INTERNATIONAL COOPERATION IN HUMAN RESOURCE DEVELOPMENT AS A TOOL TO PROMOTE NUCLEAR INFRASTRUCTURE BUILDUP

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ABSTRACT

In modern society more and more energy supply is needed to satisfy human needs. A portion of this energy is used at seemingly excessive levels in some countries and some effective conservation measures are needed to control its use. Another portion of energy is used to develop poorer countries and bring the standard of living and health care of their peoples up to a level appropriate for modern times.

The present world energy supply relies mostly on fossil fuels for domestic and commercial uses, transport, electricity generation, etc. As commercial energy, the fossil fuels account for about 90% of the total, the rest being mainly hydro and nuclear. The OECD countries use most of the energy produced in the world and are expected to increase their consumption still further. The third-world countries will also need to increase their consumption to sustain their emerging economies. This extensive use of fossil fuels poses a tremendous strain on both the natural resources of the world as well as the environment. Cleaner energy and fuels are needed for the next millennium if human life is to be sustainable on earth.

For electricity generation, the clean energy candidates are improvements in fossil fuel technologies, renewable energy and nuclear energy. Natural gas and clean coal technology are among the most promising sources of cleaner fuels. Furthermore, improvement in technology, such as combined cycle, has almost doubled the thermal efficiency of power plants. The renewables comprise mainly solar, wind, geothermal, biomass, biogas and, to some extent, hydro. Most of these are familiar forms of energies and their uses do not pose much apprehension. No extensive education and training are required to exploit these forms of energy. However the large scale implementation of most, except for hydro, is not yet practical nor economical.

In contrast, nuclear energy is relatively clean, can be implemented in large scale, is reasonably economic but its use poses a lot of apprehension by the public. To be accepted, nuclear energy requires a lot of technological infrastructure including education and training. It seems obvious that for sustainable development, the safe use of nuclear energy should be promoted.

It is however important to understand that Nuclear power cannot be considered as a single project. It needs a major commitment on a national level and a lot of infrastructure unique to the nuclear industry is needed. For a country which already has nuclear power, most if not all of this infrastructure is already in place but even in such cases, certain of these infrastructures will risk fading out if no new plants are planned or existing ones are phased out. An example being the case in some universities where student enrollment in nuclear engineering programs has trickled to a standstill. For an industrialized country with no nuclear power at present, most of these same infrastructures are available and

additional ones may be easily added should needs arise. For an emerging economy the situation is quite different. Most of the infrastructure in emerging countries lag far behind the fast pace of development and a country is normally hard pressed in trying to build them up to sustain the rapid growth.

Since infrastructure required to implement a nuclear power project goes far beyond that required for the conventional industry it is necessary to consider such issues as an integral part of any national nuclear program. This would include items like a legal framework, regulatory and safety capability and organizational structures; education and training infrastructures; scientific and technological infrastructures and research institutions. Industrial infrastructure would include well established and capable electric utilities, construction and operation/maintenance capability, etc..

Some of the above described issues may be addressed by building up structures and establishing organizational frameworks but most will rely on the availability of knowledgeable people in the various fields, thus human resource development becomes a key factor in this context. This problem becomes quite complex and poses some dilemma on the need and the timing.

To start such programs too early ahead of fundamental decisions on adopting nuclear power would be unfocussed and uneconomical. But the alternative of doing nothing in advance of a nuclear power decision would raise serious questions about the ability of the country to manage and operate such a project. For these reasons, it is believed that building up nuclear infrastructures in an early stage is necessary for a country considering the nuclear option but it should be done with the economic factor and relevancy in mind.

One way to promote nuclear infrastructure buildup is to develop high quality and flexible human resources which understand and appreciate nuclear energy. It should not be a massive program but should have enough people to fill in some strategic positions in the different basic organizations within the country. These people would help to promote the buildup of key nuclear infrastructures naturally and steadily. The traditional way is to find some scholarships and send them to be trained in countries where nuclear energy is used. This approach may be effective but rather expensive and not practical for most countries. Another approach may be to develop this human resource within the country but in a systematic and high quality fashion.

Needs for highly qualified trainers and up-to-date knowledge are evident because nuclear technology is advanced technology and is not home grown in emerging economies. Hiring specialists to do all the works may not be viable for practical and economical reasons. Mutual interests and mutual benefits of supplier countries, user countries and potential user countries may be the key to the approach. All parties have interest in promoting the safe use of nuclear energy and maintain the knowledge of it at the highest possible level. In developed countries the study of nuclear technology is declining while in emerging economies it is either non existent or of lower standard than that required for nuclear systems.

If we could combine the need to maintain expertise in developed countries with nuclear programs and the need to develop infrastructures and human resources in developing countries by sharing resources then it may be possible to both maintain and/or develop good nuclear infrastructures in all countries which are interested in this option. The cost may be shared to some extent.

In this way the more advanced countries would benefit by keeping their key nuclear facilities active and the potential users would also benefit. If the world nuclear community really has an interest in the continued safe use of nuclear energy it should then explore this possibility of cooperation based on mutual interest and mutual benefits.

It is therefore proposed that an international network of cooperation in human resource development be established. Mobility of trainers and trainees should be further promoted but the use of modern information technology and information sharing should also take place. Exchanges of personnel and knowledge, workshops, combined classrooms either physically or electronically, distance education and multimedia approach, etc. show great promise and should be further explored.

Mutual interest is the key to the success of such a scheme. As a result human resource and nuclear infrastructures can be more effectively sustained in developed countries with existing nuclear programs and new and necessary infrastructures can steadily progress in other countries which have interest in nuclear power but have not yet dedicated to themselves to this technology.

Such an approach, while developed by the IAEA, should be expanded and built upon by the core nuclear technology countries in cooperation with developing nations into a win/win strategy.