

Symposium on Globalization of Nuclear Activities

June 15-18, 1997, Rio de Janeiro, BRAZIL

The Rule of Research Reactors in Developing Countries.

Insertion of Brazil in this Market

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Abstract

In the world there are about 284 operational research reactors (RR). In developing countries there are 88 operational reactors. These RR are associated laboratories, representing a huge financial investment, have great potential for Research and Development (R&D), but many are underutilized, especially in developing countries.

RR are used mainly for radioisotope production (RI), Neutron Activation Analysis (NAA), Materials and Fuel Testing for Power Reactors, Neutron Scattering Studies (materials modification and characterization), Neutronography, Medical Application (Boron Neutron Capture Therapy – BNCT), Silicon doping gems irradiation (Topazium), and basic research (nuclear physics; solid state physics; radiobiology, etc.) All these applications have an enormous social acceptance in medicine, agriculture and industry, and in many cases can be a profitable business (RI, NAA), besides that it can be a Technical support of a Nuclear Power Program (operators training, materials and fuel testing etc.). However in developing countries most of the reactors do not have adequate capabilities to perform these applications (ex: Power of Flux Level; Design etc.), or are underutilized.

In developed countries (like USA and Europe, etc.) most of the small reactors are being shutdown, and only are in operation huge RR, in many cases sharing its utilization. In the other side, countries which have an active nuclear program, like Korea; Japan; Indonesia; China;(Asia) are constructing new RR of high power (ex: HANORO), mainly to support their Nuclear Power Program, but also to produce RI.

In developing countries most of the reactors are old and small RR, which had being constructed in the fifties or sixties (Atoms for peace Program), in a time where having RR gave country a *kind* of political *status*, and not inserted actually in a Nuclear Program, or to attempt to a social, or scientific, demand of application of RR, Minly RI production for medical application, as well as to suport National Nuclear Power Program, and so a cost-benefit of a new reactor, should be considered, as well as to seek optimum utilization for countries already having at least a medium size reactor (ex: IEA-R1 in Brazil).

This paper will analyse the situation of the RR which could be constructed at a reasonable cost, and attending a technical and social demands of developing countries.

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