

## Foreword

## Topical Issue on “INDIA’s REACTORS”

It can be no doubt, whatsoever, that in the very near future India will play an ever increasing dominant global role in economy and politics. India and China, these two giants of 2.5 billion people – dormant for a long time – have awakened, and have started a breathtaking, staggering economical rise in the last few years. Since energy is the motor of economy, it is more than important to watch and scrutinize how the Indian giant will supply and provide its immense needs for energy. India has – and knows it very well – only one choice: using both of its own natural energy resources: coal and thorium, i.e.: using fossil and nuclear energy.

In this Topical Issue, we are looking at India’s vast efforts to develop its civilian nuclear capacity.

However, it must be clear that a special issue on “India’s nuclear reactors” is somewhat more than a description of certain types of reactors and their performance. Due to obvious political reasons every politically minded observer always connects India’s reactors with India’s strong efforts to build atomic bombs. Unfortunately, these two items are always unconsciously connected and linger always in everybody’s mind. Of course, there is no doubt whatsoever that India’s vast civilian nuclear program – the topic of this special issue – came much later than its decision to ‘have the bomb’. This decision in return was triggered by the rivalry to Pakistan. Every political minded scientist knows the famous threat of President Ali Bhutto back in 1965: “If India develops the atomic bomb, Pakistan will follow ‘even if we have to eat grass or leaves or have to remain hungry’”. But – of course – this threat did not come ‘out of nothing’. Proudly, Indians always state that – back in 1948 – Nehru set up the ‘Indian Atomic Energy Commission’ for “peaceful purposes”. Many seem to have forgotten, however, that he added “but if we are compelled to use it for other purposes no pious sentiments will stop the nation from using it that way”.

Unfortunately, such ambivalence remained a central feature in India’s nuclear policy. However, and no wonder, the continued reliance of the U.S., the Soviet Union, France, the U.K. and China – and somewhat later on – of Israel, South Africa and possibly other countries – on their atomic arsenal added to the perceived need of India and Pakistan for these devices.

Over more than two decades from its very beginning in 1948, India began to construct nuclear reactors, to mine uranium, to enrich uranium, to fabricate fuel and to extract plutonium from

fuel that had been irradiated in the built reactors. It openly received ample aid from Canada, the U.S. from France, Sweden, Germany, . . . and many others.

No surprise, soon the bomb was ready; the first Indian detonation of a plutonium bomb occurred in May 1974 in Pokharan; (some years later followed by Pakistan in the Chagai Hills.) The fateful and pernicious connection of nuclear reactors (here probably the CIRUS heavy water reactor) and bombs was again clearly demonstrated to the world.

Unfortunately, the end of the cold war in the 1990s did not stop further buildup of nuclear military capabilities. This was no wonder since the “big five” banned and prohibited explosive tests “for all nations” but made it crystal clear to everybody and to the world that they themselves did not at all intend to destroy their weapons and were determined to hold on to their devilish arsenal. This ironic juxtaposition strengthened the bomb lobby in India. It came to no surprise to the world that Prime Minister Shri Vajpayee could not escape to ask his military for a series of nuclear tests at Pokharan in May 1998.

Why do I tell all this? Because all this ‘history’ is somehow – more or less – connected to the reactors and their background described in this beautiful compilation of NED’s Special Issue on “India’s Reactors”.

I jolly well recall when – after an official visit to my institute – the Deputy Director of India’s Bhabha Atomic Research Centre (BARC), Prof. Shri B. Bhattarcharjee and Dr. Venkat Raj, Mr. Yan and I were having a delightful dinner in a cozy Stuttgart restaurant. We talked about this and that, about the fantastic Indian temples (not only Khajuraho!) and – of course – about Indian atomic politics; starting from Jawaharlal Nehru, and Jehanghir Bhabha (a strong advocate of the bomb) and touching the generally imposed, but highly debatable Non-proliferation Treaty of 1968 – no Indian nuclear scientist will miss to deplore this ‘unfair treaty’ while his blood pressure is visibly rising(!) – to the recent Indian bomb tests ordered by Shri Vajpayee – still in everybody’s mind.

And suddenly it popped in my mind: why always talking about Indian bombs and why not talk more about Indian reactors which were – according to my impression and judgment – vastly underestimated and neglected in the West. Consequently I proposed: “Why not compiling a Topical Issue on India’s reactors in NED?”. This idea was enthusiastically accepted by Prof.

Bhattacharjee. Some weeks later I proposed to him a detailed outline of the envisaged issue. Authors for the various articles were quickly found; but the initial enthusiasm weakened when the difficulties of such an undertaking emerged clearly. Nevertheless, the work continued.

One year later, and to my greatest surprise, I had been personally invited to meet the Indian Prime Minister H.E. Shri Atal Bihari Vajpayee in Munich during his visit to Germany in 2003 where he wanted to also meet ‘German professors’; luckily enough I had the chance to be seated beside him during the buffet-dinner. Nearly all the other participants seemed to be specialists on past Indian languages or art professors, visible to everyone being only occupied with India’s past. I told the Prime Minister that I felt a little bit an ‘outsider’ being the only scientist – and even an atomic scientist – at this illustrious reception which seemingly was only dedicated to India’s glorious past. He told me smilingly that he had been an outsider all his life – and that he did not regret it at all. Of course I asked him about the reasons behind his decision to start once again testing atomic bombs. Readily he embarked in a deep political discussion, to the utter bewilderment and confusion of many professors who wanted to convey to him their latest findings in Veda psalms, verses and poems, or – perhaps – their new and may be ‘revolutionary’ insights of prehistoric Devanagari. But the Prime Minister talked only about ‘atoms’. He was nearly electrified when I told him that BARC and I had decided to prepare a special issue on Indian Reactors for the scientific journal NED. He seemed to be extremely pleased and told me literally: “This is a fantastic idea and very beneficial for India’s reputation as a modern, industrial country; all the world talks about India’s atomic bombs. Unfortunately, the world seems to have forgotten that India builds also very fine nuclear reactors which use the atomic forces peacefully. Young man – he continued – I invite you to the ‘White House’, the Rashtrapati Bhavan in Delhi, to hand over to me the first printed journal of your special issue dedicated to ‘India’s Reactors’; please keep me informed”. This had been in May 2003. Unfortunately, the progress of this work was very often stopped – or at least slowed

down – by many, many hurdles which could not have been foreseen. So the months and years passed and this issue was still not complete when the Prime Minister’s term finished in May 2004.

Now, in the beginning of 2006, finally the issue is complete and I am sure it is one of the finest Topical Issues NED has ever produced. It is really a trough of treasures many nuclear scientists have rarely seen nor studied. Of course this issue represents the work and energetic will for success of many, many Indian scientists and engineers. It is not possible to name them all, surely this would need to add some more pages to this volume. But one man must be praised: Dr. Ratan K. Sinha from BARC. It can be no doubt – whatsoever – that this issue is to a large extent his baby. Without his never ending endeavor and his willingness to try as far as ever possible to fulfill the many, never-ending wishes of the editor, this issue would have never been finalized. The nuclear community is very much obliged to him.

I am sure that even by only leafing through this issue many will see India’s great achievements of harnessing the nuclear forces for peaceful energy production either for the first time or at least with much other eyes. It will be quite obvious to everyone that the presented strategies on nuclear energy and the various reactors described clearly show that India is on the right way to solve their energy needs. This clear nuclear policy of India could serve as an example for many western politicians, who only talk about nuclear energy but never dare to decide anything since they see only ‘ifs’ and ‘when’s’ and never see the unique challenge of success.

When proudly presenting this volume, I have only one regret: obviously but unfortunately, I will never have the opportunity to see the monumental Rashtrapati Bhavan from inside, which I have – so often – marveled at from outside.

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