"Challenges Ahead"

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There is an obvious relationship between the need for energy and the size of the world's population, as well as between energy consumption and the standard of living. The world's population in 1975 was nearly 4000 million; total electrical capacity in that year amounted to 1 111 000 MW, 6 per cent of which was represented by nuclear power plants. Forecasts for the year 2000 predict a rise in world population to 6000 million with an accompanying rise in the total installed electrical capacity to some 4 million MW, of which present predictions foresee about 35 per cent to be supplied by nuclear power.*

Apart from such extrapolations and forecasts it is quite certain that the present world consumption of about six billion tons of oil equivalent will increase to about two to three times this level by the year 2000. This will happen even if maximum efforts by industrialized countries at conserving energy are undertaken. One should not forget that even energy conservation measures have a long lead time and in some cases are energy-intensive. In addition, low energy costs have been taken for granted for so long in the past that they have in effect been accepted as the norm. This kind of thinking has until recently prevented the assignment of higher priority to research programmes and investments aimed at developing alternative energy supplies for safe use on a substantial scale.

The developing countries, which today represent more than half of the world population and may represent two-thirds by the year 2000, urgently call for closing the gulf between the prosperity of the industrialized world and their own poverty. A "new economic order" is at present being discussed in various forums. The industrialization that it presumes would require an expansion of energy consumption which, by the turn of the century, would raise the relative share of the less-developed countries far beyond the current level of today's ten per cent of total energy consumption. The long-term security interests of the entire world may depend to a large extent on rapidly narrowing this gap and bringing stability to the so-called "north-south" relations, particularly in the energy field.

The Agency's membership has grown from 57 Member States in 1957 to its present total of 110. These Member States can be said to have three main concerns: non-proliferation, the safety of nuclear power production, and technical assistance. Of the total, 79 are developing countries, eligible for assistance under the United Nations Development Programme. Taking into account both technological development and energy resources, one might distinguish four different categories of states, each with very specific concerns:

(1) Countries which are both advanced in development and rich in energy resources, as for example the USA and the USSR, and which share the task of perfecting a highly

* The figures shown for electrical capacity do not include countries with centrally planned economies.

sophisticated technology. For nuclear power, these countries are the driving force behind improved waste management techniques, quality assurance and standardization, research and development and studies on risk assessment;

(2) Countries which are advanced in development, but poor in energy resources, for instance, Japan, Sweden, Switzerland, Italy, and to a certain extent the Federal Republic of Germany and France. These countries may have no other immediate solution at hand but conservation measures and the rational further development of the nuclear fuel cycle;

(3) Countries lacking in technological development, but rich in natural resources, such as the oil-producing countries. They can at present afford to buy both the technology and the know-how, but cannot be expected to remain dependent on foreign expertise and manpower in the long run; and

(4) Countries which need assistance both in development and in energy. Members of this category include not only those the United Nations terms the "least developed countries", but also countries such as India, Egypt, and the Republic of Korea, where extensive efforts have been undertaken in the nuclear field.

The IAEA should help to determine the particular set of problems inherent in each group of countries in respect of the use and further development of nuclear technology and, whenever possible, assist in finding appropriate solutions.

All IAEA Member States recognize the need for a strong non-proliferation regime, which, following the terms of the Treaty on the Non-Proliferation of Nuclear Weapons and in order to be acceptable to all States, must not limit in any way a country's access to nuclear energy. The Agency must have the co-operation of all its Member States in order to administer an international safeguards system which can effectively guarantee the non-proliferation regime.

Regulations for the safe use of nuclear power also concern the Agency's entire membership and it will remain one of the Agency's main tasks to help maintain the high safety record of the nuclear industry. Nuclear safety standards, safety codes and guides, measures for physical protection and the safe transport of nuclear material will, therefore, be expanded and refined in order to reach the highest common international standard.

The first category of IAEA Member States is the one most involved in vast research and development efforts — such as exploring other advanced reactor systems — nuclear fusion, the possibilities of nuclear energy parks with combined production of electricity and heat — to name but a few. The exchange of information under IAEA auspices, such as in relation to fusion technology, can play an important role in this respect.

States included in the first two categories are specifically interested in problems concerning the back end of the nuclear fuel cycle, which have been reviewed in depth at the Agency's Conference in Salzburg last May. In this regard, the Agency has already taken some indicative steps; the study of regional nuclear fuel cycle centres is one of these and its future scope could include, for example, providing advice and developing guidelines for long-term storage of spent fuel in relation to an open-ended fuel cycle. It could also be expanded to studying fuel cycles. Before any multi-national fuel cycle centres come into operation, however, there might be a growing dispersal of significant amounts of separated

In 1974 the IAEA started a series of nuclear power training courses aimed primarily at those developing countries which were intending to initiate or accelerate nuclear power programmes. The picture shows participants in the first IAEA course on Nuclear Power Project Planning and Implementation at Karlsruhe, Federal Republic of Germany, which took place from 8 September to 19 December 1975.

plutonium and, as foreseen in the Statute, the Agency could assume responsibility for storage facilities for surplus plutonium if necessary. A plutonium management study has already been initiated.

The technologies now available for the safe treatment and storage of radioactive wastes need practical demonstrations. More attention must also be paid to the eventual de-commissioning of nuclear facilities, preferably at the time of planning and siting a nuclear plant. Again, the role of the Agency in fostering information exchange will continue to be of importance.

Countries in the third category show enormous potential for rapid development, but require most of all the training of skilled manpower. The Agency has launched a sustantial training effort, a series of training courses on the management of nuclear power projects, which will be continued in the years to come. It is now time for direct assistance to build up the educational structure for this purpose in each of these Member States.

For those in the fourth category, the considerations of prime importance are those relating to the acquisition, preparation and management of nuclear fuel prior to its use for power

production. Apart from access to advanced technology transfer and an assured supply of nuclear fuel on equitable terms, the needs of these countries include adequate local infrastructure, manpower training, and a stabilized nuclear market. In many cases uranium prospection should be increased so as to provide the countries concerned with data and experience in developing their own natural resources.

A fundamental problem faced by most countries is that of financing, particularly where foreign currency is required. Here, the Agency should also look for innovative solutions with the co-operation of the International Bank for Research and Development (IBRD) and all its Member States, both industrialized and less industrialized, in order to establish a sound basis for a stable energy market in which nuclear power can play its role.

A matter of particular urgency of relevance to all Member States is that of long-term energy planning. The Agency has now gathered all available data on energy production and consumption in most of its Member States through the year 1975 and should have all basic information on the world's energy situation and related economic parameters at its disposal by the end of 1978. This will make possible the establishment of an energy data bank, in respect of which the co-operation of specialized institutions like the Economic Commission for Europe (ECE) and the IBRD will also be sought.

The challenges ahead, therefore, are as great as those faced by the Agency at the outset. They clearly require a high order of dedication and the fullest co-operation with Member States.