

**ATOMIC ENERGY AND SPACE RESEARCH
A PROFILE FOR THE DECADE 1970-80**



**ATOMIC ENERGY COMMISSION
GOVERNMENT OF INDIA
1970**

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FOREWORD

□ "When nuclear energy has been successfully applied for power production, in say, a couple of decades from now, India will not have to look abroad for its experts, but will find them ready at hand...." H. J. Bhabha—March 1944.

□ "India should be able to produce all the basic materials required for the utilisation of atomic energy and build a series of atomic power stations, which will contribute increasingly to the production of electric power in the country. These developments call for an organisation with full authority to plan and implement the various measures on sound technical and economic principles and free from all non-essential restrictions or needlessly inelastic rules. The special requirements of atomic energy, the newness of the field, the strategic nature of its activities and its international and political significance have to be borne in mind in devising such an organisation".—From Preamble to Resolution of the Government of India creating the Atomic Energy Commission, 1958.

□ "If you have the picture of the future of India that you are trying to build up, of the power that you require....you will come to the conclusion of the inevitability of our building up atomic power for peaceful purposes from now onwards".... Jawaharlal Nehru—January 1961.

□ "This moment marks a new phase in our technical history. With the commissioning of the Tarapur Power Station, we join the select band of nations which use atomic power for the advancement of human welfare....

"To those who made wry remarks about a cow-dung economy wishing to go in for nuclear energy, Dr. Bhabha convincingly explained the 'technological fall-out' which results from atomic energy, and the impact it has on other fields of economic and scientific activity. In the last 20 years, we have been engaged in building our infrastructure. The developing countries are in the advantageous position of stepping over several intermediate and not-so-essential stages. If the building of the infrastructure itself incorporates higher technology, future progress will be further accelerated. It is this point of view which gives significance to the work of the Atomic Energy Department"—Indira Gandhi—January 1970.

□ “The key to national prosperity, apart from the spirit of the people, lies in the modern age, in the effective combination of three factors—technology, raw materials and capital—of which the first is perhaps the most important, since the creation and adoption of new scientific techniques, can, in fact, make up for a deficiency in natural resources, and reduce the demands on capital. But technology can only grow out of the study of science and its applications. . . .

“ . . . It is an inherent obligation of a great country like India, with its traditions of scholarship and original thinking and its great cultural heritage, to participate fully in the march of science, which is probably mankind’s greatest enterprise today”—
The Scientific Policy Resolution of 1958 of the Government of India.

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The progress of science and technology is transforming society in peace and in war. The release of the energy of the atom and the conquest of outer space are two most significant landmarks in this progress. Largely due to the consistent national support which the programmes of the Atomic Energy Commission have received since Independence, India is amongst the nations of the world advanced in atomic energy, and is striving for a similar position in space technology and research. There are those who preach that developing nations must proceed step by step following the same process by which the advanced nations themselves progressed. One is often told that such and such a thing is too sophisticated to be applied. This approach disregards what should perhaps be obvious, that when a problem is great, one requires the most effective means available to deal with it.

The seeming disadvantage of a developing nation such as India, which has only a limited existing technological infrastructure to build on, can be an asset rather than a liability. I suggest that it is necessary for us to develop competence in all advanced technologies useful for our development and for defence, and to deploy them for the solution of our own particular problems, not for prestige, but based on sound technical and economic evaluation as well as political decision-making for a commitment of real resources. The traditional approach of planning to provide things like electric power or telecommunication services for a national infrastructure, based on projections of growth from past experience is inadequate. An alternative approach lies in creating consumption centres alongside facilities for supply, as for instance an agro-industrial complex served by a large nuclear power station or a programme for television to the entire countryside using a direct broadcast synchronous communications satellite.

Indeed there is a totality about the process of development which involves not only advanced technology and hardware but imaginative planning of supply and consumption centres, of social organisation and management, to leapfrog from a state of backwardness and poverty.

Nuclear power is today essential for economically supplying energy in large parts of the country, and is moreover the only major supply on which we will need to fall back in perhaps less than 50 years' time. We therefore need to commit ourselves to an appropriate programme of atomic power stations. We cannot hope to gain all the great economic advantages of nuclear power unless we develop a mix of thermal and advanced fast breeder reactors. It is my firm belief that the problems of poverty and regional imbalances in our country cannot be effectively tackled without it.

Several uses of outer space can be of immense benefit to us as we strive to advance economically and socially. Indeed without them it is difficult to see how we can hold our own in a shrinking world. The greatest cost/effectiveness of the uses of outer space occur through large scale applications rather than those of limited scope. A communication satellite can most effectively serve communities dispersed over large areas. Meteorological applications of satellites are likewise most relevant for a global system like the World Weather Watch.

It is possible to develop atomic energy and space research through basic, applied and developmental research in islands largely isolated from the rest of the country, but large scale applications of either for the benefit of the nation cannot be undertaken in isolation. We cannot have 20th century atomic energy or space research with 19th century industry or antiquated systems of management and organisation. There is a totality about modernisation, and in order to gain confidence, we must experiment with our resources even at the risk of failure. We have to rise from an in-built culture within which a major departure from an existing well-proven system and anything which is innovative in character is automatically regarded with suspicion.

There might be many opinions concerning what would be an advantageous course to follow in the short run, but 10 or 20 years from now, when the population of India would be somewhere between 750 and 1000 millions, it can hardly be controversial that we would need a very strong base of science and technology, of industry and agriculture, not only for our economic well being but for our national integration and for ensuring our security in the world. The profile of development, during the present decade, of atomic energy and space research carrying with it advances in fields such as metallurgy, electronics and instrumentation as well as computer sciences has been fashioned to provide a viable future. Advances in science and technology are accompanied by rapid obsolescence

of existing systems. Recognising that we do not wish to acquire black boxes from abroad but to grow a national capability, we should note that our plans have to be continually updated and even the strategy altered as we proceed. In many innovative tasks, forward planning and cost estimates can only be *ad hoc* and this has inherent limitations. Even so, the present document has been brought out in conscious recognition of the need to have national backing for the major objectives of our programme. There are many details, some technical in character, and others at a stage requiring further definition, which have been largely excluded in order that we can convey the broad outlines in terms of commitment of economic and human resources.

It is hardly necessary to emphasise that for projects which take five to seven years to complete, we have to look at least ten years in advance if our progress is not to be halting and results mediocre. The programme that we envisage is ambitious, but achievable. Without a deep commitment to it we shall certainly fritter away our resources.

*Bombay,
July 22, 1970.*

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