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FEATURE

INDIA'S MEMBERSHIP OF ITER PROJECT

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18:9 IST

Fusion is the energy source of sun and stars. In fusion, two light nuclei (e.g. deuterium and tritium) combine to form a heavier nucleus, and a large amount of energy is released. For the past 50 years, scientists have been working on the development of fusion technologies to generate energy on earth. Fusion has several attractions as a large-scale energy source. Its basic fuels are abundant and available everywhere and the technology is environment-friendly.

Magnetic Bottle Concept

Controlled thermonuclear fusion experiments have been investigating possibilities of confinement of a low density fusion grade plasma of deuterium and tritium at temperatures approaching hundred million degrees by magnetic fields, so that slow and controlled release of fusion energy may become possible. This search has led to a successful magnetic bottle concept, viz. the tokamak concept, in which the magnetic confinement geometry is created by a combination of fields produced by external coils, and fields produced by plasma currents.

Considering the complexity of this technology, Japan, European Union, the then Soviet Union and the United States had established a collaborative project International Thermonuclear Experimental Reactor (ITER) in 1985 to harness fusion energy. China and South Korea also joined the consortium of parties to the ITER venture.

Fusion Research Programme

India has had a fusion research programme of its own, since the early eighties. Two tokamaks have been indigenously built at the Institute for Plasma Research (IPR) near Ahmedabad, and a small tokamak has been imported from Toshiba, Japan at the Saha Institute for Nuclear Physics, Kolkata (SINP). The SINP tokamak has been used for an intensive study of low rotational transform tokamak discharges. ADITYA, the first indigenously built Indian tokamak, has been extensively used for the study of plasma turbulence in the edge and scrape-off layer regions. The second IPR tokamak, SST1, is a steady state superconducting tokamak and is currently undergoing commissioning tests. It will have megawatts of ion cyclotron and neutral beam based auxiliary heating. These two tokamaks and associated auxiliary equipment have been built by Indian

industries with designs and integration responsibilities taken up by IPR. Many sophisticated diagnostic tools have also been developed at IPR and SINP.

Two years ago, the European Union (EU) encouraged India to join ITER and a team from EU visited India for initial discussions in October 2004. This was followed by further interactions at the international level and approvals at home. Finally India was admitted to the ITER negotiations on December 5, 2005 at a meeting held at Jeju, South Korea. Following the decision to select the site for the construction and operation of ITER in Europe at Cadarache in southern France, these seven parties met in Brussels on 24 May 2006 to confirm the agreements negotiated over the past year.

Prototype DEMO Reactor

The ITER project is an international collaborative research project on an unprecedented scale, which will reproduce the fusion reaction on the earth, physical reaction - fusion. ITER is the Latin for “the way”. It is a prestigious international project which will nearly complete the scientific and technological investigations required to build a prototype demonstration reactor DEMO, based on the magnetic confinement scheme of controlled thermonuclear fusion. An experiment of the size of ITER will produce energy amplification by a factor of 10 and will thus be able to generate about 500 mega watts of fusion power.

A common understanding on procurement packages for each partner was reached in the Jeju (South Korea) meeting and finalized. The Procurement Allocation amongst the seven parties has been developed to enable the successful realization of ITER construction, according to the available resources and overall project schedules. The allocation has been made aiming at reduction of project risks and definition of clear responsibilities. The sharing ratio of in-kind procurements by the seven parties is about 4:2:1:1:1:1:1 respectively.

“Lines-of-Defense” Methodology

Safety and licensing issues have been incorporated into the operation scenario. The current design focuses on confinement as the overriding safety function of equipment, other functions being recognized as being required to protect this confinement. A “lines-of-defense” methodology is used to obtain the required level of safety while balancing the functional requirements of systems and components. Successive barriers are provided for tritium (and activated dust). These include the vacuum vessel, the cryostat, active airconditioning systems, with detritiation and filtering capability in the building. Confinement and effluents, normal as well as accidental, are filtered and detritiated, in such a way that their release to the environment is As Low As Reasonably Achievable (ALARA).

Implementation Agreement

Initialing of the Agreement for implementing ITER, called Joint Implementation Agreement (JIA), has been executed on May 24, 2006 at Brussels and signing will be done towards the end of the year followed by ratification a few months later. With the ratification of the agreement, it will become possible to launch the ITER International Organization and set up an ITER Council for decision making.

Kanema Ikeda from Japan has been nominated to be the Director General of the prospective ITER organization and Norbert Holtkamp of EU as the Principal Deputy Director General.

India's Contribution to ITER

India will contribute equipment worth nearly 500 million US dollars to the experiment and will also participate in its subsequent operation and experiments. India's contributions to ITER are largely based on the indigenous experience and the expertise available in Indian industry. India will be fabricating the 28 m dia , 26 m tall stainless steel cryostat, which forms the outer vacuum envelope for ITER. The vacuum vessel shields made of 2% boron steel and occupying space between the two walls will also be designed and fabricated by India. It will also take up the design and fabrication of eight 2.5 mega watt ion cyclotron heating sources, complete with power systems and controls. It will also take up the fabrication of a diagnostic neutral beam system which will give crucial information about the physics of burning plasmas in ITER. India will also be responsible for a number of other diagnostic subsystems. Finally, India will contribute to cryo-distribution and water cooling subsystems. All this equipment will have to be built with ITER quality standards and in a time frame (approximately ten years) determined by the International Team at the host site in Cadarache, France. (PIB Features)

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DEVELOPMENT OF NATIONAL HIGHWAYS

Saroj Kumar Dash**

18:12 IST

Government has given utmost priority to the development of National Highways (NHs) in the country. The National Highways Development Project (NHDP) was launched for upgradation of NH corridors with high traffic volume. This initially had two main components i.e upgradation of 5,846 km of Golden Quadrilateral (GQ) linking four metros viz. Delhi, Mumbai, Chennai and Kolkata passing through 13 States and corridors comprising the North-South and the East-West Corridors of 7300 kms, extending from Srinagar to Kanyakumari, including Salem-Kochi Spur, and from Silchar to Porbandar, passing through 17 States.

Over 2-lakh Crore Investments

The Government has decided to substantially expand the scope of NHDP by including further phases from III to VII with an investment of Rs. 2,27,258 crore as below:-

(a) Completion of balance work on GQ and EW-NS Corridors - Rs. 52, 434 crore (b) Upgradation of 11,113 km, of National Highways under NHDP Phase-III -Rs. 72, 454 crore

(c) 2-laning with paved shoulders of 20,000 km of National Highways under NHDP Phase-IV - Rs. 27, 800 crore

(d) 6-laning of 6,500 km of GQ and other selected stretches of National Highways under NHDP Phase-V - Rs. 41, 210 crore

(e) Development of 1,000 km of Expressway under NHDP Phase-VI - Rs. 16, 680 crore

(f) Construction of ring roads, flyovers and bypasses on selected stretches under NHDP Phase VII - Rs. 16, 680 crore

Delhi-Mumbai Corridor

The Delhi-Mumbai Corridor of the GQ is fully complete and over all progress of the full GQ is 92.50% as on 30.06.2006. Around 830 km of Corridors has also been completed and 5,063 km are under implementation at present. The Phase-III of NHDP for upgradation of existing National Highways linking important cities having tourist/commercial/religious centres GQ Corridors has been taken up for improvement of around 11000 km and 30 km has also been four-laned and 1090 km is under implementation.

The six laning of National Highways under NHDP Phase V, as announced by the Prime Minister last year has been started by award of six laning of two stretches between Vadodara and Surat with record negative grant offered for this project.

Public-Private Partnership

The major policy decision is that the projects under NHDP Phase-III onwards would be implemented mainly through PPP. Normally civil contracts would be given only where either those are not financially viable or where constraints of the remote areas or low traffic are encountered. For this purpose, National Highways Authority of India, assigned to implement these phases of NDDP, is being restructured and strengthened.

There has been a record number of 156 contracts for 6,563 km awarded in the last two years, out of which 129 contracts for 5,435 km were awarded in the year 2005 alone. Also 45 projects under PPP have also been awarded having a length of 2457 kms for the last two years. (PIB Features)

**Joint Secretary, Department of Road Transport and Highways, Government of India

18:15 IST

Mahatma Gandhi once said that the soul of India lives in its villages. Since Independence the focus of development both at the Central and the State Level was on the rural sector. In the process, we lost sight of the fact that a sizeable percentage of the population live in urban cities and more and more urban settlements are emerging. By the year 2001, 27.8% of the total population of the country lives in urban areas. Thus, though Mahatma's words still remain true, the need for urban development cannot be overlooked.

Urban development is a State subject. However, it has always been the endeavour of Government of India to chip in wherever the States' efforts require supplementation. Realising the need for providing better infrastructural amenities in the urban areas of the country, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) has been launched to address the inadequacies in urban infrastructure in urban centers. It was also felt necessary to bring about improvement in the governance pattern through time bound reforms. 63 cities have been identified. The mission's objectives and reforms are as follows:

Mission Objectives

- Ø Planned Development
- Ø Integrated development of infrastructural services
- Ø Effective linkages between asset creation and asset management
- Ø Ensure adequate investment of funds
- Ø Scale up delivery of civic amenities and provision of utilities with emphasis on universal access to the urban poor
- Ø Take up urban renewal programme, i.e. redevelopment of inner (old) cities area to reduce congestion; and
- Ø Provision of basic services to urban poor including security of tenure at affordable prices where possible in situ, improved housing, water supply, sanitation and ensuring delivery of other already existing universal services of the government for education, health and social security.

Reforms

- Ø To improve financial health of the local bodies, sustainability of assets created, improvement of urban governance and service delivery, reforms have been proposed at State and urban local bodies levels.
- Ø Reforms are of two categories, mandatory reforms and optional reforms. All reforms have to be completed within the Mission period by the States and ULBs/Parastatals.

Undoubtedly, development of Indian cities on a large scale, as envisaged in the JNNURM, would call for investment of a huge amount. The Government of India has committed Rs.50,000 crore as Additional Central Assistance for the Mission period of 7 years. It is expected that the urban local bodies, on the strength of the Additional Central Assistance they receive, will be able to leverage further funds from the market. Moreover, Private Sector Participation is also expected in the Mission. Total investment under the mission over a period of 7 years is expected to be Rs.1,00,000 crore. To provide better leadership and direction to the mission, a National Steering Group with Minister of Urban Development as Chairman and Minister of State (Independent charge) for Housing & Poverty Alleviation as co-chairperson has been constituted. A Technical Advisory Group has been established to enlist support and participation of CBOs, NGOs / Civil Society. Due diligence is exercised in examination of project proposals both at the State and Central level. Greater attention is paid to projects, which provide basic facilities for human habitation such as water supply, sewerage, solid waste management, drainage and transport. Even though it is only 7 months since the launch of JNNURM, achievements made so far are quite impressive.

Fifty-three projects in sectors like water supply, transport, drainage, sewage/sewerage and solid waste management costing Rs. 1957.48 crore have already been sanctioned. (PIB

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