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The International Atomic Energy Agency's Technical Co-operation

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I. INTRODUCTION

A. Purpose

1. The twenty-fifth anniversary of the International Atomic Energy Agency (IAEA) provides a useful dateline against which to focus attention on the Agency's activities such a period of existence in a field as important as the peaceful utilization of the atom cannot but invite an assessment of what has been taking place within the Agency and whether the road pursued is the best one.

2. It is a fact that the role of the Agency is being felt much more intensely in times of increased need for security, of energy scarcity and of the search for new technologies as a means of solving problems such as hunger, health, environment and development. One of the most important aspects of the Agency's contribution in this respect is its technical co-operation programme which has inevitably become a major topic of discussion and interest.

3. It is in this general context that JIU decided to assess the Agency's technical co-operation.

B. Approach

4. The measures taken and efforts made by IAEA to ensure effective management of its programmes and projects in this field are substantial: the creation of a Department of Technical Co-operation, within which an Evaluation Unit has just been set up; the establishment of a Technical Assistance and Co-operation Committee as an organ of the Board of Governors; the organization of meetings of groups of experts on technical co-operation; the adoption of improved measures and procedures recommended by such committees and groups; the collection of statistical data and information for better management: all these are clear examples of the Agency's interest in this field.

5. What is not visible, or at least not well known, is the impact of these projects and programmes on the recipient countries. How do these projects and programmes fit into their energy development policies? Are they responsive to their needs and concerns? How are they selected? How are they programmed, formulated, implemented and evaluated? Those are some of the questions which this report will be trying to clarify. The approach will thus consist of analysing the impact of the Agency's technical co-operation on the recipients' side rather than looking into its arrangements and procedures as they are established at Headquarters, though maintaining the link between the two.

C. Methodology

6. Preliminary discussions with high officials of the Agency enabled us, at the outset of this study, to circumscribe the subject-matter and to determine the approach and methodology. It was evident also that a visit to the field was indispensable. A selection was made of countries at various stages of development and engaged in programmes of different dimensions in co-operation with the Agency. Visits to those

countries were arranged, and working meetings were held with Government officials responsible for the programmes and projects supported by the Agency. In addition, a questionnaire was made available to the officials concerned. The replies of this questionnaire served to supplement the information gathered during the visists. Both our discussions and the questionnaire were structured around the chronological sequence which characterises most technical co-operation activities: programming, project formulation, project implementation, project evaluation and follow-up.

7. The report will therefore concentrate on the Agency's technical co-operation in those terms, while stressing the aspects of training, recruitment of experts, acquisition of supplies and equipment, and relation between Headquarters and the field.

8. We should like at this stage to express our gratitude to the Government officials of the countries visited and their Permanent Representatives in Geneva and Vienna, to IAEA and in particular its Department of Technical Co-operation, and to the UNDP Resident Representatives, who enabled us, through discussions, visits to projects, provision of information and documents, and replies to questionnaires, to gather valuable information, necessary for the preparation of this report.

II. EVOLUTION OF THE AGENCY'S TECHNICAL CO-OPERATION

9. Before analyzing the Agency's technical co-operation problems and how they can be solved, it may be useful to indicate the scope of that co-operation and briefly review its development.

A. Development of technical co-operation

10. Between 1958, the first full year of the Agency's operation, and 1983, the latest year for which complete statistics are available, the resources allocated to technical co-operation increased from $0.8 million to $34.5 million (see table I). This global figure calls for some comments.

Table I

IAEA: Resources available for technical co-operation 1958-1983 (in thousand $US)

	1958	1968	1978	1979	1980	1981	1982	1983
UNDP Funds	-	1 173	3 205	6 066	5 018	5 186	4 631	3 700
Assistance in kind	689	565	1 987	2 015	2 628	2 788	2 493	2 172
Extrabudgetary resources	-	-	2 860	2 643	2 692	3 624	4 474	9 390
Technical assistance and Co-operation Fund	125	1 348	7 121	8 802	10 633	12 675	15 999	19 241
Total	814	3 086	15 173	19 526	20 971	24 524	27 597	34 513

Source: GOV/2117: The Annual Report for 1982, p.19 and GOV/2161: The Agency's Technical Co-operation Activities in 1983.

11. The growth described above seems to be indicated in current values. In constant values, one can say that the increase in funds allocated to technical co-operation has been less important. If one takes into consideration the fact that the number of recipient countries doubled during the same period, it becomes clear why member countries constantly request and insist that the Agency should make more resources available for technical co-operation. However one should recognize that the growth rate of technical co-operation funds has been more pronounced in the case of the Agency than in other United Nations organizations and that the share of the Agency's total budget allocated to technical co-operation is among the highest in the United Nations system.

12. It is also evident in table I that UNDP funds, after reaching a peak of $6 million in 1979, began to decline and have continued to decrease both in volume and in percentage ever since ($3.7 million in 1983). This decrease in resources has been compensated by an increase in extrabudgetary resources, but the utilization of such funds is not without causing some problems because inter alia they are not easy to forecast.

13. It should be noted also that the figures indicated in table I refer to available resources, which are greater than the amounts actually expended. Although the

Agency has made appreciable progress in gradually reducing the margin between the two, it is still possible to increase the utilization of the allotted funds. Some of this report's recommendations will be addressed in this direction and designed to assist in achieving this aim.

14. The pattern of earmarking funds for different technical co-operation activities (fellowships, experts, training courses, supplies and equipment) has evolved unevenly. From table II, in which the five-years totals eliminate annual fluctuations, it can be seen that the number of fellowships has doubled while that of experts has increased nearly sevenfold. Admittedly, the length of stay of experts has dropped precipitously and the Agency is relying increasingly on its own staff members to undertake field missions. We consider that these two new features constitute a positive development, nevertheless, a better balance should be found between the number of experts and that of fellowship recipients. We shall make the point in the sections devoted to experts and to training that both of these components play specific roles which, we felt during our field visits, are highly appreciated. The substantial increase in funds allocated to equipment should be noted with great appreciation. However, these funds cover only a proportion of the real needs of developing countries.

Table II

IAEA: Technical Co-operation Components
1958-1982

	1958-62	1963-67	1968-72	1973-77	1978-82
Fellowships	1 157	1 530	1 566	1 715	2 161
Experts	273	809	1 177	1 194	2 096
Equipment ($ million)	1.0	4.5	6.2	14.0	39.4
Training courses	16	48	62	62	127

Source: GOV/2149: Review of the Agency's activities, p.55.

B. Technical co-operation programmes and projects

15. It would not be possible to analyze the problems posed by technical co-operation without giving at least a brief description of the programmes it covers. At the present time, the Agency's technical co-operation covers two major fields of activity, each supported at Headquarters by a specialised department (a) the Department of Nuclear Energy and Safety, whose programmes cover (i) nuclear power, (ii) nuclear fuel cycle, (iii) nuclear safety and (iv) management of radio-active waste; and (b) the Department of Research and Isotopes, which is responsible for programmes dealing with the application of radioisotopes to (i) food and agriculture, (ii) medicine, (iii) industry and (iv) physical sciences.

16. The range of programmes has been constantly widening over the years and their content is becoming more complex, in order to respond to the expanding and diversifying demands by member States.

1. Nuclear power

17. This programme is directed at assisting developing countries to build nuclear power plants. By the end of 1982, there were six developing countries possessing and operating nine nuclear power plants. To this can be added a further 22 plants which were under construction in nine developing countries. It was evident from the visits to some developing countries that technical co-operation provided by the Agency, although limited in monetary terms, played a very substantial and catalytic role in the initiation of their nuclear power programmes. At the present time, the Agency is trying to co-operate with developing countries in studying the planning and construction of nuclear power plants and their integration within over-all national energy plans. Among the tools made available by the Agency to member States for this purpose are: planning of nuclear power with the help of systems and models developed by the Agency (WASP[1] and MAED[2]), holding of training courses on planning nuclear power, operation of an energy and economic data bank (EEDB[3]) established by the Agency containing basic information on all member States, and a power reactor information system (PRIS).

2. Nuclear fuel cycle

18. Through this programme, the Agency co-operates with developing countries in:

(a) exploration, extraction and processing of uranium,

(b) collection, evaluation and exchange of information on water-reactor fuel element processing quality control and quality assurance.

(c) spent-fuel management.

19. Table III shows that under these two programmes, nuclear power and nuclear fuel cycle, more than 1,700 fellowships were awarded to nationals of developing countries and more than 1,100 specialists took 53 training courses offered by the Agency which arranged 1,274 assignments of experts, and procured equipment worth more than $US 37 million.

3. Nuclear safety

20. Within this programme, emphasis has gradually shifted from the preparation at Headquarters of recommendations and reports for the use of member states to the application of safety regulations. Table III shows that 215 advisory and technical assistance missions in matters of health and safety were organized by the Agency. The Agency has also co-operated actively in the choice of sites for nuclear power plants and in the solution of the safety problems related to their construction. The most notable form of co-operation has probably been in the contribution to the establishment of national regulatory bodies.

1/ Wien Automatic System Planning Package.
2/ Model for Analysis of Energy Demands.
3/ Energy and Economic Data Bank.

Table III

IAEA: Technical Co-operation Activities
1958-1982

	Fellowships	Experts	Equipment ($ million)	Training courses/ participants
1. Reactors and fuel cycle	1 731	1 274	15.0	53/1153
2. Safety and waste management	680	787	4.7	46/966
3. Isotope and radiation applications				
(a) to food and agriculture	1 264	1 280	15.2	93/1568
(b) to life sciences	1 441	674	8.3	41/701
(c) to physical sciences	3 013	1 534	21.8	82/1430

Source: GOV/2149: Review of the Agency's activities.

21. Technical co-operation on safety matters is supported by the Agency's preparation and publication of basic norms, such as the Basic Safety standards for Radiation Protection and the NUSS[4/] codes and guides, seminars, training courses and advisory missions, the establishment of a system of exchange of information among member countries, computerized programmes on the evaluation of safety measures, and, more recently, the establishment of an extensive system for reporting incidents which develop during operation and providing information on the causes of accidents and on methods of preventing their occurrence. The benefits derived by recipient countries are substantial but they vary from one to another.

4. Waste management

22. This programme addresses itself mainly to the problems of treatment of radioactive wastes, storage of wastes underground and ecological aspects of nuclear energy, through the collection and updating of technical information and the drawing up of recommendations on waste management, final disposal and storage; the preparation of recommendations for conventions on the protection of the environment, and the development of methodologies for assessing the environmental implications of nuclear facilities. The Agency holds for these purposes symposia, seminars, and technical committee meetings, on which summaries and reports are made available to all the member States. The programme is also supported by organizing training courses, study tours, fellowships,

4/ Agency programme on nuclear safety standards for nuclear power plants.

experts, co-ordinated research contracts, and the operation of INIS[5/] which supports activities in many other areas. In the countries visited we met officials who had actively participated in such projects and had derived great benefit from them.

5. Applications of radioisotopes and radiation to food and agriculture

23. This programme is mainly directed to the solution of problems facing developing countries in utilizing radiation to improve agriculture and food products. This technique has resulted in the development of nearly 200 varieties over the past 25 years. It has also contributed in a number of countries to their campaigns for eradicating the Mediterranean fruit fly. Finally, food preservation through the irradiation of edible products is making much progress in replacing food additives.

24. Isotope techniques are gradually being used more and more extensively by developing countries in co-operation with the Agency for the purposes of improving the fertility of soil, increasing crops' intake of nutrients and fertilizer, and achieving optimum water utilization.

25. Radioimmunoassay techniques for increasing the productivity of dairy cattle and producing attenuated vaccines are increasingly being used by developing countries in co-operation with the Agency. We visited certain centres, universities and laboratories of developing countries receiving assistance from the Agency in different forms: equipment, training, experts, consultants and research contracts. We found such assistance appreciated everywhere.

6. Applications to life sciences

26. This programme covers the Agency's co-operation with developing countries in the use of radionuclides and radiation in clinical medicine and the medical sciences, radiosterilization of medical supplies, cancer radiotherapy, development of potent vaccines for the control of parasitic diseases prevalent in developing countries, applied research on topics of direct interest to those countries, creation for their radiotheraphy establishments of a postal dose intercomparison service for cobalt-60 dosimetry, the establishment of a Network of Secondary Standard Dosimetry Laboratories (SSDLs).

27. The Agency's co-operation in these areas is of great benefit to the recipient countries. In more than one case, the equipment supplied by the Agency, the nationals trained by the Agency and its experts who assist in installing this equipment and bringing it into operation constituted a nucleus of the country's first services in this field and the point of departure for their future development.

28. We shall see later on the ageing of some equipment and the lack of funds or clear arrangements for maintaining it and decentralizing its availability in the country remain important problems whose solution calls for the Agency's co-operation.

7. Applications to physical sciences

29. Under this programme the Agency co-operates with member States in introducing

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5/ International Nuclear Information System

isotope techniques in the field of hydrology. These techniques are applied to nuclear waste disposal, geothermal energy and environmental analysis. They are of particular importance to developing countries in the arid zones, because they help to gather more adequate information about water resources and water movements.

30. The Agency is also co-operating with developing countries in the application of radioisotope and radiation technology to such industrial activities as wear and corrosion studies, non-destructive testing, sterilisation, on-line control, and the exploration and recovery of minerals.

31. Here again, the Agency has provided equipment, trained experts and, what is most important, helped to establish national services. We visited a number of them and spoke to those in charge about aspects of their co-operation with the Agency. Their comments and suggestions for maximizing the effectiveness of technical co-operation will be discussed in subsequent chapters.

III. PROGRAMMING OF TECHNICAL CO-OPERATION

32. Many of the technical co-operation activities supported by the Agency in member States started more than 10, 15 or 20 years ago on the basis of one or two small projects and now cover, in certain countries, a large number of projects involving several economic sectors and a variety of components and depending on multiple sources of financing. Our discussions with Government officials responsible for the programming of technical co-operation in the countries visited (economic co-operation departments of the ministries of foreign affairs, planning, national economy, finance, etc.) showed in the majority of cases that the time had come to integrate such projects in a general framework covering all of the Agency's technical co-operation, so as to approach it as a whole and determine its objectives and the necessary human resources and institutional elements that must be mobilized to ensure its cost-effectiveness with the least possible waste and duplication. The need for programming the Agency's activities is all the more pressing as the great majority of projects are not only supported but also financed by the Agency, and are therefore excluded from the country programmes of the United Nations system's technical assistance financed by UNDP.

33. The idea of programming the Agency's technical co-operation is not entirely new, since a few years ago IAEA began to undertake technical co-operation programming missions in member States upon their request. However, only a very limited number of such missions have been dispatched. Moreover, the programming in question is only beginning and is still fragmentary. It seems to us that its development, its implications and even its conception deserve to be better defined, so as to exploit its maximum benefits for the Agency and member States.

A. Adaptation of programming to the Agency's technical co-operation

1. Present programming

34. The largest part of the Agency's technical co-operation resources has so far been directed to the implementation of small projects of less than one year's duration. Since 1980, however, the Agency has made an effort to increase the volume of its resources allocated to "multi-year programming".[6/] This applies to individual projects expected to last up to three years. Although some of these projects are designed from the beginning to cover two or three years, in most other cases there is merely a multi-year presentation of annual projects. In such cases it would be useful to speak of "multi-year projects" rather than "multi-year programming". In this report we shall limit the programming concept to the preparation of a programme of general policy regarding nuclear power and nuclear applications that indicates global and sectoral priority objectives, and the means of realizing them. Such a programme would be implemented through projects whose execution is consistent with the attainment of those objectives and the mobilization of resources. It is entirely possible to design a programme on the basis of projects in course of execution or preparation provided that their implementation will contribute to the attainment of the programme's major objectives.

6/ The Memorandum by the Director-General on "Technical Co-operation Policy Review" dated 29 April 1983 (GOV/2120) and submitted to the Board of Governors in its 1983 June Session.

35. As mentioned above, the Agency has organized some programming missions in recent years. These missions have been quite useful, for they co-operated with the recipient countries to establish a better link between their atomic energy development programmes and their national economic development programmes. They also measured the impact of Agency-supported projects on, and their contribution to, the implementation of their atomic energy development programmes, assisted in planning the implementation of these programmes and in identifying the obstacles that had to be removed. However, such missions can be more effective if, in addition, they assist in creating institutional mechanisms for reviewing and updating their recommendations at regular intervals, aid in identifying basic alternative policies and choices so as to help the Governments concerned to opt for the best policies, adapt their terms of reference to the stage of development reached by the countries concerned (least developed countries, developing countries starting their economic take-off, semi-industrialized developing countries), and devote greater effort to the technical co-operation aspects best suited to the different needs and stages of development of those groups of countries.

2. Cross-sectoral programming

36. Some of the countries visited would prefer to eliminate simultaneously bottlenecks in several sectors which are related to shortcomings in the form of absence of training, research, studies, information and institutional infrastructure. We felt that the majority of these countries had accumulated enough practical experience of technical co-operation with the Agency to enable them to programme co-ordinated measure in the field of training or research, or even institutional infrastructure. On the oth hand, systematic programming related to the preparation of studies, or the accumulatio and dissemination of scientific information, does not seem to have received sufficient attention. The Agency may co-operate with recipient countries, at their request in pro gramming such elements and ensuring that appropriate attention is given to each of them

3. Programming of inputs

37. The programming we are suggesting would make it possible to group the required inputs: experts, supplies and equipment, manpower, subcontracting, research contracts. This would provide an excellent opportunity to verify that there is no duplication or waste, and simultaneously to organize complementarities and solve problems common to those inputs: for example, establishment of a rapid and simplified procedure at the national level for the passage through customs of the supplies and equipment of the Agency's projects; organization of inspection, maintenance and repair of all of the Agency's equipment; pooling of information concerning Agency experts requested by the country; concentration of Agency-supported training in the most important sectors; harmonizing policy for the research contracts awarded by the Agency; etc. We came to realize in the countries visited how advantageous such an approach would be both to them and to the Agency and we believe that it is probably in this direction that the Agency should orient its efforts to render technical co-operation more beneficial to member States.

4. Programming of sources of financing

38. Our discussion in the field revealed another major difficulty encountered by some member States, namely that related to financing of technical co-operation programmes. Owing to the diversification both of the sources of financing and of the procedures to be followed to obtain it, it is becoming increasingly difficult for some countries to familiarize themselves with those procedures and to find their way through. Yet better knowledge, and above all programming, of those sources would make it possible to comprehend the advantages of each of them, and to harmonize the features of each project with the most appropriate sources.

B. Implications

39. The gradual development over several years of integrated programming of the Agency's technical co-operation, as defined above, will require the introduction of adequate arrangements both within the Agency and in the field. We shall deal at this stage with two aspects which we consider important: revision of the annual procedure for contributions to the Agency's technical co-operation, and the Agency's representation in the field.

1. Financial estimates

40. Realistic and effective programming would have to be based on budgetary resources which cover several years and which are feasible, i.e. which have reasonable prospects of availability. It would be most useful if member States committed themselves to the payment of voluntary contributions extending over a cycle of several years. While such commitments would enable the Agency to plan ahead the implementation of multi-year programmes, they would not be protected from substantial fluctuations and especially from downward revision for reasons connected with economic conditions. Therefore, in addition to the adoption of multi-year cycles of voluntary contributions, it would be necessary to envisage the introduction of safety measures and the accumulation of financial reserves to cope with unforeseen shortages of funds.

41. Multi-year programming of technical co-operation funds (regular programme and extra-budgetary resources), instead of their annual allocation to specific projects as at present, would enable the unused funds of inactive projects to be utilized to support other projects short of resources and thus prevent such funds from remaining frozen until the projects in difficulty are reactivated. Under present procedures some funds have to be held back for one to eight years while the projects to which they are allocated are inoperative. As a result, when such projects do resume, the funds in questions will be financing projects which are obsolete or which no longer serve priority objectives.

42. Multi-year global programming of funds would therefore make it possible, within the same financial year, to spend practically the entire sum available to the Agency annually and simultaneously reduce the gap between available resources and

funds utilized. It would thus significantly increase the volume of funds reaching the recipient countries and permit the allocation of those funds to current priority projects. We would like to mention that the Agency is aware of these problems and has taken appropriate measures to solve them since last year through the so called "dynami programming" which provides the possiblity of using unobligated funds for the financin of new projects.1/

2. Representation in the field

43. The implementation and periodic review and updating of these programmes at the country level, as well as the identification and formulation of the projects, the channelling of necessary information from the Agency to the field and vice-versa, and the need to make available to Government services, departments and ministries a focal poin that would provide them with information concerning the Agency's procedures, formaliti programmes, choices of financing, etc. - all these functions require someone to deal with them permanently. More than once, in the countries visited, our attention was drawn to the fact that it is difficult to obtain locally adequate information concerning particular aspects of the Agency's technical co-operation, a project executed by the Agency, or an Agency officer or service concerned.

44. We therefore believe that it is important to consider the possiblity of establishing a form of Agency representation in the field. In this spirit, we suggest that the Agency consider the possibility of adopting one of the following solutions:

(a) The agency might organize for nationals responsible for programming, supervising or co-ordinating the Agency's technical co-operation and working in a central ministry, in a national commission or an institute that acts as the opposite number of the Agency, annual training courses of one or two months on programming, financing, project formulation, information exchange, services offered by the Agency and the procedures it requires with a view to enabling them to play the role indicated in paragraph 43 above. On returning to their countries, those officials could hold training or re-training sessions for persons responsible for the Agency's technical co-operation programmes and projects in other ministries and institutes. This approach may be of particular suitability to developing countries already having an advanced administration capable of making one or more officials available to carry out, in addition to their normal duties, the duties of an adviser on technical co-operation with the Agency.

(b) The agency might also consider the possibility of appointing regional representatives who would be entrusted with the task of visiting frequently the countries of their region to provide them with the services enumerated in paragraph 43.

45. We should like at this stage to refer to the problems raised by the termination of the services of co-ordinators of large projects financed by UNDP who at the

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1/ See the Memorandum by the Director-General (GOV/2120) pp. 10-12.

same time are responsible for the co-ordination of other projects financed by the Agency. These co-ordinators, who in some cases have assistants, co-operate mainly with the national commission responsible for the country's atomic energy programme but also with other interested ministries. At the end of the UNDP project, the co-ordinator and his staff have to cease their functions and the co-ordination of the Agency's projects is thereafter assumed partially by the national commission, since the latter rarely covers all of the Agency's projects, some of which are operated directly and independently by other ministries, universities or institutes. The continuity of co-ordination then raises the question of who would be able to cover all of the projects and who would have a status separate from the commission and the other ministries. We suggest that in such cases, whenever a co-ordinator leaves, one or two local persons should be kept and made responsible for acting as an information officer. The separate status accorded to this information officer is justified by the fact that this person have to deal not only with Agency projects implemented in co-operation with the national commission but also with projects executed in co-operation with other ministries. If its separate status is to be assured, he would have to be paid out of Agency funds. It is possible to consider that his salary could be within the 8 per cent changed by the Agency as supporting costs.[8/]

C. Development of programming

1. Progressive development

46. Integrated programming could be introduced gradually, but it seems premature to introduce it in countries where the Agency carries out only a limited number of small projects. Actually, such countries enjoy definite advantages, for it is easier not only to administer well-defined small projects but also to interest more than one contributing country in financing them.

47. In other countries, where the number and size of projects justify the introduction of a global multi-year programming process, it may be undertaken without too much delay because the advantages of such programming far exceed its drawbacks. If introduced pragmatically, without creating complicated or bureaucratic structures, it can be inexpensive and provide the Agency with an instrument which continuously and completely shows the status of all the projects and the progress being made in attaining the objectives of a nuclear energy development policy.

48. On the other hand, if introduced in a country which is in the early stages of developing a nuclear energy policy, programming would make it possible to select the approaches most suitable for the country. In a country which already has several years' experience in this field, programming would provide it with an opportunity to take stock of its past experience and to look more clearly towards the future.

8/ Least Developed among Developing Countries (LDC's) are not changed.

2. Ultimate goal

49. Our visits to the field showed that programming may become one of the important tasks facing the Agency in the next future. The Agency should be prepare to introduce in developing countries a form of programming involving multi-year financing mechanisms and based on an uncomplicated field structure to ease implementation, updating and monitoring of the national programmes. We have already dealt with financial programming and Agency representation in the field. We should at this stage mention that most of the countries visited would be ready to provide the Agency with the mechanism needed to integrate the programming of the Agency's technical co-operation into their machinery for programming multilateral and bilateral technical co-operation. Many countries already have, in their Ministry of Foreign Affairs or of International Co-operation, interministerial commissions responsible for the programming of co-operation with international organizations. In many cases these commissions include representatives from the ministries of planning, finance, health, agriculture, education, etc. These commissions hold meetings on specialized subjects and have follow-up committees and sub-committees which meet regularly. They would be prepared to extend similar treatment to co-operate with the Agency and to create a standing committee to look after the programming and implementation of that co-operation. To initiate the system, the Agency may consider the possibility of assisting these commissions, at the request of the countries concerned, to prepare multi-year programmes covering its technical co-operation with them.

IV. PROJECT FORMULATION

50. Our visits to countries and our discussions with officials concerned showed that the formulation of most projects pose similar problems and that there are special problems relating to the formulation of preparatory studies concerning the construction of nuclear power plants. We will be addressing these two sets of problems in this chapter.

A. Problems relating to project formulation

1. Government contributions

51. It is important to ensure that as accurate as possible a list of the various types of government contributions required for the implementation of the project is drawn up at the formulation stage, so as to determine the nature of such contributions, and to confirm with those concerned that they will be available at the time needed, in accordance with the conditions agreed upon by the Agency and the government. Government contributions should be pooled with those of the Agency. A consolidated schedule for the procurement of supplies and the performance of services by the Agency and the government should be drawn up and included in the project document.

2. Periodic and final evaluations

52. In the case of fairly large projects to be implemented over a period exceeding one year, the project document should be so formulated as to provide for periodic evaluation in the course of implementation as well as upon completion of the project. Evaluation carried out during the execution of the project should ensure that implementation is proceeding according to expectations to enable any necessary modifications to be made, while the ex-post evaluation would provide an opportunity to examine the project's impact and to decide on follow-up action. Precise details of the evaluations (machinery, timing, participants, aims, etc.) should be worked out at the project formulation stage.

3. Formulation missions

53. We recommended that the Agency should help interested countries, at their request, to formulate medium-scale or large-scale projects by dispatching missions composed of one or more Agency officials and consultants. The purpose of these formulation missions, would be to ensure that suitable conditions for the implementation of the project exist or can be created on the spot (legal framework, administrative and institutional infrastructure, human resources already available or to be trained, technical capacity already acquired or to be acquired). In fact, the Agency has for the first time schedule in 1984 a small number of project-formulation assistance missions under the heading "pre-project assistance".[9/] The Agency could develop and broaden this kind of assistance, at the request of member States.

9/ A total of $US 90,000 has been allocated to pre-project assistance in the 1984 budget. See GOV/INF/441: Implementation of the Agency's technical co-operation programmes as at 30 September 1983.

54. The anticipated advantages of formulation missions along the lines indicated here would be considerable. Such missions would provide an opportunity for studying an optimum combination of project components taking account of actual conditions within the country concerned; they would improve prospects of avoiding large numbers of adjustments and exchanges of views between the Agency and the Government; and they would reduce to a great extent the need for undue use of expert services during the project implementation phase to deal with complications which were not apparent at the formulation stage.

B. Problems concerning the formulation of studies relating to the construction of nuclear power plants

55. According to the Agency's estimates of the number of nuclear power plants in operation, or expected to be under construction within the next two or three years, a total of 33 countries, including 10 developing countries, will have nuclear power plants by 1990. By that date, there will be an estimated 38 nuclear power plants situated in the developing countries, with an installed capacity of 24,000 MW (e), representing approximately 5 per cent of total installed electrical capacity in those countries, as against 20 per cent in the industrialized countries.[10/] It is generally agreed that, without the present economic recession, which began in the early 1970s, the number of developing countries possessing nuclear power plants would have been higher. It would not be inaccurate to anticipate the possibility of a resurgence of nuclear-power-plant construction in the developing countries as and when the present economic trend is finally reversed. Consequently, it can be expected that the Agency's services in this field will be in greater demand during the coming decades and that the Agency will be expected to increase its technical co-operation with the developing countries regarding the construction of nuclear power plants, and more particularly the preparation of preliminary studies relating to such plants. In the light of discussions with officials responsible for nuclear-power development programmes in the countries visited, we would recommend that the Agency should take advantage of this breathing space to prepare itself for a resumption of such co-operation in optimum conditions, utilizing its long experience in this area.[11/]

1. A sound foundation

56. We have briefly described the services which the Agency makes available to member States interested in conducting preparatory studies: the Model for Analysis of Energy Demands (MAED), computer programmes for planning the expansion of electricity supply systems (WASP III), the Energy and Economic Data Bank (EEDB), and the Power Reactor Information System (PRIS). We should mention that, at the request of

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10/ H.J. Laue, "Nuclear energy: facing the future", IAEA Bulletin, Supplement 1982, p. 10.

11/ The analyses and recommendations made in paragraphs 68-83 can usefully be supplemented by reading the article by L.L. Bennett, J.P. Charpentier and J.A. Marques de Souza entitled "An assessment of nuclear energy in developing countries: how the Agency can help", IAEA Bulletin, September 1982.

member States and in co-operation with them, the Agency prepares energy and nuclear power planning studies (ENPP). These studies are designed to help member States to undertake detailed economic analyses of requirements and of the appropriate role of nuclear power as part of a national energy development plan. The Agency also prepared a number of very useful guidebooks which provide policy makers and managers of nuclear power programmes with information and guidance on various aspects related to the requirements, planning and implementation of nuclear power programmes including the development of nuclear power plants.[12/]

57. In our view, the foregoing provides the Agency with adequate means of making available to developing countries the basic information and techniques needed for the correct and timely planning of the use of nuclear power as an additional source of energy. Our discussions with the national officials responsible for nuclear power development in the countries visited have, however, given us the impression that either this information and these studies and data are not fully exploited, owing to lack of time, communication difficulties, weak infrastructure, etc., or insufficient attention is paid in drawing up applications, and subsequently in drafting project documents relating to studies on the construction of nuclear power plants, clarifying the basic choices to be made before engaging in the construction of nuclear power plants and to assessing the implication of such choices.

2. Making the options clearer

58. The final decision as to whether or not to build nuclear power plants naturally lies with member States, the Agency's role being limited to co-operation in conducting the requisite studies. However, most of the countries we visited stressed that the Agency could provide useful assistance by establishing more clearly the advantages and drawbacks of such a decision so as to enable national authorities to decide on a firmer basis.

(a) Comparative advantages, improved utilization and sequence

59. The preparation of detailed comparative studies on the advantages of the various conventional and new sources of energy, including nuclear energy, would prevent a situation in which a decision is taken to develop nuclear power only after all the other possibilities have been exhausted. Another important study preceding any decision to build a nuclear power plant would be aimed at establishing whether the sizeable amounts required to construct such a plant could not be better used for nuclear-science applications in areas other than electricity production (application of radioisotopes and radiation to agriculture, health, industry, geology, physics, chemistry, etc.).[13/]

12/ See for example the Guidebooks on the Introduction of Nuclear Power IAEA 1982 or the Guidebook on Manpower Development for Nuclear Power.

13/ See the "Proposal for a Co-ordinated Research Programme to Investigate Implications of Nuclear Power Programmes on the Overall Economic Development of Developing Countries - Internal Document IAEA, May 1982.

This would enable nuclear sciences to be harnessed even if the technique of nuclear-power-plant construction is not mastered, and would not present the safety and environmental problems created by nuclear power plants. It is, however, true that this option would do nothing to solve the problem of diversification of energy sources.

60. Studies concerning the various patterns or sequences of nuclear power development should probably be included in this category of studies preceding any final decision: can or ought a nuclear power plant be constructed forthwith without going through intermediate stages? Or would it be better to start with research reactors and the move on to experimental reactors and later increasingly powerful industrial reactors so as to make better use of technology, build up a country's human, institutional, scientific and industrial infrastructure and create conditions conducive to the emergence of a domestic nuclear sector.[14/]

(b) Different scenarios

61. The lessons learned in recent years as a result of the unforeseen fluctuations in the price of oil caused by crises which were equally difficult to foresee, the emergency of situations resulting from accidents which have occured in nuclear power plants despite all the precautions taken, the growing sensitivity of public opinion to environmental and safety problems, should also be reflected in the preliminary studies through scenarios based on different assumptions concerning the extreme variations in the main parameters. For example, studies should incorporate different assumptions concerning sharp variations in the price of other sources of energy, including petroleum, additional safety costs (extra protection against earthquakes, tidal waves, etc.), environmental conservation, the solution of the problem of waste (local storage, reprocessing, export to other countries, etc.), the tremendous increase in the cost of constructing nuclear power plants, and the monopolistic nature of reactor supply, particularly in the case of small and medium-sized reactors, when the supply of equipment needed for thermal or hydro-electric power stations[15/] is more competitive. Account should be taken of the great difficulty of preparing these assumptions and long-term forecasts, as well as the relative imprecision of the results of the different scenarios. Nevertheless, the elaboration and comparison of these scenarios should make it possible to adopt a carefully weighed decision taking account of the risks involved, to choose the optimum solution and to determine the right time to launch a programme of nuclear-power-plant construction.

(c) Taking account of technical and economic characteristics

62. On the basis of our discussions in the field, it seems to us that studies of the technical and economic characteristics of nuclear power plants undertaken prior

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14/ Geological prospecting and data regarding the availability or otherwise of exploitable uranium deposits should also be incorporated in the choice of sequence of nuclear energy development

15/ It is true that the cost of constructing these plants has also increased considerably.

to construction have neglected or ignored an important factor, namely that nuclear power plants, particularly when they are constructed on a turnkey basis, as they are in most developing countries, have forward and backward linkage effects[16] which are much less marked than those of thermal or hydro-electric power plants. The level of participation by local industry in the production of items of equipment for nuclear power plants is among the lowest. For developing countries seeking "industralizing industries",[17] i.e. industries helping to fill the largest possible number of spaces in the "inter-industry transaction matrix",[18] nuclear power plants are comparatively less attractive than other electric power plants.

3. Improved assessment of implications

63. It should be possible for the Agency to co-operate upon request with member States which have taken a decision to launch a study on the feasibility of a nuclear power plant in making a detailed assessment of the implications of such a decision. Below we shall analyse those implications which, in the light of our visits to the field, seem to us to have received insufficient attention.

(a) Establishment of a team of national experts

64. It would seem that the best on-going projects for the construction of nuclear power plants are those which are managed by a team of high-level national experts capable of designing and realizing a power plant on the basis of national policy. It should be possible for the Agency to participate, at the request of the countries concerned, in the establishment and operation of such teams before construction work on nuclear power plants begins. In some countries where such teams exist it did, however, seem to us that they sometimes lacked expertise in the negotiation of construction contracts. The Agency would do member States a great service if it could assist in filling this gap by training national experts qualified in this area.

(b) Taking account of the time factor

65. Another factor which seems to be lacking is a study schedule expressed in real time - i.e., taking account of the time actually needed to carry out preliminary studies such as the ENPP, which takes at least two years to prepare; construction time, which has increased from six to eight years because of the complexity of the new safety legislation; the time needed for related studies concerning the establishment of the human, material and legal infrastructure; etc. It should be possible for the Agency to assist in devising a schedule for these studies, adjustable to each case.

(c) Intergovernmental co-operation

66. From our discussions with certain Government officials, it seemed to us that construction of nuclear power plants could commence earlier if the possibilities

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16/ See A.O. Hirschman, The strategy of Economic Development, New Haven, Yale University Press, 1958, p.98.

17/ Cf. the related concept of "motive industries" in F. Perroux, La coexistence pacifique, PUF, 1958, and L'économie du XXe siècle, PUF, 1961.

18/ Also known as "input-output table". See W.W. Leontief, Input-Output Economics, New York, Oxford University Press, 1966, p.13 et seq.

for exchanging surpluses of nuclear-powered electricity between neighbouring countries were seriously examined. The temporary expansion of certain national markets to the scale of two or more neighbouring countries would enable more powerful and economic reactors to be used and to be run at full capacity as soon as they are completed. Here, too, the Agency may lend assistance in exploring such possibilities under certain circumstances.

4. Updates and supplementary studies

(a) Updates

67. Another conclusion drawn from our discussions with officials responsible for nuclear-energy development programmes was that there is often a fairly lengthy delay (several years) before preparatory studies and pre-feasibility studies for nuclear power plants result in a decision to commence the feasibility study and subsequently start construction. Consequently, the assumptions or even conclusions of preparatory studies become less valid and no longer fully correspond to the new conditions emerging in the country. Brushing up these studies or attempting to bring them up to date at minimum cost by making minor adjustments may not be enough. It should be possible for the Agency to co-operate in devising an updating procedure or a methodology enabling the assumptions and parameters of the preparatory studies to take account of the fact that the final study and the commencement of construction will involve some delay which should be determined as accurately as possible in co-operation with the authorities concerned.

(b) Supplementary studies

68. We also noted during our visits that some member States would like to secure the Agency's co-operation in undertaking crucial supplementary studies once the decisio to proceed with construction has been taken - for instance, the study of the impact of the burden which the allocation of such huge financial sources to finance construction of a nuclear power plant is bound to impose. This burden is particularly heavy since many developing countries are already in difficult economic circumstances and it takes 8 to 10 years before nuclear energy becomes available and can be substituted for imported energy - petroleum, gas or coal - during which period the gap will have to be bridged. Assistance in coping with such a situation would bring financial relief

5. Concluding remarks

69. In the paragraphs concerning the various studies which should be carried out before, during and after the construction of nuclear power plants, we mentioned only those studies which seemed to us, on the basis of our visits to the field, to warrant more attention. There are other studies which are also essential, such as those concerning the choice of different kinds of reactors (pressurized-water reactors, boiling-water reactors, natural-uranium and heavy-water reactors and graphite-gas reactors, to mention only the four types most commonly used) and the inevitable

implications (production or purchase of nuclear fuel, production or import of heavy water, etc.). We have not referred to these studies because it seems to us that they are adequately covered. Other, equally important studies on matters such as the use of breeder reactors, the reprocessing of fuel, security of supply in fuel or spare parts have not been mentioned because they seem to us to have been amply dealt with.

70. Without claiming to present an exhaustive list of important studies to be undertaken to ensure an informed final decision, we would like to mention one last study which is of considerable significance. We believe it should be possible for the Agency to co-operate with member States interested in a programme for the installation of several reactors in studying the advantages of selecting and keeping to the same model of reactor and nuclear power plants, at least during a certain period of time, so as to be able to envisage the possibility of constructing part or all of the reactors and their heavy auxiliary equipment locally.

71. In conclusion, we believe that it is extremely important for the Agency to co-operate with interested countries, at their request, so as to ensure that the decision to construct a nuclear power plant is based on comprehensive and detailed studies on the anticipated advantages and the risks entailed. As mentioned above, there is a lengthy list of drawbacks. As to the advantages of nuclear energy, one might say that they are very important. It suffices to mention that it provides an additional source of energy and provides the opportunity to harness a technique of the future. It should be added that, the more promptly the decision to build a nuclear power plant is taken, the less likely it will be that the technological gap in favour of the industrialized countries will broaden. The large number of nuclear power plants operating in those countries means that they benefit from what economists refer to as "external economies", to which the developing countries cannot aspire in the short or medium term. In addition, the "economies of scale" resulting from the large size of the nuclear power plants installed in the developed countries, merely accentuate the comparative advantages which those countries already enjoy, not to mention the fact that some of them are now progressing to a quantitatively and qualitatively higher level through the use of breeder reactors. The combination of all these factors means that the industrialized countries have a comparative advantage in the nuclear energy field which will only continue to grow if the developing countries take too long to develop their own nuclear energy programmes. The more time passes, the greater the likelihood that nuclear energy produced in the developing countries will be more expensive than that produced in the industrialized countries, with all the consequences that will inevitably entail. To name but one such consequence, developing-country manufactures produced with nuclear energy would, ceteris paribus, become far less competitive.

V. PROJECT IMPLEMENTATION

72. In this chapter, will deal with the supply of equipment by the Agency, the granting of fellowship, and making available to countries the services of experts and consultants.[19] Our aim is to examine some of the problems related to these activity and raised by the officials with whom we conferred in the countries visited as being matters calling for action.

73. While each of these types of component has its own particular importance for an individual country at a given time, it seemed to us that most countries pay continuing attention to the training of personnel. It is man that controls the machines, and he that is at the origin of any invention and any wealth. The machine is, of course, important: without it, no research or progress is possible and acquiring it means taking an enormous historical short cut. The expert is also in many cases indispensable. He immediately makes available to a country knowledge and experience which it would otherwise take several years to accumulate. He helps to set up the most suitable programmes and projects and to minimize mistakes from being made. He also trains nationals to take over from him. Bearing these comments in mind, we think that the Agency should attach particular importance to co-operation with member States so as to determine with them the best blend of these three components on a project-by-project basis, depending on the requirements of each country and its stage of development.

A. Equipment

74. The overwhelming majority of officials with whom we conferred declared themselves highly satisfied with the procedure established by the Agency for the procurement and delivery of equipment. They are convinced that the Agency is well placed to launch international invitations to tender, that it has a list of the best firms and that it can obtain sizeable discounts as a result of combined orders. The recipient countries particularly appreciate the latter point because they can use the money saved to acquire spare parts, train greater numbers of skilled staff, or obtain additional expert services.

1. Customs clearance

75. However, it seems that the lack of an agreement between the Agency and the customs authorities in certain countries produces what are sometimes substantial delays in clearing IAEA-supplied equipment through customs. A special effort should be made to arrive at such agreements. In the meantime, account should be taken to the fact that it will take longer to deliver the equipment needed for the implementation of certain projects because of the slowness of customs clearance procedures.

19/ The development of these various forms of project during the last 25 years is described in document GOV/2149: Review of the Agency's activities, p. 92 et seq.

2. Repairs

76. Another important question which calls for serious analysis and solution is the difficulty experienced by a number of countries in maintaining and repairing their equipment, including equipment delivered by the Agency. The latter equipment sometimes breaks down and remains out of service for long period because it can only be repaired in the country of manufacture. The very limited amount of equipment similar to that supplied by the Agency means that only very seldom is there a representative of the firm in the country concerned who can provide after-sale service on the spot (inspection, maintenance, repair). Some breakdowns are straightforward and the repairs could be done on the spot, but in some cases the parent company has failed to supply maintenance instructions.

77. We suggest that the Agency, at the request of the countries concerned, should consider the possibility of assisting in establishing national workshops for the maintenance of IAEA-supplied machinery and other similar machinery from other sources. A team of national specialists might be set up as a basic central nucleus which would gradually be expanded and diversified. The role of these specialists as servicemen and repairmen could be expanded so that they would provide regular preventive inspections and maintenance, give their advice on the most common causes of breakdown of a particular machine before equipment is acquired, draw up a list of spare parts to be stocked in readiness for such breakdowns, collect all relevant technical documentation concerning the maintenance and repair of the stock of machinery and equipment, help to select the sturdiest equipment, indicate the spare parts which could be manufacture locally, etc.

B. Experts

78. The role of experts is becoming increasingly similar to that of consultants; the length of their stay in the countries concerned is decreasing steadily (an average of 1.3 months in 1982, as against 3.8 months in 1970) and their area of activity is becoming more and more specialized. Another positive trend has emerged and gathered strength in recent years, i.e. the increasing fielding of Agency's staff members to undertake field missions. As a result of these changes one third of expert missions are performed by Headquarters staff assigned by the Agency, while another third are subcontracted to commercial firms and the remainder to independent experts.

79. The very great majority of the countries visited consider that the experts recruited by the Agency play a valuable role. In addition to acting as advisers or demonstrators, they help to install equipment and bring it into service, train local staff to run the machinery and, where appropriate, repair equipment. We were nevertheless informed of certain very rare cases in which the expert was not up to the job.

Either his terms of reference had not been defined sufficiently precisely, or, on the contrary, had been defined too restrictively. In very few instances some experts have been recruited for too long a period when it would have been better to engage them for a number of shorter assignments at greater intervals.

80. The non-availability at short notice of highly qualified experts who would accept an assignment of only few weeks, constitutes another obstacle facing the Agency and member countries. In this respect we would like to make two suggestions which we hope might prove useful.

1. Register of national and regional experts

81. It is increasingly difficult to find highly specialized experts available at short notice to undertake assignments of only a few weeks. To overcome this difficulty, we would suggest the preparation of a register of national and regional experts, having realized from our visits that there are far more such experts than is generally thought. Their recruitment would reduce travel costs and take advantage of their ability to speak the language of the country or region and their superior knowledge of the prevailing conditions. However, it must be recognized that the Agency has endeavoured to recruit a larger share of experts from developing countries. Actually they represent around 25 per cent of total experts.

2. "Contract while actually employed"

82. This arrangement consists of signing a one-year contract with an expert whose services are in great demand and who undertakes to make himself available to the Agency for service at short notice, when and where it needs him, up to 90 days in the year. This procedure is used when the requesting country or the Agency is uncertain as to the timing, duration or place of the expert's assignment. It has been tried out very successfuly by some United Nations departments and has appreciably reduced the time needed for recruitment. We understand that recently the Agency has initiated a similar scheme, through consultant firms.

C. Training

83. From our visits to the field we realized that most Agency fellows have returned to their home countries and are occupying posts corresponding to their specialization. A number of former Agency fellows are even used as experts in other countries and in regional and network agreements. Agency training is much in demand among member States, since it makes for a reduction in the number of nationals trained by contracting firms and hence permits substantial savings. We should like to make a number of suggestions for the further development of IAEA training services.

1. Planning of training

84. It seems to us that, if training were planned 18 to 24 months earlier, particularly where it forms part of a multi-year project and concerns a large number of persons, that would amply make up for the slowness of the procedure and delays

in correspondence. Training should be provided to a larger number of specialists, to take account of the fact that some of them will be called upon to occupy administrative positions and that individuals occasionally withdraw at the last moment and need to be replaced.

85. Regularly updated exchanges of information concerning member States' training requirements, and the training opportunities which IAEA is planning to offer during the next two or three years, would enable requirements to be brought more into line with opportunities. Such exchanges would, for instance, make it possible to establish in advance that there are vacancies available in particular IAEA-organized courses in specific member States which could be filled by participants from other countries.

2. Training committees

86. The establishment by certain countries of training committees specializing in technical co-operation with the Agency and coming under the national commission responsible for atomic energy development has produced excellent results. These committees co-ordinate IAEA training, try to integrate the training into Agency-supported projects as far as possible, and attempt to ensure greater consistency between the objectives of the training and those of the project. In some cases, accelerated courses in the Agency's working languages are organized in the country so as to enable fellows to derive greater benefit from the technical courses and seminars arranged by IAEA.

D. Dissemination of information

87. As regards exchanges of practical information during project implementation, it would seem that the situation varies enormously from case to case. Some project managers are in possession of the appropriate information at the right time because they have succeeded in identifying their counterparts in the scientific, administrative and financial departments at Headquarters. There are other (very few, it is true), who do not know how to resolve certain problems because they do not have enough information about the Agency's internal organization and methods of operation. In addition, the increasingly long chain of command does not simplify matters. We belive that project implementation would be made more efficient through direct correspondce between the relevant departments of the Agency and project manager wherever possible, although the supervisory or hierarchical services concerned should be kept constantly informed.

1. Technical meetings, seminars, conferences, etc.

88. Most of the officials with whom we conferred stressed the inestimable benefits of technical meetings, seminars and conferences organized by the Agency.[20/] Such gatherings are particularly useful in enabling scientists from the developing countries to establish scientific contracts. The contracts established between experts and

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20/ All these are not technical co-operation activities, however they usefully complement them.

professionals from developing countries and Agency experts at these meetings endure long afterwards and provide the Agency on the other hand with the opportunity for obtaining valuable and direct feedback. When held in developing countries, these meetings enable those countries to improve their knowledge of the Agency's work and stimulate greater awareness among public opinion. As part of these activities, it may be useful for the Agency to consider the following suggestions:

(a) The Agency may whenever possible conclude a co-operation agreement with the national service concerned for exchanges of information, documentation and time-tables of meetings, with an indication of the topics to be examined, the basic documentation to be discussed, etc. That would enable some countries to be better informed a fairly long time in advance so that they can prepare themselves for active participation.

(b) The information classifications of the data bank and INIS should include a greater number of categories and have separate headings for highly specialized subjects, since this would facilitate research by experts particularly interested in them (one example is the application of atomic science to the treatment of certain parasitic infestiations of animal origin, for which there is apparently no special heading).

(c) The Agency may consider the possibility of co-operating with interested member States in order to set up, within their national libraries, a department specializing in atomic sciences which would collect references to all the material which may be available in the country. This would represent a very valuable saving of time for researchers and experts.

VI. EVALUATION

89. In the introduction, we took note with satisfaction of the establishment within the Agency and, more particularly, the Department of Technical Co-operation, of a Technical Co-operation Evaluation Unit.[21] Although established only recently (1983), the Evaluation Unit has already produced an Evaluation Procedures Manual for IAEA Technical Co-operation Projects[22] and undertaken a number of important activities: evaluation at Headquarters of 59 on-going or recently completed projects ("desk evaluation review"), evaluation of all Agency-supported training courses during the period 1977-1983, preparation of basic documents for evaluation courses, etc.

90. We fully agree with the Agency's statement that, just as in the undertaking of a project itself, the Agency should in its evaluation activities take account "of the concerns and needs of national authorities and ensure maximum appropriate national involvement".[23]

A. A fourth level: evaluation of integrated programmes

91. For this reason, the Agency may, through its Evaluation Unit, attach equal importance to evaluation of integrated programmes covering technical co-operation with the Agency. The individual evaluation of projects and of their inputs and outputs, or indeed of the whole of an activity (for instance, training), is extremely useful and helps to enhance the effectiveness of each component. On the other hand, only the evaluation of an entire programme at the national level enables the major objectives of IAEA technical co-operation to be brought into line with each member State's strategy for atomic energy development.

92. We would therefore suggest that another level - the evaluation of multi-year integrated programmes as described in the chapter on programming - should be added to and perhaps head the three "evaluation levels" assigned to the Unit, namely: evaluation of projects inputs; evaluation of projects at Headquarters - "desk evaluation review"; and ex-post field evaluations of complex multi-year projects.

93. It goes without saying that the evaluation suggested would apply only to those countries where the Agency's various activities have reached a scale justifying its introduction.

B. Evaluation in the course of implementation and retrospective evaluation

94. In paragraph 52, we stressed the need, at the time when major multi-year projects are formulated, to make provision in the project document for an evaluation procedure in the course of implementation and a retrospective or ex-post

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21/ See GOV/INF/444: Establishment and initial work programme of the Technical Co-operation Evaluation Unit.

22/ See IAEA: Evaluation Procedures Manual for IAEA Technical Co-operation Projects, August 1983.

23/ See GOV/INF/444, op. cit., p.2.

evaluation. We indicated that each of these evaluations served a useful purpose. While the ex-post evaluation permits conclusions to be drawn for future projects, it does not enable the situation to be adjusted during the implementation of the project to which it applies. Hence the usefulness of evaluation in the course of implementation. It would apper that such evaluation is in its early stage. While realizing that it entails the establishment of machinery and procedures (particularly frequent visits to the field) which are more costly than ex-post evaluation (a one-time exercise), we nevertheless recommend that equal importance should be attached to evaluation in the course of implementation, particularly in the case of very costly projects so that member States can ensure that the project is being properly implemented and make the necessary changes or corrections at the appropriate time.

VII. CONCLUSIONS AND RECOMMENDATIONS

95. Our visits to a number of countries members of the Agency and our discussions with the leading officials responsible for atomic energy development programmes in those countries have led us to conclude that, in general, technical co-operation with the Agency is highly appreciated by the recipient countries, although relatively modest in volume. We noted on more than one occasion that the Agency had played a catalytic role out of proportion to the size of its assistance. In addition, the Agency's moral support for the development of certain activities has in many cases proved decisive. We also noted that IAEA-supported projects have generally been implemented successfully and without too much delay or any major problems, probably because most such projects are of a small scale and take only a few weeks or months to execute (see paragraphs 9-31).

1. Programming

96. Nevertheless, the steady expansion and continuous diversification of the Agency's technical co-operation are increasingly involving it in the implementation of sizeable multi-year projects. The execution of such projects call for more elaborate programming than that needed by small projects. In addition, the large number of such small projects in certain countries also requires their integration in a multi-sectoral, multi-year programme which would channel them all towards the attainment of the priorities of the country concerned (see paragraphs 32-49).

Recommendation No. 1

97. The Agency should co-operate with each member country concerned with a view to establishing a multi-year programme covering all IAEA-supported projects in that country. Such a programme would be reviewed and updated every year, should be based on the general policy of the country concerned with regard to atomic energy policy development and would indicate uses of alternative techniques, over-all and sectoral priorities and means of achieving them.

2. Multi-year cycle of voluntary contributions

98. Such programmes would be meaningful only if they were prepared on the basis of financial contributions which can be foreseen and can reasonably be expected to materialize. Consequently, the existing procedure of pledging voluntary contributions for technical co-operation each year should gradually be changed so as to cover longer periods corresponding to the duration of new integrated programmes (see paragraphs 40-42.)

Recommendation No. 2

99. To enable the Agency gradually to bring multi-year programming of its technical co-operation into general use, member States may consider the possibility of pledging voluntary contributions for technical co-operation covering a renewable cycle of several years.

3. Representation of the Agency in the field

100. The Agency's technical co-operation projects are increasingly financed out of its regular programme; as a result, UNDP offices are mainly involved in certain operations connected with the implementation of these projects. Agency representation in the field which would deal with all aspects of technical co-operation, from programming to evaluation and including identification, formulation and implementation, would pave the way for the establishment of facilities for accommodating multi-year integrated programming (see paragraphs 43-45).

Recommendation No. 3

101. The Agency should study the possibility of having its own representation in the field, although without establishing unwieldy or costly structures, so as to be able to oversee the formulation and implementation of integrated programmes. Various suggestions are made to that end in the body of the report.

4. Formulation of project documents

102. In expectation of an appreciable increase in the number and proportion of major multi-year projects, the Agency may co-operate with interested countries, at their request, in formulating project documents covering all the main elements which would enable the project concerned to be effectively implemented. The project budget and Government contributions to the project should be clearly indicated (see paragraphs 50-54).

Recommendation No. 4

103. In formulating project documents relating to multi-year projects, the Agency may adopt the procedure of indicating the project budget, Government contributions and evaluation arrangements. The Agency may also consider sending short-term missions to interested countries to co-operate with them in formulating such projects.

5. Studies concerning the construction of nuclear power plants

104. Nuclear-power-plant projects are among the most costly and complex and those which take the longest time to carry out. They require a large number of preparatory, pre-feasibility and feasibility studies as well as related and supplementary studies. The options on which the final decisions are based are never easy to establish and the implications always have to be studied with great care. The Agency has accumulated a very appreciable amount of experience and documentation in this area which it makes available to member States. We are convinced that this experience will become richer and richer with time, to the benefit of member States. The report indicates some of the areas in which, in addition to the range of studies it currently conducts, the Agency may carry out supplementary studies which would be of great value for developing countries considering the possibility of building nuclear power plants. It goes without saying that a decision to build a nuclear power plant is taken on the basis of several vital factors. This report endeavours to assist in

clarifying the technical and economic aspects directly related to the technical co-operation of the Agency with Member States (see paragraphs 55-71).

Recommendation No. 5

105. The Agency may furnish a greater effort to co-operate with member States in utilizing fully the preparatory and supplementary studies concerning the construction of nuclear power plants, so as to give member States a clearer idea of the basic options and a better appreciation of the various implications of implementing such projects.

6. Project implementation

106. Our visits to the field and our discussions with the leading Government officials concerned lead us to conclude that, in general, member States appreciate this co-operation and consider that project implementation is generally satisfactory. There are, however, a number of improvements which could still be made (see paragraphs 72-88).

Recommendation No. 6

107. As regards the supply of equipment by the Agency, IAEA should make a special effort to work out simplified and accelerated procedures or general agreements concerning customs clearance with the member States concerned, where no such procedures or agreements exist, and should co-operate with interested countries in establishing national central workshops composed of national experts for the maintenance and repair of IAEA-supplied equipment as well as similar equipment derived from other sources within the limits of these workshops' capacity.

Recommendation No. 7

108. With regard to the recruitment of experts and consultants requested by member States, the Agency should co-operate with member States to obtain the services of a greater number of national or regional experts, if the possibility exists. Such a procedure would add another dimension to the Agency's technical co-operation and take advantage of potential available in the area and in the country itself.

Recommendation No. 8

109. The Agency should co-operate with member States, at their request, in establishing national committees responsible for supervising and co-ordinating the training of skilled staff through the Agency. These committees should have an uncomplicated structure and should preferably belong to the national commissions for atomic energy development.

7. Evaluation

110. We have noted with satisfaction the establishment, within the Department of Technical Co-operation, of a Technical Co-operation Evaluation Unit which has been entrusted with the implementation of a work programme involving the evaluation of the Agency's technical co-operation activities at three levels: evaluation of

project inputs, Headquarters evaluation of small projects, field evaluations of complex multi-year projects. It seems to us that, to be comprehensive, the Unit's responsibilities should also include evaluation of integrated programmes (see paragraphs 89-94).

Recommendation No. 9

111. The Agency should include the evaluation of integrated programmes in the activities of its Technical Co-operation Evaluation Unit, so as to ensure that the various IAEA projects make an effective contribution to the implementation of national programmes for atomic energy development.