20 million degrees centigrade. This difference seems incredible. "Mankind is lucky to have accomplished this objective," one of the project's organizers Yevgeny Velikhov, full-time member of the Russian Academy of Sciences, president of the well-known Kurchatov R&D Institute and head of the Institute's ITER Council, said.

Physicists have long dreamed of harnessing thermonuclear fusion, which is much safer than nuclear energy. Thermonuclear reactors cannot explode the way the Chernobyl nuclear power plant's No. Four reactor blew up on April 26, 1986. Moreover, they will not spew radiation because deuterium - tritium fusion is their basic principle of operation. At the same time, existing nuclear reactors utilize the nuclear-fission concept. This planet has an unlimited amount of hydrogen isotopes for powering thermonuclear reactors. However, the really intricate thermonuclear power plant will feature unheard-of technologies. Its reactor will be subjected to immense pressures and temperatures. Scientists spent decades trying to solve this problem and to ignite thermonuclear plasma. Experimental thermonuclear reactions have now been harnessed in several countries.

Nobody seemed to know anything about thermonuclear fusion only fifty years ago. Nobel Prize winner Academician Igor Tamm and one of his post-graduate students, Andrei Sakharov, who would also become an Academician later and receive the Nobel Prize, were the only scientists capable of discussing this subject. In 1934, Tamm published a textbook on the theory of electricity that outlined the concept of thermonuclear fusion. The situation has changed greatly since then. Today 75% of mankind are infatuated with this idea.

It all began in 1992 when Russia, the United States, the European Community and Japan decided to jointly develop the first-ever international thermonuclear experimental reactor on the basis of TOKAMAK (Toroidal Chamber in Magnetic Coils) technologies. Soviet physicists developed the first TOKAMAK units in line with Andrei Sakharov's ideas. Sakharov suggested the TOKAMAK concept back in the 1960s. The world's physicists offered 114 "thermonuclear" concepts. However, TOKAMAK alone has survived to this day. Sakharov's concept was eventually tested at the Kurchatov R&D Institute, and has proved to be a success. Russian achievements in the field of superconductors, as well as unique electron-plasma heating methods, were instrumental in implementing the ITER project. "We can be proud because this idea was authored, initiated and promoted by us. In his time, Gorbachev reached an agreement with Mitterrand and Reagan. But for this, the project would have never materialized," Velikhov stressed.

This project, which will require an estimated \$5 billion to complete, now involves three more countries, namely, China, India and North Korea. A country, whose territory has been chosen for building the reactor, shall contribute 50% of this sum total. The parties to the project debated this issue rather hotly, with France and Japan offering to accommodate the reactor. It was eventually decided to construct the ITER reactor in France's Gadarache (Provence). Russia undertakes to finance 10% of this promising and ambitious project. The Government of Russia will support the ITER project in line with the federal target program "ITER International Thermonuclear Reactor".

ITER is the most ambitious undertaking in the history of mankind, dwarfing the International Space Station (ISS) in terms of its intellectual and financial resources. "The project hinges on new principles of equitable cooperation. The inequality of owners and consumers has been rectified within its framework. This is an act of intellectual globalization," Velikhov noted.

Each country will contribute an ITER segment. Once complete, the reactor would feature 100 times more high-precision parts than a B-747 jumbo jet does. An international directorate will oversee the entire construction project. Moreover, the GLORIAD telecommunications network will handle tremendous data flows.

St. Petersburg is to host the next G8 summit in the summer of 2006. The final agreement on ITER construction will apparently be signed during that summit. And the groundbreaking ceremony may take place in late 2006. The concerned parties are now analyzing all aspects of this agreement. Some other countries, such as Kazakhstan, Brazil and Mexico, may also join the ITER project.

Russia initiated the ITER project's subsequent development. In 2003, Moscow suggested the construction of another ITER center. This center, due to be built in northern Japan, will help develop a commercial thermonuclear power plant as soon as possible. "We will require state-of-the-art technologies, models and computers," Velikhov stressed. According to Velikhov, "computers with a speed of several thousand teraflop will help build a thermonuclear reactor model." This seems like a mind-boggling task because a teraflop is one trillion floating point operations per second. Moreover, the world's fastest computer has a speed of just 100 teraflop. Velikhov also claims that "all technical aspects are clear." Still the creation of software packages and computer models is the most difficult aspect. But a team of leading Russian theoretical physicists is already working in Japan.

The ITER project is called on to remove the last obstacle hindering the creation of the world's first thermonuclear power plant that promises to solve global energy and environmental problems.

A thermonuclear power plant may appear by 2030, requiring tremendous amounts of energy. "Those involved in the ITER project understand that thermonuclear fusion will become a powerful and reliable source of energy," Velikhov said.



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