

DEVELOPMENT OF NUCLEAR POWER IN INDIA—A PERSPECTIVE

Anil Kakodkar

Bhabha Atomic Research Centre, India

INTRODUCTION

From an energy point of view, India is a resource deficient country. In the long run, coal and nuclear are the only conventional options available to us. We have to look at solar energy, but at present it looks as though bulk generation using solar is a futuristic option. Keeping this in view we are developing nuclear power and during the past five decades we have succeeded in establishing a robust nuclear power programme covering every facet of the nuclear fuel cycle. The power programme has been devised with the aim of thorium utilisation on a long term basis as India's uranium deposits are only moderate. Thus with "early transition to thorium" as the objective, we have followed a three-stage nuclear power development strategy right from the inception of our programme. The first stage, comprising setting up of Pressurised Heavy Water Reactors (PHWRs) and associated fuel cycle facilities, is already in the industrial domain.

The second stage envisages the setting up of Fast Breeder Reactors (FBRs) and involves setting up reprocessing plants and plutonium based fuel fabrication plants. Fast Breeder Reactors are necessary for our programme in order to multiply the fissile material inventory. Such a multiplication is necessary to eventually establish a higher power base using thorium in the third stage of our programme.

The third stage will be based on a thorium uranium-233 fuel system. Uranium-233 is to be obtained by irradiation of thorium in PHWRs and FBRs. To expedite transition to the thorium based systems, an Advanced Heavy Water Reactor (AHWR) is being developed. Besides expediting the transition to thorium, it will enable us to sustain some of the heavy water technologies which we have already acquired.

We have initiated studies on advanced fuel cycles involving the use of uranium with slight fissile enrichment in PHWRs. On a long term basis, if resources permit, we would like to initiate work on high temperature systems.