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(Malaysia)*

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MALAYSIA

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CURRENT AND PROJECTED USES OF NUCLEAR ENERGY
FOR ECONOMIC AND SOCIAL DEVELOPMENT

1. Nuclear Power Production

The Malaysian energy sector has been characterised by a rapid increase in energy demand. With recent policy developments, notably the emphasis on industrialisation, this trend is likely to continue. It is also expected that the share of electricity in the final energy demand will increase significantly in the future. On the supply side the nation has embarked upon a course of diversification of primary energy sources in line with the national four-fuel strategy, which identifies gas, hydro, coal and oil as the fuels for the future.

Malaysia is fortunate in its energy resource base, but within the context of long term planning it must be realised that these resources are finite and cannot sustain rapid energy growth much beyond the year 2000.

A fifth energy option, which has been deferred until the year 2000, is nuclear power. One study has been carried out under the IAEA technical assistance to review the position of nuclear power for Malaysia's energy future. To this end the position of nuclear power in the long term development of the electric power sector is analysed in detail. In addition the study assesses infrastructural, manpower and related aspects, and the impacts and implications of the introduction of nuclear power in Malaysia. Finally recommendations are made as to the various actions that need to be taken to ensure that the nuclear option is kept open.

2. Other Peaceful Applications of Nuclear Energy

The Nuclear Energy Unit came into existence on 16th. June 1983 when the Tun Ismail Atomic Research Centre (PUSPATI) previously an agency under the Ministry of Science, Technology and the

Environment, was transferred to the Prime Minister's Department.

The objectives of this Unit are:

1. to introduce and promote the application of nuclear science and technology for peaceful purposes in diverse areas covering agriculture, medical and education and
2. to coordinate all aspects and issues related to nuclear power and energy.

In order to achieve the said objectives the Unit is responsible for the following tasks:

1. to conduct research programmes related to the application of nuclear technology in medicine, energy, engineering, agriculture, physical sciences and environmental studies,
2. to provide training facilities in various aspects of nuclear science and technology, e.g. reactor physics and engineering, applications of isotopes and radiation, nuclear instrumentation, health physics, and radiation protection,
3. to produce radioisotopes for medical uses, research institutions, institutions of higher learning, as well as industries,
4. to encourage and provide technical assistance to other research institutes and industries on the applications of nuclear techniques, and
5. personnel and environmental monitoring.

Most of the activities are carried out by this Unit itself while the rest are joint projects carried out with the various local institutions.

The facilities available at the Unit are not only used for research but also for providing service essential to research programs and other related areas within the Unit as well as in other institutions. These services are:

1. supply of radioisotopes and radiopharmaceuticals,
2. nuclear instruments maintenance,
3. irradiation services,
4. nuclear analysis,
5. consultancy in the applications of radioisotopes and radiation,
6. waste treatment and disposal,
7. dosimetry and calibration,
8. dissemination of information in nuclear science and technology, and
9. training in areas related to nuclear science and technology.

Currently the main emphasis on research is in three major research areas or programmes which are in nuclear technology, in the applications of isotopes and radiation in industry, and in the applications of isotopes and radiation in biology and agriculture.

1. Nuclear Technology Programme

Three functional research groups are formed in nuclear technology namely in the areas of applied physics, material technology and fuel technology. The objective of the programme is to prepare the necessary manpower and to develop expertise in these areas in anticipation for the possibility of going nuclear power in the future. Malaysia believes that the act of getting prepared for nuclear power should be pursued, but since the introduction of nuclear power into the country has been postponed indefinitely the urgency has been taken off.

2. Isotope and Radiation in Biology and Agriculture Programme

Three research groups make up the programme on the applications of isotope and radiation in biology and agriculture. They are on food irradiation, on mutation breeding and on soil-plant relationship. The objective of this programme is to introduce, disseminate and promote the applications of nuclear techniques in the fields of biology and agriculture. The applications of ionizing radiation in the processing of agricultural products will also be developed. The introduction of nuclear techniques will add to the availability of techniques to existing techniques already in these fields.

3. Isotope and Radiation in Industry Programme

The programme on the applications of isotope and radiation in industry has five groups namely hydrology and tracer technique, non-destructive testing (NDT), radiation processing, analytical services, and nuclear techniques in geology.

In this programme, efforts are made to promote the applications of nuclear techniques in industry and the transfer of these technologies to the industrial sector. Nuclear techniques are especially important when applied to such systems as quality control, quality testing and others. It involves the improvement in the quality of local indigenous products and their applications through their physical properties. It includes radiation processing of rubber latex and wood together with their products. In other words this programme deals with the applications of nuclear technology in socio-economic activities. The objective is the search for better quality products, saving in energy used in manufacturing, added value to raw materials and better health care.

4. Health and Medicine

In the medical field, radioactive isotopes and sources are used in diagnosis and treatment.

5. Health and Safety

To maintain a high safety level in nuclear energy utilization corresponding to expansion and diversification of utilization in the future, it is important to promote research on all aspects such as safety research on environmental radioactivity. This must be done with respect to characteristics and behaviour of radiation and radioisotopes in the environment. Other researches pertaining to the safety issues have also be done.

6. Radioisotope Production

The Nuclear Energy Unit has developed techniques for producing shortlived isotope such as P-32, Tc-99m, Na-24, K-42, Cr-51, H-3, Br-82, Rb-86, Au-198 and Sc-46 which are now used in agricultural and industrial research.

It is necessary to properly plan a research project to the smallest possible detail before it is implemented in order to ensure that the problem is looked at from the right technical perspective and that the viability of the project is beyond doubt. It is all the more so when the researchers involved have very limited experience. It is for this reason that cooperation in research with other institutes at national and international levels was established. The International Atomic Energy Agency (IAEA) is coordinating research in these areas world-wide. Malaysia has taken advantage of this, especially in the technical assistance and Regional Cooperative Agreement projects, on industrial applications. The Unit has also sought cooperation with institutions of international repute in this region, such as the Australian Atomic Energy Commission, JAERI, Japan, the National Atomic Energy of Indonesia, the Bhabha Atomic Research Centre of India, and the Pakistan Atomic Energy Commission. Through the cooperation with these institutes the Unit has been able to secure on-the-job training for its researchers and supporting staff. It is hoped that international cooperation of this nature can be extended to include interchange of researchers.

CONSTRAINTS ENCOUNTERED IN THE DEVELOPMENT
OF PEACEFUL USES OF NUCLEAR ENERGY

It is recognised that many processing technologies, important to Malaysia, have been developed and reduced to commercial practice in many developed countries. The question is how soon can these technologies be transferred to us. It is imperative that effective transfer of these technologies be preceded by the development of relevant knowledge. Therefore strong efforts and seriousness are required. These can be done by special training - demonstration activities. This is very necessary for future benefits where economy and efficiency in the use of limited resources - manpower, facilities and equipment, as well developed technology - can be expanded through existing cooperation. Malaysia realises that the development of both industrial infrastructure and manpower are vital for the integration of modern technologies into industries. Demonstrations, expert services, fellowships, workshops and on-the-job training form important components of manpower development.

Finally, since the nuclear reactor at Nuclear Energy Unit has a low maximum power, very limited short-lived number of isotopes can be produced.