International technical co-operation for a safer world

by C. Veléz Ocón*

It is difficult, judging from the news that reaches us daily from all parts of the globe, not to be concerned about such issues as international stability and security. One of the chief causes of instability in the world is assumed to be the gap that exists between the advanced and the less advanced countries, between the rich and the poor, between countries with technical know-how and those without it. Among the various technologies available today, those related to energy and energy-production are of paramount importance since, without energy, all programmes and models for development, regardless of their scope or soundness, represent only exercises in wishful thinking.

For better or for worse, efforts to promote international technical co-operation in the field of energy seldom make headlines in the world. Typically, such co-operation – in which the provision of assistance plays a fundamental role – proceeds slowly, and its results only become manifest many years later. It is, however, an indispensable part of the global effort to narrow the technological gap. For the International Atomic Energy Agency, the furtherance of technical co-operation in the nuclear field is a primary objective, and this role is clearly defined in the organization's Statute.

While *nuclear energy* is not a particularly clear expression, it is generally taken to mean processes and applications of nuclear reactions, the most important of which is at present fission. Both energy and neutrons are released in the fission reaction; the neutrons can be used to produce radioisotopes, which can variously be employed as radiation sources or as tracers to follow biological, physical, and chemical processes. There is scarcely a field of human endeavour to which nuclear energy, as defined above, does not have application.

Nuclear techniques are appropriate technology

In the first instance, there is the production of heat and electricity by means of power reactors. Nuclear fission is, for the time being, the only proven new energy technology that is supplementing or replacing on a significant scale traditional methods of power generation. If the history of technology can be used as a guide, one can foresee an increasingly important role for nuclear power in meeting the world's energy needs, even with the development of alternative sources of energy, well into the next century.

For many countries, however, and particularly for developing ones, nuclear power has not yet become an economic option. In these countries, it is often the other aspects of nuclear energy that are of greater interest. Nuclear techniques are used, for example, in treating disease, eradicating pests, augmenting agricultural production, improving the quality of food, assessing and managing water resources, and increasing the efficiency of industrial processes. For all countries, developed and developing alike, nuclear techniques are the "appropriate technology" to deal with these problems.

In a practical sense, nuclear energy was discovered at the University of Chicago 40 years ago. The ulterior motive for the construction of that first reactor was military, however, and mankind has not forgotten that nuclear energy's first application brought with it death and destruction on a massive scale. The technology thus appeared before the public with a genuine and well-deserved stigma. In this context, I think it useful to note that ambivalent, or even hostile, attitudes have also been held in respect of other, incomparably less dangerous technologies, which, when first offered to the public, appeared with similar stigmas and gave rise to public misgivings on the part of a great many. Alternating current, for which all our homes are wired and for which all of our common appliances are now designed, was, for instance, first used for the electric chair. The competitors of the manufacturer who first introduced alternating current did not fail to exploit this fact in attempting to discredit the technology.

It is a fact, however, that nuclear power carries with it unique risks and could have military implications. While the shortest route to nuclear weapons does not include the power reactor, it is undeniable that a country possessing comprehensive nuclear power technology is in a position to produce nuclear explosives if it so desires.

This gives rise to a dichotomy peculiar to nuclear energy and our attitudes to it. While it is generally recognized that the technology offers great benefits and that efforts to narrow the technological gap through its application contribute positively to global prosperity and security, the transfer of nuclear technology, without limitations and appropriate controls, could accelerate the spread of nuclear weapons. It should be emphasized, however, that most applications of nuclear

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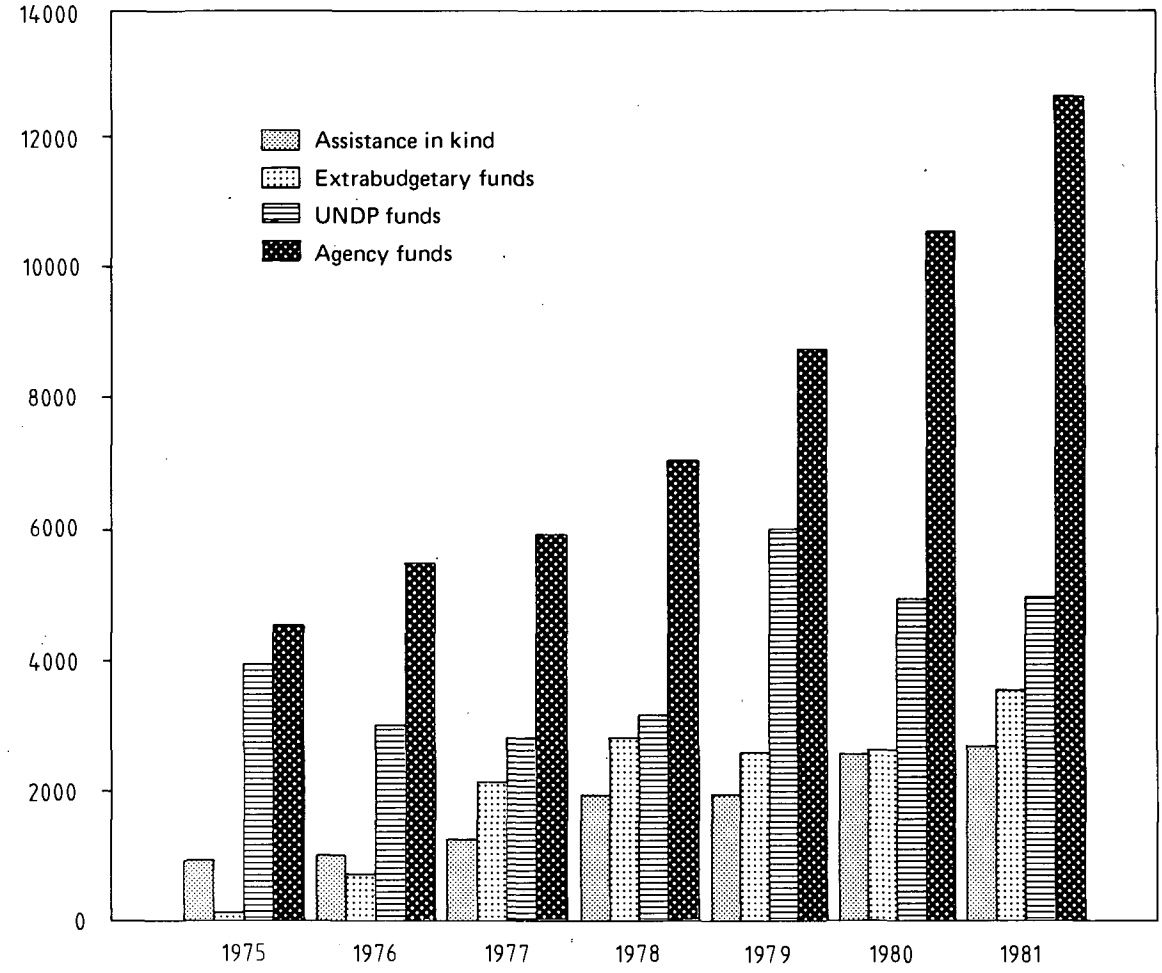

Figure 1. Resources available to the Agency's Technical Co-operation programmes from 1975 to 1981 (in US $1000).

energy have no direct relationship with the development of nuclear explosives.

The Agency is probably best known to the general public as the international organization in charge of applying safeguards, as stipulated in the Treaty on the Non-Proliferation of Nuclear Weapons. In promoting technical co-operation, the Agency imposes the restriction that "the assistance provided shall not be used in such a way as to further any military purpose" (Article XI of the IAEA Statute). Although safeguards and technical co-operation – control and promotion – must be seen not as opposed concepts but rather as complementary ones, there are differences of opinion among Member States concerning the amount of resources that should be devoted to each activity. Understandably, some countries attach more importance to the safeguarding function while others would prefer to see more vigorous support of all nuclear energy applications.

The Agency contributes to the transfer of nuclear technology in many ways. It plays the important role of an intermediary between Member States in the transfer of experience, information, materials and equipment. Within the framework of its technical assistance programme, the Agency, in response to requests from Member States, supplies expert services and equipment and organizes training activities through fellowships, courses, scientific visits and study tours. Outside the regular programme of technical assistance, the Agency awards research contracts, primarily to institutes in developing countries, and supports co-ordinated research programmes under which the Agency brings together research establishments from both advanced and developing countries to work on common problems.

The technical assistance provided under the Agency's regular programme is financed from voluntary contributions of its Member States, supplemented by so-called extrabudgetary funds and assistance in kind. The Agency also administers funds made available by UNDP and other national and international sources (such as the Swedish International Development Authority). The resources available to the Agency for

Spending on Technical Co-operation in 1981

Field of activity		Share of total programme: Amount in US $1000	%
General atomic energy development		1 630.5	7.8
Nuclear physics		1 606.9	7.7
Nuclear chemistry		723.2	3.4
Prospecting, mining, and processing of nuclear materials		1 849.4	8.8
Nuclear engineering and technology		3 111.3	14.8
Application of isotopes and radiation in	Agriculture	4 860.6	23.2
	Medicine	2 551.7	12.2
	Biology	361.1	1.7
	Industry and Hydrology	1 969.3	9.4
Safety in nuclear energy		2 296.3	11.0
Total assistance		20 960.3	100.0

Type of assistance	Share (%)
Experts	24.1
Equipment	47.1
Fellowships	28.8
Total	100.0

technical co-operation activities have increased appreciably over the last few years, as can be seen from Figure 1. The types of assistance requested and rendered depend upon existing scientific and technological infrastructures in the recipient countries. On a global basis, the assistance delivered in 1981, excluding training courses, can be broken down as shown in the Table. The distribution of technical co-operation inputs by region and source for 1981 is given in Figure 2.

These statistics require some comment and explanation:

- Although the Technical Assistance Fund, which reflects the target for voluntary contributions established by the Agency's Board of Governors, has grown at an annual rate of approximately 19%, growth in the total resources available has been slower, sometimes uncomfortably close to the inflation rate.
- Grouped together, the fields of activity "general atomic energy development", "nuclear physics", and "chemistry" absorb close to 20% of the resources; "prospecting, mining and processing of nuclear materials" about 10%; "nuclear engineering and technology", including "safety in nuclear energy", about 25%; and the "application of isotopes and radiation" the remaining 45%. Although these figures fluctuate from year to year, they give a general picture of the distribution by field and provide a representative cross-section of the status of nuclear energy in developing countries. For most developing Member States, the use of nuclear technology to increase agricultural production is of paramount importance. Similarly, the application of isotopes and radiation in medicine, which is routine in the advanced countries, needs further support so as to secure improvements in health care in many developing nations. In countries where geological conditions are favourable, exploration for uranium contributes to the national resource inventory and can have desirable economic implications, even in the absence of any domestic nuclear power programme. The most industrialized of the developing nations have already embarked on nuclear power programmes, and their requests to the Agency reflect a need for assistance in specialized fields related to reactor technology, the nuclear fuel cycle and nuclear safety.
- The distribution of inputs by region shows that Africa, Asia and the Pacific, and Latin America each receive about one quarter of the total assistance delivered. In the case of Latin America, a significant portion of the assistance provided is represented by funds made available by UNDP and applied to a few large-scale multi-year projects.

Training

The Agency well knows that effective technology transfer requires more than the mere provision of equipment and foreign experts. Accordingly, the aim of its technical co-operation programmes is to ensure that imported technologies are adapted to, assimilated in, and fully integrated with, the recipient countries' economic and social framework. For this reason, approximately 30% of the Agency's own resources for technical assistance are spent on training activities designed to further the knowledge and expertise of persons from developing Member States.

Since much of the assistance offered in kind is used for fellowships – including on-the-job training – and training courses, the portion of the total resources going for training is actually larger still. The Agency has, over the last few years, built up an impressive programme of training courses on a great number of specialized subjects that change from year to year in a planned fashion. There were 28 regional and interregional training courses and study tours in 1981, with the participation of approximately 600 people; the total cost to the Agency was roughly US $2.1 million (of which US $529 000 was in non-convertible currencies). Among the subjects covered were: The role of nuclear energy within a national energy plan; Electric system expansion planning; Siting of nuclear power plants; Uranium exploration; Nuclear fuel cycle management; Nuclear power plant operational safety; Design, use, and maintenance of nuclear medical equipment; Use of

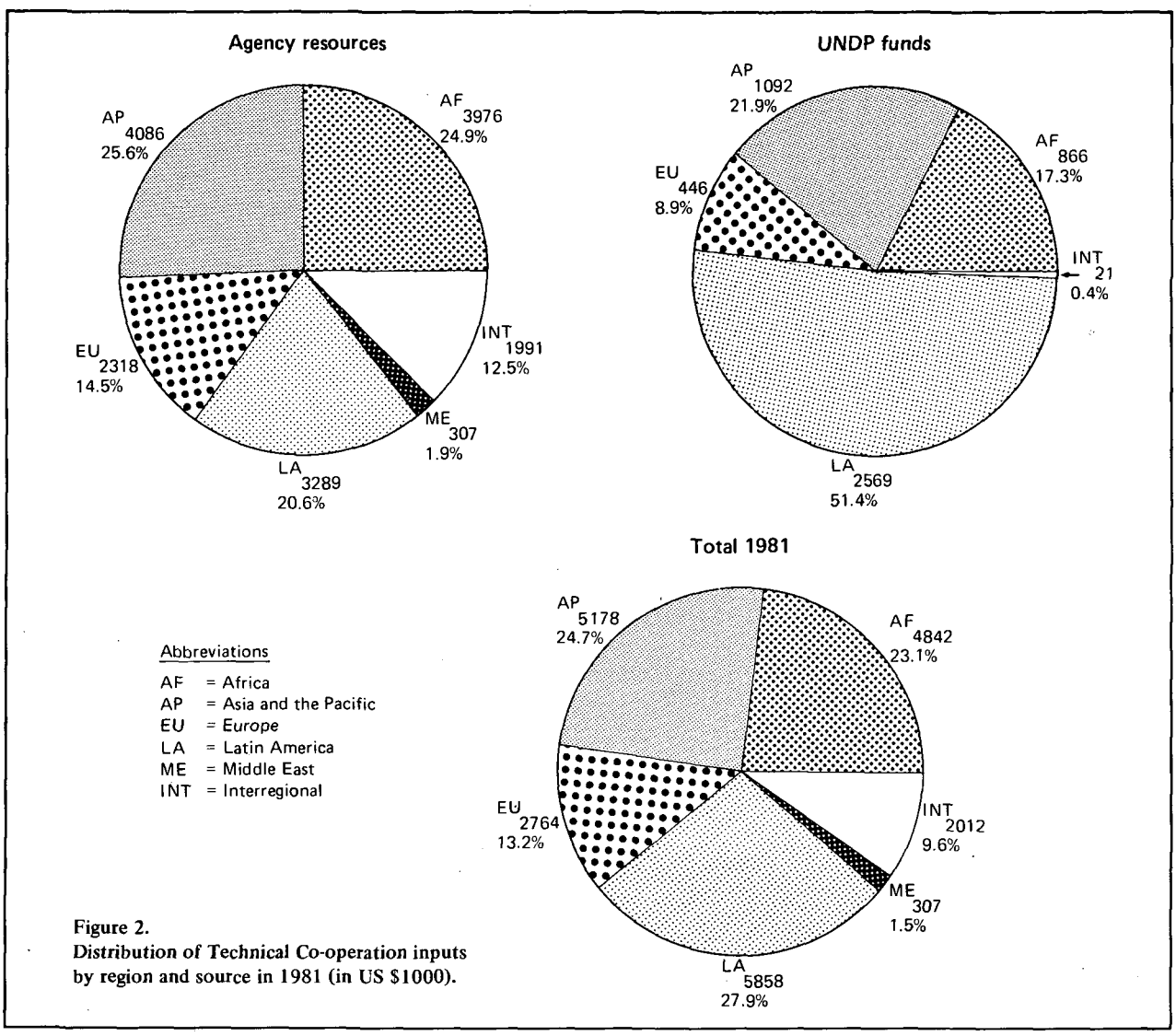

Figure 2.
Distribution of Technical Co-operation inputs by region and source in 1981 (in US $1000).

nitrogen-15 in soil science and plant nutrition; Animal production research; Integrated pest management; Radioisotope techniques in industry for process and quality control; and Utilization of low-energy accelerators.

Through the organization of regional activities and, in particular, through the establishment of regional agreements, the Agency has been promoting technical co-operation ties between developing countries. This is one of the ways in which the Agency has helped Member States to obtain the degree of self-confidence and knowledge required in order to make independent decisions on technological matters of national importance.

Effectiveness

The recent growth of the technical assistance programme has posed, to donor and recipient countries alike, and to the Agency's staff in charge of both technical and administrative aspects of the programme, questions as to the effectiveness of the organization's efforts and the approaches that should be taken in the future. This has led the Agency to take preliminary steps towards the establishment of an evaluation unit whose aim will be to point out deficiencies, to enhance effectiveness, and to stimulate dialogue between all parties involved in technology transfer. The unit should serve as a management tool for better resource allocation through, among other things, the timely detection of flaws, the removal of impediments to implementation and the judicious application of previous experience to future technical co-operation activities.

Although military applications of nuclear energy may be the greatest single contributor to the feeling of uncertainty that looms over the world, it is the goal of the Agency in promoting technical co-operation to further the causes of peace and international stability by making available the benefits of this technology to all countries. In the twenty-five years that have elapsed since its founding, the Agency has contributed effectively to the reduction of the once enormous gap that existed between countries in the field of nuclear energy. It will continue working towards this goal.