

## ***Shift to thorium for energy security of Viksit Bharat: Anil Kakodkar***

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Renowned scientist Dr Anil Kakodkar, spoke to The Sunday Guardian on why he believes focusing on using thorium as a source of power generation was vital for India's growth. Dr Kakodkar, who is Chancellor, Homi Bhabha National Institute and Chairman, Rajiv Gandhi Science & Technology Commission, and had headed the Atomic Energy Commission, argues that thorium offers a path to energy security and net-zero emissions crucial for India's development. He also spoke on the concerns over nuclear safety post the Fukushima disaster and India's no first use policy.

Edited excerpts:

Q: Dr Kakodkar, you have been speaking and writing about the need to focus more on thorium generated energy to power India's aspirations. If you have to give two arguments to convince people in deciding authority to invest more in what you are suggesting, what would that be?

A: The case for leveraging our thorium resources for meeting our energy requirements is very compelling and in fact unavoidable. The reasons are: India's energy needs to support a quality of life of her citizens comparable

with the advanced countries of the world and would be at least around three and a half to four times larger than the current energy use. Already, we are the third largest energy consumers in the world with a large import dependence. In a situation when our energy needs become a significantly large part of global energy supplies, ensuring energy security of “Viksit Bharat” (developed India) would become difficult without being atmanirbhar (self-sufficient) in energy. In this context, thorium is the only energy source on the Indian landmass that can meet Viksit Bharat aspirations, while meeting net zero GHG emission target, which is critical for our very survival. Rapid deployment of large-scale thorium utilisation for meeting our energy needs is, therefore, crucially important. Fusion energy is the other possibility. However, the time required for fusion technology development at the scale necessary is expected to be well beyond the net zero target date.

Although the nuclear energy development had to necessarily begin with uranium reactors (uranium being the only naturally available material that has a small isotopic fraction usable for release of fission energy), at high burn-ups achievable these days, it is the thorium fertile matrix that enables larger energy release from fissionable materials in a single fuel cycle. Further, nuclear, thermo-physical, and chemical characteristics of thorium enable superior performance of nuclear reactor and fuel in terms of safety, storage and proliferation resistance. Thorium can therefore play a much better role in terms of simultaneous development and clean energy transformation of the developing world which constitutes a larger part of humanity. India has a large opportunity here both for boosting her economy as well as for addressing a seemingly intractable global challenge.

Q: The 2011 Fukushima nuclear accident has added more strength to the argument that nuclear power plants are not the future. Many countries have either completely discontinued their nuclear program, while a few have scaled them down. How does one address this concern?

A: Large scale public trauma resulting from severe nuclear accidents is caused by excessive distress relocation of masses arising out of fear of radiation. Studies have shown that psychosomatic consequences in such cases have done more harm than the possible health consequences of radiation. Data on consequences like fatalities per unit of electricity produced shows that in the case of nuclear power, the consequences are minimum as compared to other sources of power generation. Also, nuclear power technology has gone through systematic learning from the experience and has become much safer today. Rapid growth in nuclear power deployment is now seen in many countries as inevitable for addressing the dual challenge of development and clean energy transformation. In absence of realisation of net zero GHG emission, the consequences of climate change could mean a much greater risk as compared to the risk of nuclear accidents.

Nevertheless, this is an important matter of public perception and comprehensive public awareness programmes need to be intensified.

Q: We had done a couple of RTI-based reports that indicated how Indian scientists, engaged in the nuclear field, were dying premature deaths in alarming numbers. Do you think India's nuclear program was facing some sort of aggression from outside that impacted the lives of these scientists?

A: Things connected with nuclear energy always attract greater attention. I am aware of some such stories that have appeared in the media. They all have been investigated. Reading too much in these stories, in my view, is uncalled for.

Q: The budget of the Department of Atomic Energy is about Rs 25,000 crore. Is that a reasonable amount or does it need to be enhanced significantly? Especially when one considers your argument for more thorium-based reactors.

A: I do believe in the need for a paradigm change in the implementation rate of the nuclear power program in terms of scale of deployment for addressing growing electricity needs, economically competitive clean hydrogen production at scale, long-term energy security and sustainability, and new reactors and fuel cycle technologies leading to large scale thorium utilisation. This scale up has to be achieved ensuring the necessary safety, security, and investment in the best national interest. This obviously requires a much larger budgetary support, but also in addition a proactive policy support and well designed and empowered implementation organisations in adequate numbers.

Q: India, along with China, is one of the only two countries that have a "no-first use" policy. Does that need to change?

A: I believe, in the case of nuclear weapons, "no-first use", along with credible minimum deterrence, is the right approach to deter adversaries without having to indulge in an arms race.

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