

近代科学技術の中で核技術ほど、技術と人間・社会・世界との係わり合いを多くの側面で鮮明且つ劇的にみせつけているものはない。それは化石エネルギーや新技術のエレクトロニクスやバイオテクノロジーとちがって、強烈なデメリット（核兵器）から人類の前に姿を現わしただけに、そのエネルギーとしての平和利用（原子力発電など）についても安全性や廃棄物についての厳しい議論の中で開発がすすんでいる。その上、その原子力発電の実用化の時期がエネルギーの大宗を占める石油をめぐるの地じり的な国際関係の変動（石油危機）の時期と一致したこともあって、先進国と開発途上国との間で、平和利用核技術への参入の時期・方法・条件について、国際的核不拡散体制との関連で、きびしい対立がおこりつつある。

原子力発電は経済的で地域格差の少い石油代替エネルギーとして多くの国ですでに有力な地位を確保しており、世界全体では267基1億6,800万kwの原子力発電所が運転されており、とくにエネルギーの輸入石油依存度が先進国中で最も高い（67%）日本では、すでに全電力量の4割が原子力発電で供給されている。その燃料であるウラン資源は現在確認されている埋蔵量だけで、現在技術（軽水炉）ではほぼ石油資源と匹敵し、新技術（増殖炉）ではその数十倍のエネルギーを供給できる。しかし原子力発電の主要国のなかで軍事利用と全く無関係に原子力産業を構築してきたのは日本と西ドイツ位のものである。核兵器国が際限もなく増強競争をエスカレートさせている状況は、人類の生存にとっての決定的な脅威であると同時に、核技術の平和利用への大きな障害となっている。日本の原子力産業関係者は、世界ではじめて、今年の第2回国連軍縮特別総会に「核エネルギーの平和利用による人類の未来のために」と題するメッセージを送り核兵器の廃絶を強く訴えた。

核技術はその平和利用において、その技術の基本的な革新性から、従来技術の利用にはなかった多くの機構や制度（Institution）が導入されてきた。たとえば、安全性の確保については開発の推進と安全規制とを明確に分離する体制をほとんどの国が採用しているし、実用化のはるか以前から万一周辺に被害を生ずるような事故の場合の第三者への損害賠償制度が事業者の無過失責の原則の上に確立されている。さらに国際的には核不拡散を担保するため、国家の主権を超えた国際保障措置制度（国際原子力機関による核物質の検量と原子力施設に関する機器の封印、モニターおよび人員による査察）を既に50か国が受入れているし、盗取などの不法行為による核物質の軍事転用を防止するための国際条約も成立しようとしている。また国際原子力機関を中心とする多国間或いは当事者同士の二国間、あるいは地理的に近縁なグループ国間などで、情報交換、技術援助、共同研究開発プロジェクト、国際基準の作成等々の国際協力は、他の技術に例をみないほど、網の目のように多角的多面的に具体化されている。そしてこのようなインスティテューションは、核兵器の廃絶をめざす具体的な行動や制度づくりにも多くの参考となる面を含んでいるように思われる。

核技術はそのデメリット（兵器・放射能）のコントロール乃至消滅のためにも、またそのメリット（平和利用）の最大限の発揮のためにも、あらゆる面で国際化の方向を強く要求しており、終局的には世界の統合さえも指し示しているように思われる。人類がその知性（その生産物としての科学技術）を放棄しないで生き残るべきであるならば、人間の理性もそれ位の高い境地に達するべく義務づけられていると思われる。

Nuclear Energy and the Future of Mankind

Kazuhisa Mori

No modern science or technology has had more distinct and dramatic bearings on people, society and the world than nuclear energy. Unlike conventional energy, or new technologies such as electronics and genetics, nuclear technology cannot be utilized, even for peaceful purposes, without raising a lively debate on safety and waste problems associated with its use such as for nuclear electric power generation. This public concern arises in part because people are aware of the demerits of the technology so strongly impressed upon them when it first came into being as nuclear weapons. Nuclear power generation is now reaching the point of commercial application at a time when international relations have undergone an upheaval due to the oil crisis which jeopardizes the status of petroleum as the mainstay of energy sources. How and under what conditions a country should move forward with development of sensitive nuclear technology for the peaceful purpose is a tough question arising between advanced and developing countries in connection with international nuclear non-proliferation.

Nuclear Power generation is already gaining firm ground in some countries which seek to develop an economic energy alternative to petroleum. A total of 267 nuclear power plants with a combined capacity of 168 million KW are in operation around the world. In Japan which depends on imported oil for its energy supplies at the highest level of any industrialized country both in terms of overall percentage (66%) and total amount used, nuclear power plants now provide one-fourth of the nation's total production of electricity. Uranium makes it possible to supply energy almost equal to the present petroleum resources when taking into account only the proven uranium deposits and when you calculate output in terms of the present day technology using light water reactors. When one considers the new breeder technology the output can be 50 to 100 times more. However, only Japan and F. R. Germany, of the major nuclear power generating countries, have built up their nuclear industries independent of military uses. Nuclear-Weapons states are escalating the arms race which poses a crucial threat to the existence of mankind and constitutes

a great obstacle to the peaceful use of nuclear technology. In a message sent to the second special United Nations session on disarmament this year, the Japanese nuclear industry made a strong appeal for elimination of nuclear weapons. This represents the first time that the nuclear industry in any part of the world has taken such a position and called for "peaceful uses of nuclear energy for the future of mankind" in the absence of nuclear weapons.

The innovations that are essential to nuclear technology development and use for peaceful purposes have compelled the establishment of a number of mechanisms and institutions never before required for the use of other technologies. To assure nuclear safety, for example, most countries are operating under a system which distinctly separates promotion and development of nuclear energy from safety control. Such countries make it a rule to follow the principle of "no fault liability" of the owner/operator of nuclear plant for third party compensation in case of nuclear accidents. The requirement for "no fault" liability insurance was established long before the commercialization of nuclear energy. On the international front, 50 countries have already agreed to accept an international safeguards system (under which the International Atomic Energy Agency is authorized to check nuclear materials accountability and to inspect nuclear facilities) that oversteps national sovereignty in giving assurance for nuclear non-proliferation. An international treaty is about to be concluded to preclude theft and other illegal acts designed for the use of nuclear materials for military purposes. IAEA initiated efforts, along with other initiatives, are being directed toward international co-operation in many areas. These include the exchange of information, technical assistance, joint research and development projects, and the formulation of international standards on a multi-lateral and bi-lateral or geographical basis. These important steps are materializing on a level unequaled before in other fields of technology. The sum total of these initiatives are expected to offer mechanisms and institutions for concrete actions aimed at controlling and eliminating nuclear weapons.

In attempting to rationalize the demerits (nuclear weapons and radio-activity) and the merits (peaceful uses), nuclear technology will require setting a course for internationalization leading eventually to the world integration in this vital area. If human beings are to survive without discarding their intellect (science and technology as its products), their reasoning must also reach such a far-sighted stage.

Nuclear Energy and Mankind's Future

Kazuhisa Mori

No modern science and technology have more distinct and dramatic bearings on people, society and the world than nuclear technology. Unlike fossil energy and new technologies such as electronics and biotechnology, nuclear technology cannot be developed, even for peaceful purposes, without raising a lively debate on safety and waste materials associated with the use of nuclear energy (such as nuclear power generation), because people are aware of the demerits (nuclear weapons) that the technology strongly impressed on them when it first came into being. Nuclear power generation, in particular, is coming to the point of commercial application at a time when international relations are undergoing an upheaval (oil crisis) that jeopardizes the status of petroleum as the mainstay of energy sources. When, how and under what conditions nuclear technology should be introduced for peaceful purposes is an important question arising between industrialized and developing countries as they are concerned over the international effort at nuclear non-proliferation.

Nuclear power generation is already gaining firm ground in many countries which seek an economic energy source alternative to petroleum as to which a great local diversity exists. A total of 267 nuclear power plants with a combined capacity of

168 million KW are in operation around the world. In Japan which depends on imported oil for its energy supplies at a rate highest of any industrialized country (67%), nuclear power plants cover one-fourth of the nation's total production of electricity. These plants are fueled by uranium which exists, when estimated by proven deposits only and calculated in terms of the present technology (light water reactor), in amounts almost equal to the petroleum resources. The new technology (breeder reactor) would make it possible to supply 50 to 100 times as much energy. However, no major nuclear power generating countries have built up their nuclear industries regardless of military uses, except Japan and West Germany. Nuclear-weapons states escalating an ~~and~~ unceasing arms race pose a crucial threat to the existence of mankind and constitute a great obstacle to the peaceful use of nuclear technology. In a message sent to the second special United Nations session on disarmament this year to make the first appeal for elimination of nuclear weapons to be made by nuclear industry circles in the world, the Japanese interest called for "peaceful uses of nuclear energy for the future of mankind."

The innovations that are essential to nuclear technology for peaceful purposes have compelled it to be equipped with a number of mechanisms and institutions that have ~~never~~ never been necessary for the use of other technology before. To make sure of nuclear safety, for example, most countries are operating

under a system that distinctly separates the promotion of development from safety control. They make it a rule to follow the principle of strict liability, establishing it long before the commercialization of their nuclear plants, that obligates their operators to compensate for damage should it be caused to third persons in an accident affecting surrounding areas. On the international front, countries have already agreed to establish an international safeguards system (under which the International Atomic Energy Agency will be authorized to measure the amount of nuclear materials and inspect nuclear facilities) that will overstep national sovereignty in giving security for nuclear non-proliferation. International arrangements are about to be concluded to preclude theft and other illegal acts designed for the use of nuclear materials for military purposes. ~~IAEA~~ IAEA-initiated and other efforts toward international cooperation in the exchange of information, technical assistance, joint research and development projects, and the formulation of international standards on a multilateral, bilateral or geographical basis are materializing in all points on a level unequalled to other fields of technology. These efforts are also expected to serve the purpose of arousing concrete actions and establishing institutions aimed at eliminating nuclear weapons.

If only to control or eliminate its demerits (nuclear weapons and radioactivity) and make full use of its merits

(peaceful uses), nuclear technology seems to demand that its course be set for internationalization in all its bearings, and eventually for world integration. If humans are to survive without discarding their intelligence (science and technology as its products), they must know what choice they have to take.

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