

India's fast nuclear reactors to be redesigned to cut costs

Scientists and engineers at the Indira Gandhi Centre for Atomic Research (IGCAR) are hoping to save around Rs.5 billion (Rs.500 crore or \$104 million) by modifying the design of four fast reactors on the anvil for nuclear power plants.

'The proposed reactors are going to be different in many ways from the prototype fast breeder reactor (PFBR) designed by us and which are under construction,' IGCAR director Baldev Raj told IANS.

With the Rs.35-billion PFBR project progressing at good pace at Kalpakkam, 80 km from here, the Indian government has sanctioned building of four more 500 MW fast reactors.

A breeder reactor is one that breeds more material for a nuclear fission reaction than it consumes, so that the reaction - that ultimately produces electricity - can continue.

The Indian fast reactors will be fuelled by a blend of plutonium and uranium oxide.

While the reactor will use fission plutonium for power production, it will also breed more plutonium than what it uses from the natural uranium.

The surplus plutonium from each fast reactor can be used to set up more such reactors and grow the nuclear capacity in tune with India's needs.

These reactors are also called fast spectrum reactors since the neutrons coming from the fission will not be moderated. Two of the proposed reactors will come up in Kalpakkam, the site for which has been approved, while the location for the remaining two are yet to be finalised.

According to Raj, the four reactors will be designed to last 60 years - an increase of 20 years over PFBR's current life span.

'The blueprint for the four oxide fuel fast reactors is ready. The roadmap for research and development will be ready next month,' reactor engineering group director S.C. Chetal told IANS.

According to him, the idea is to sell power at Rs.2 per unit as compared to Rs.3.20 per unit from PFBR; hence the effort to reduce the capital cost.

Detailing the cost-cutting steps, Chetal said: 'The proposed reactors will be built as twin units. That means many of the facilities will be shared by the two reactors, which in turn saves capital and running costs.'

For instance, there will be fewer welding points, making the reactors safer and more economical.

'The savings will be achieved from reduced material consumption through innovative design design,' said P. Chellapandi, director, safety group.

Chellapandi said the safety vessel of the proposed reactors will be smaller than the one installed inside the PFBR's reactor vault: its diameter will be reduced to 11.5 metres from 12.9 metres.

'A reduction of one metre will result in an overall saving of Rs.25 crore (Rs.250 million) on material, fabrication and civil construction.'

The new design fast reactors will have six steam generators as against eight in the PFBR and changes will be made in the grid plate, sodium and reactor shutdown systems.

With the experience gained from fabricating giant equipment and the country embarking on a major fast-breeder reactor programme, vendors should be able to lower price.

These apart, the focus will be on sourcing local components and raw materials to save costs. Imports for PFBR consist of sodium and high grade steel, both sourced from France.

'The design changes in the proposed reactors do not mean PFBR is over-designed. The proposed changes will be realistic or less conservative,' said Chellapandi.

With the experience gained from PFBR, the new projects can be completed in five years as against seven years, the officials feel.

Venkatachari Jagannathan (© IANS / India eNews)