UNDP and World Bank project: Energy planning for European and Arab States

Summary of activities and lessons learned

by Jean-Pierre Charpentier

Sound investment decisions have always been needed in the energy sector. The sector typically accounts for around 10% of all national investment and failures in supply have the potential for widespread disruption throughout the economy. Recently, with the volatility of international energy prices, the environment in which energy planning takes place has changed and requires an even greater emphasis on efficiency and the successful integration of policies across a broad front.

Firstly, the decline in oil prices in early 1986 not only calls for a reappraisal of energy strategy, but also reminds us of how uncertain many of the variables that influence sector strategy are. Because of this uncertainty, *energy planning needs to be a continuous and iterative process* so that energy strategies have flexibility to adjust to external changes.

Secondly, many countries are facing balance of payment deficits and problems of debt service. The "debt crisis" has led to slowdowns in economic growth rates, and consequently slower rates of growth in energy consumption. It has also meant that financial resources are now much more scarce. Indeed energy investment programmes often need to be re-examined in light of overall financial resources, and alternatives to building new capacity investigated.

The new planning environment is characterized by a number of factors: the need for closer attention to the links between the energy sector and the rest of the economy, as well as between energy sub-sectors; constrained resources for new investment that require more policy alternatives to be considered; and greater uncertainty which requires more flexibility in energy strategy.

As the planning environment changes so will the role of the energy planner — a role that will require increased emphasis on policy formulation and the investigation of policy alternatives, flexibility and adaptability in the interpretation of energy plans, and an ability to assess the impact of risk and uncertainty on decision making in the sector.

Furthermore, recent advancements in technology including the increased capabilities of relatively low cost micro-computers and associated development of sophisticated software suitable for energy planning, presents a timely opportunity for many energy planners to acquire new skills. It also eliminates the difficulties of energy planners obtaining access to costly mainframe computers.

The UNDP–World Bank project

In 1987, the United Nations Development Programme (UNDP) initiated a technical assistance project in energy planning. It was designed to stimulate the exchange and flow of knowledge and experience among countries of Europe and Arab States. (Algeria, Bahrain, Egypt, Jordan, Kuwait, Morocco, Tunisia, Cyprus, Hungary, Poland, Portugal, and Yugoslavia. These countries are referred to hereafter as the Region.) The World Bank is the executing agency.

The project's broad objective is to strengthen national energy planning capabilities within the participating countries. Two paths were simultaneously followed to achieve this objective:

- implementation of a series of technical assistance procedures at the country and regional levels, including the development of training programmes, energy planning analysis, expert consultations; and
- promotion of a technical co-operation programme among countries of the Region through the implementation of a series of networks aimed at improving the exchange of information, and of mutual advisory services with a view to facilitating the follow-up of technical co-operation among the participating countries.

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The World Bank and its role in the energy sector

The World Bank Group includes the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA). The common objective of these institutions is to help raise standards of living in developing countries by channeling financial resources from developed countries to the developing world.The IBRD is owned by the governments of some 150 countries. The IBRD, whose capital is subscribed by its member countries, finances its lending operations from its own borrowings in the world capital markets, retained earnings, and the flow of repayments on its loans. The interest rate charged by IBRD is a function of its cost of borrowing and its loans generally have a grace period of 5 years and are repayable over 15 years or less. Each loan is made to a Government or must be guaranteed by the Government concerned. In the case of project financing, IBRD normally seeks both foreign co-financing as well as government contribution in local currencies.

The IDA provides assistance for the same purposes as the IBRD, but primarily in the poorer developing countries and on terms that would bear less heavily on their balance of payments than would IBRD loans. IDA money goes essentially to countries with less than US $480 per capita gross national product (in 1987 dollars). The same staff work on IBRD and IDA operations.

The IFC promotes growth in the private sector of the developing countries. Legally and financially, the IFC and IBRD are separate entities with separate staffs.

The MIGA, established in 1988, encourages equity investment and other direct investment flows to developing countries. MIGA offers investors guarantees against non-commercial risks and sponsors a dialogue between the international business community and host governments on investment issues.

The World Bank is one of the most important official sources of external capital for energy development in the developing countries. The Bank's energy lending during the fiscal year 1989 (1 July 1988 to 30 June 1989) has almost reached US $4 billion, which corresponds to about 18% of its total annual lending programme for that year. At the end of June 1989, cumulative lending operations amounted to about US $224 billion of which more than 20% were in the energy sector.

In the energy sector, the Bank is diversifying its activities. Besides its traditional lending for energy projects, the Bank is providing increasing amounts for structural and sector adjustment loans and sector investment loans. Furthermore, the Bank has increased its energy policy and advisory role through advising on energy sector strategies and comprehensive technical assistance projects.

Most of the non-financial assistance projects executed by the Bank and which can serve as a catalyst to induce development of the energy sector are generally financed or co-financed with national or international organizations and in particular by the United Nations Development Programme (UNDP). The Energy Planning Project described here and executed by the World Bank's Europe, Middle East, and North African Region is mainly financed by UNDP. The IAEA is an active participant in this project through the provision of technical advice and planning and training programmes. The project is intended to assist participating countries to better formulate their energy policies and strategies, and to get a better understanding of the role of nuclear power.

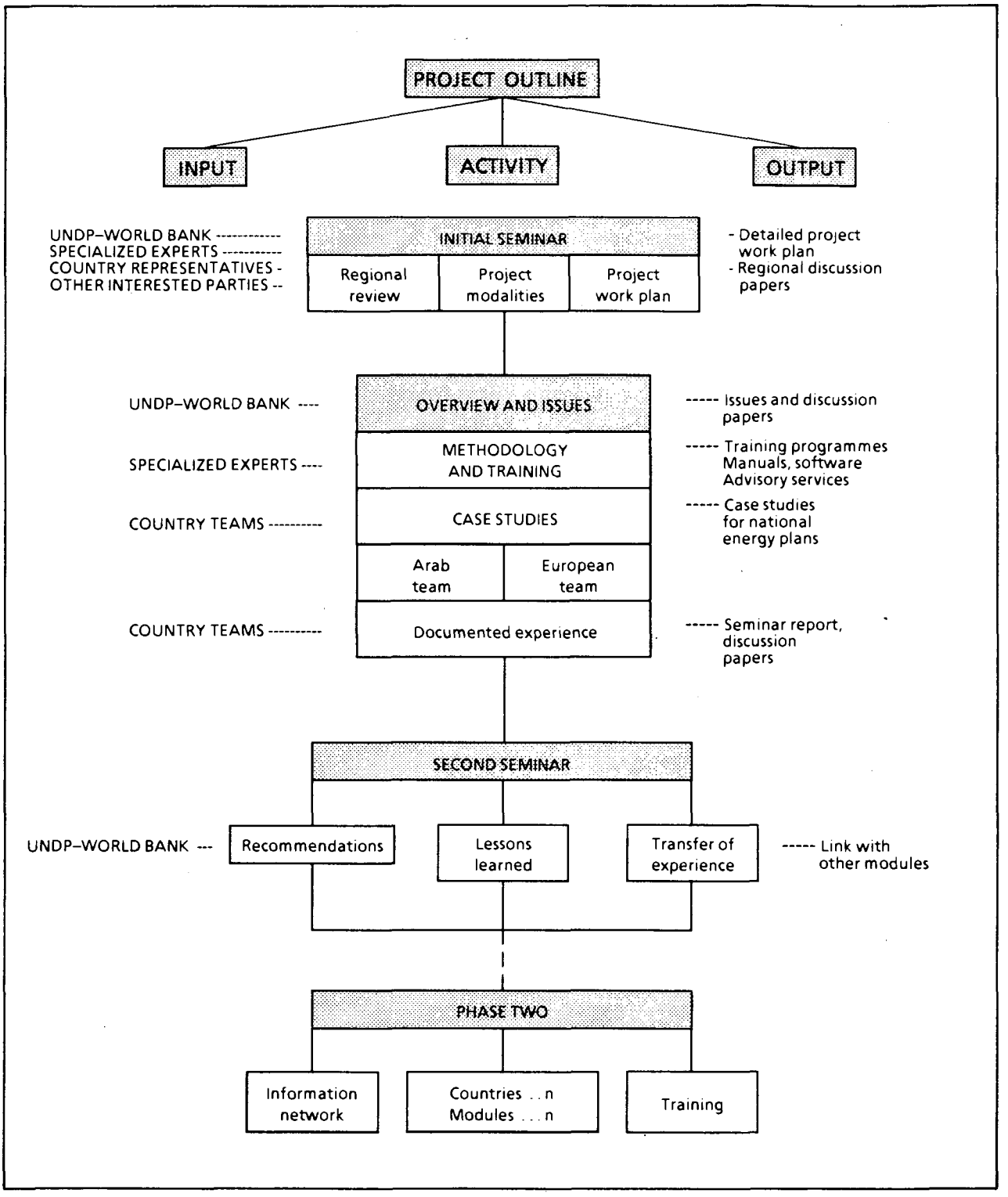
The project has been divided into two phases, each of about 2 years duration. The first phase, which lasted from January 1987 to June 1989, was essentially technically oriented and its main objective was to familiarize all participating countries with a set of basic energy planning procedures, practices, and techniques.*

The second phase, now in progress, will end in September 1991. It is more oriented toward the development of energy policies and strategies which, within each participating country, will require a reinforcement of the co-operation between energy planners and energy-policy decision makers. In parallel, a specific effort is being made to strengthen the co-operation between the participating countries through the development of sub-regional networks to facilitate the exchange of information. Altogether the two phases of the project will have required about US $3 million and raised an additional US $5.5 million over a 5-year period.

The specific objectives of the project are to:

- transfer a set of widely used planning techniques and methodologies (which generally require only microcomputers) to the participating countries;

* For example, one of the basic techniques that has been used for all participating countries is a model called ENPEP (ENergy and Power Evaluation Program) which can be used to investigate energy demand, optimization of power investment programmes, energy balances, and environmental impacts. This relatively simple menu-driven model can be run on most standard personal computers and is composed of several sub-programs which can be utilized separately according to the needs and issues studied. Additional models and techniques have also been introduced to study more specific and complex issues.



● provide the development of country-level case studies prepared by national teams and covering specialized aspects of energy planning;

● provide a forum for inter-regional training, information dissemination, and exchange of views on a wide range of energy planning issues within all the participating countries;

● develop thematic and sub-regional networks of co-operation between the participating countries to enhance planning skills and to expose countries to different kinds of current thinking on selected issues; and,

● in selected cases, foster the development of joint actions in the energy sphere, especially interconnection of energy systems.

Quite a large effort was devoted to the selection of the models and techniques during the project's preparatory phase. From the outset, it was clear that to attempt to select the "best" models would result in an endless and

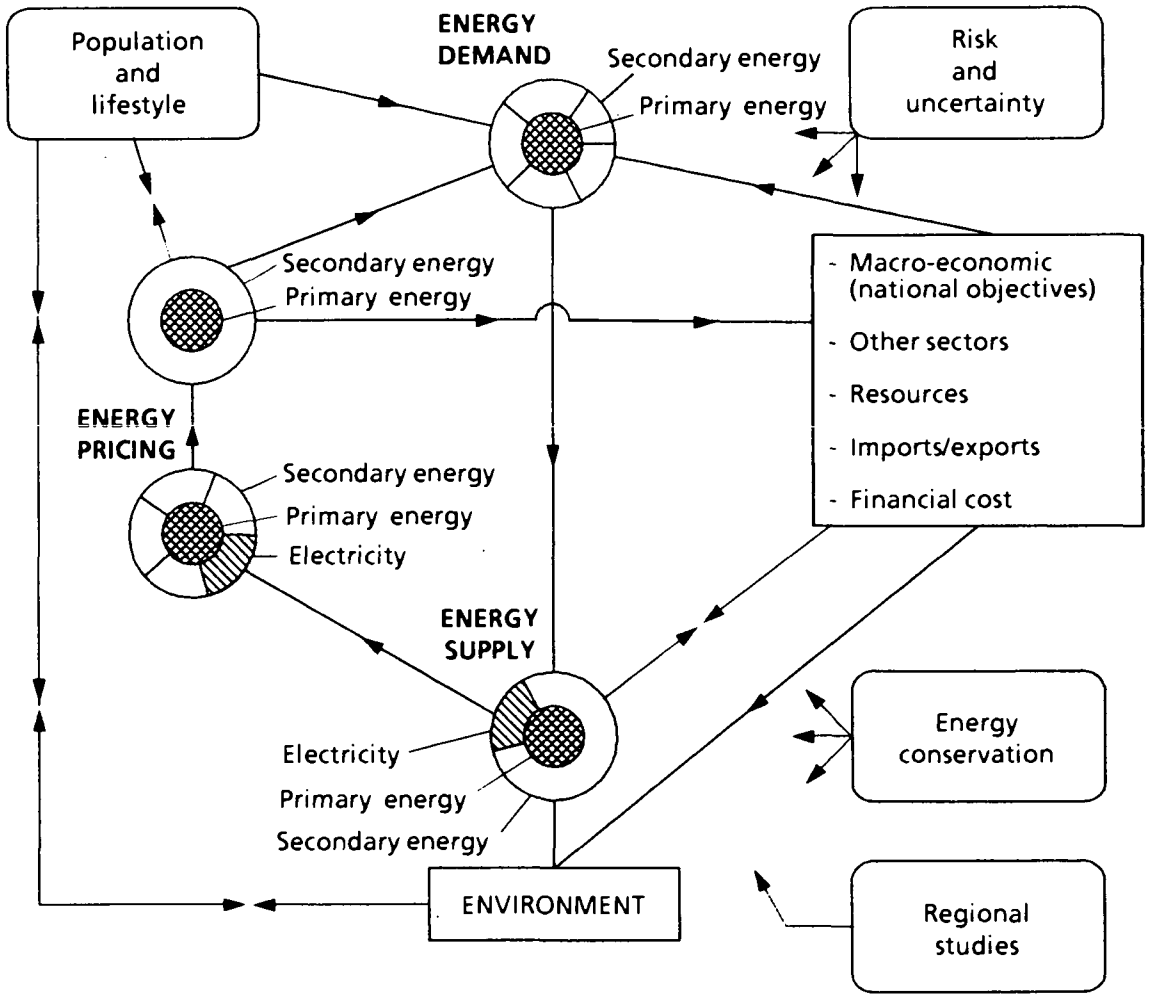
fruitless debate. Following a brief review of the better-known models, the selection was made of those that could be provided free of charge to participants, would have some back-up services, and would allow an understanding of the basic principles of strategic thinking in the energy sector. In some cases, deficiencies in the models were recognized but discussions with their authors and users provided means of adjusting or manipulating the models to overcome these difficulties. Furthermore, during the project's whole development, constant attention has been devoted to the proper utilization of the models, in making sure that participants were using these tools in a creative way and not as "black boxes".

Project structure

The project is built upon a series of thematic modules covering a broad range of topics of interest to the contemporary energy planner. These were identified in a prospectus which was circulated to all countries. Together with a World Bank-authored Regional Energy Strategy Report, it was used as the basis for an initial seminar to review regional energy issues, reach broad agreement with policy makers on the parameters of energy strategy in the Region, and establish a consensus for the project.

A module typically consists of four elements: (1) a thematic working paper setting out the broad issues, providing a conceptual framework for the module in the context of the overall energy sector, and providing an up-to-date review of current thinking on the topic; (2) a methodological working paper outlining in detail the methodology, analytical techniques, and software to be used; (3) one country-level case study (or more, if appropriate) based upon the methodological working paper but providing an operational dimension; and (4) a summary report, prepared by the country team, outlining findings, experience, and lessons learned.

The Modular Approach



These various modules can be combined to assist in formulating a comprehensive national energy policy and planning framework. *(See accompanying diagrams.)*

For each module, an agreed methodological framework has been identified or developed and is applied within different country-level case studies *carried out by national teams* under the guidance and advice of recognized consultants. Meetings among countries working on identical modules are organized so as to reflect the findings of the studies and share the respective experiences. In addition, periodic training courses, workshops, and seminars are organized to systematically enhance the knowledge and promote the co-operation and understanding among all participating countries.

The modular approach was designed specifically to allow flexibility in project design and to expand coverage of the project in the event of additional funding becoming available.

The project is both *voluntary* and *participatory* in nature and its success is determined by the attention devoted to the preparation of the country-level case studies which constitute the backbone of the project. The project is therefore conceived as a *technical co-operation* project rather than a *technical assistance* one. It acts as a facilitating framework for technical co-operation, training, and selective technical advice. However, the project's success is determined primarily by the quality, dedication, and commitment of the country participants. Furthermore, to retain the interest of the policy and decision makers, it is important that *the case studies prepared by national teams form an integral part of that country's energy planning work programme*, besides being of substantive interest to the project.

First phase: January 1987 to June 1989

During the first phase which ended in June 1989, each participating country worked on one or two national case studies based upon standard modules reflecting given energy planning issues. From a long list of potential modules presented in the prospectus, the participating countries, at their discretion, decided to focus on six of them: energy demand, electric power investment and long-run marginal cost, energy price impact, macro-economic and energy sector linkages, planning of hydro-thermal systems, and energy conservation. In addition, a training course on basic energy planning techniques was organized to reinforce the skills of the country-level planning teams.

Thirteen countries participated in the first phase, and 15 national case studies were developed, as well as a training course on integrated energy planning and a workshop on energy conservation. The work achieved was generally impressive and of high quality. At the end of this phase, a seminar was organized in which each country presented the findings of their work.

In some specific cases, the project contributed to policy and programmatic decisions:

- One country used the project's framework to review its electric power investment programme and was able to identify major improvements to its electric investment policy. This was later translated into a request to the World Bank for an investment loan.
- One country used the project to carry out a major pricing study of its energy sector. The objective was to study the impact of a substantive price increase in its main primary energy resource on the different sectors of the economy and on the balance of payments. The results of the analysis were used as the basis for a major policy dialogue within the Government.
- One country, which had developed a model to analyse the complex investment issues arising from mixed hydro-thermal systems, has become a lead centre in the project for training participants from other countries. The project may also support the further development of the model including downloading it to a personal computer-based version through a co-operative venture between two participating countries.

At the end of the first phase, a general understanding of the nature and role of energy planning (both in terms of methodology and institutional organization) was established and substantive studies initiated. Furthermore, during the whole period, technical co-operation among countries was promoted through periodic meetings and programmes of mutual assistance among the countries of the Region.

An independent evaluation of the first phase concluded that the project's impact had been very beneficial to the participating countries. It specifically provided efficient and updated methodologies and approaches which were utilized for reinforcing the capabilities of the different energy planning teams and institutions and for the preparation of up-to-date energy planning studies. However, it was recognized that while the transfer of knowledge related to the mastering of planning techniques had been successful, utilization of these techniques for the development and formulation of comprehensive and flexible energy policies and strategies required further effort and support. A similar conclusion was reached regarding the need to constantly reinforce *the dialogue between energy planners and energy policy and decision makers.*

This phase has fostered deep interest and enthusiasm and has succeeded in achieving its main objectives. A forum for a broad inter-regional exchange of views has been developed and generated a momentum whereby benefits are expected to be substantially emphasized during phase two.

Second phase: July 1989 to September 1991

Co-operation among countries continues to be at the forefront of the project. Thematic networks among countries having developed experience in given modules are stimulated by specialized meetings where lessons

learned are exchanged, and where the more experienced national energy planners identified during the first phase are periodically used as advisers.

Each module of the second phase is policy oriented and designed to be operational. Each case study aims to assist the decision-making process, and therefore deals with the examination of alternative options, sensitivity analysis, and general issues of risk and uncertainty. The number of modules was increased to include issues such as electricity pricing policies, preliminary studies on regional electricity and gas interconnection, environmental issues, risk and uncertainty in investment decisions, and the development of energy databases.

The "cluster" meetings organized among country teams working on the same module have proved to be useful in providing opportunities for exchange of experience and information. This approach is further developed during the second phase and these cluster groups will be gradually transformed into *well-structured and organized thematic networks* including lead centers and co-ordinators. Furthermore, at the request of participating countries, sub-regional networks will be developed. These sub-regional networks will cover all areas of expertise developed within the sub-region and will be responsible for providing technical assistance between the countries of the sub-region at the end of the project. Three sub-regional networks are being developed: countries of the Maghreb area, European countries, and Middle East countries.

To ensure that all countries are kept aware of the project's progress, a newsletter is prepared and circulated quarterly. It also serves to keep interested multilateral and bilateral agencies, including donors, aware of the status of implementation of the project.

Lessons learned

The decomposition of complex energy planning issues into modules allows considerable flexibility in the project and this is appreciated by participating countries. It allows each individual country to include the proposed approaches into its planning procedures according to its respective priorities.

Making the national teams *fully responsible* for the development of the case studies is a key element for effective on-the-job training and skills development.

Limiting the role of external consultants to guidance and advice during the development of the activities has proved to be effective.

The specialized meetings organized between national teams working on similar modules provide a good vehicle for the exchange of experiences and information.

Within each participating country, the creation of national working teams composed of experts from different national organizations is a powerful means for strengthening the co-operation between different national entities which, in many countries, often have the tendency to duplicate their respective activities or never talk to each other.

Training courses organized on basic techniques are very effective for rapidly transferring methodologies and technical skills. However, they should be complemented by follow-up activities to ensure not only mastery of the methodologies but also to demonstrate the value of such analysis in policy and planning formulation.

While technical training of energy planners is one of the project's key elements, training in the development of energy policies is, at least, equally important. Planners may have a tendency to be model oriented and forget that the final objective of all these exercises is to develop coherent energy strategies based upon alternative scenarios and options. Energy planning is as much an art as a science. These scenarios are the basis on which decision makers can assess the costs and benefits of alternative strategies and decide upon the most appropriate policy. During the second phase, increased emphasis is placed on this issue. Similarly, the dialogue between planners and policy and decision makers has to be constantly pursued and reinforced.

Although regional projects should aim at sharing experience among participating countries, publication of input/output data should remain at the discretion of each country. Countries should not be compromised or embarrassed into releasing potentially sensitive data. Only the common exchange of experiences and lessons learned should be mandatory, not the numerical results.

A clear work programme and agenda should be prepared well in advance but should remain flexible. Many reasons for delays occur and should not become bottlenecks in the development of the whole programme.

A certain degree of competition between national teams is often a good stimulus for speeding up the work programme and can often act as an incentive to produce high-quality work. For that purpose, circulation of a periodic newsletter (e.g., quarterly) has proved to be a good means to both disseminate the information and stimulate progress of the work.

Development of networks of co-operation among participating countries may be a useful means to facilitate the exchange of knowledge, lessons learned, and information. However, such networks will only be of tangible value if participating countries themselves are committed to the networks, and there are substantive issues to be addressed, discussed, and resolved.

In this regard, two types of complementary and interrelated networks can be developed:

- thematic/technical networks, e.g., energy demand, price impact, energy and macro-economic linkages, energy conservation, etc.; and
- cultural/geographical networks, e.g., where countries face similar levels of development or where economic co-operation programmes already exist.

Conclusions

Recommended steps in organizing a similar project. The development of a regional project is a complex mat-

ter which requires a well-planned and extended preparatory phase. This should include:

- an inventory of the region's needs in terms of issues faced, and methodologies available; and
- a review of existing techniques and approaches which could be used to deal with those issues and which could be easily adapted to the specific situation of the region.

Summary of the project's second phase

Duration: July 1989 to September 1991

Twelve countries involved: Algeria, Bahrain, Egypt, Jordan, Kuwait, Morocco, Tunisia, Cyprus, Hungary, Poland, Portugal, and Yugoslavia.

Nine basic modules: Energy demand, optimization of electric supply systems, hydro/thermal systems, electricity tariff design, energy price impact, environment impacts, energy and macro-economy linkage, energy conservation, and risk and uncertainty. Within the framework of each module, several case studies, adapted to the interest of participating countries are developed. *In progress:* 20 national and two regional case studies.Each module is supervised by an external consultant who reviews and guides the activities of the national teams during the development of their case studies. The consultant visits each national team four or five times during the duration of the project.

Two training courses: • One of 1-month duration on the model "ENPEP" which is the basic model proposed by the project. • A second course of 2-weeks duration on the development of energy databases. Each participating country is entitled to send two participants to each training course. Additional candidates are accommodated at the country's expense where space exists.

Seminars/workshops: • Two 1-week workshops on two energy conservation issues: institutional/financing issues and energy conservation in the transport sector. • Two general seminars where experiences and lessons learned are exchanged. • Several meetings of network leaders aimed at strengthening their technical and energy policy co-operation.

Furthermore, this phase should also be used to set up the most appropriate *modus operandi* which could be adapted to the structure and needs of the participating countries. It must place considerable emphasis on building a clear consensus among potential participants on the importance of the issues, as well as a firm commitment and enthusiasm to enter into a regional project. Stress needs to be placed upon the participatory nature of this kind of project and a clear understanding that its success (or failure) will lie entirely in the hands of the participants.

Information on the proposed general structure and *modus operandi* should be disseminated fully among participating countries so that they understand, review, discuss, and finally agree on an appropriate format and structure for the project. The project's ownership must lie with the participating countries and not with the executing Agency. As such, it must be seen as a demand-driven project. Reaching agreement with the various counterparts is a prerequisite for success but will almost certainly be time consuming. Nevertheless, careful planning in the early stages of such a project will reap significant benefits later on.

Dissemination of the information and ways to reach agreement and a consensus on the form of the project can be done in two steps:

- A general seminar should be organized where representatives of all participating countries are invited; the objective is to disseminate, in broad terms, the project goals. For that purpose a "prospectus", summarizing the proposed structure, content, and *modus operandi* can be prepared to facilitate the dialogue with the participating countries.

- The launching seminar should be complemented by more detailed contacts at the country level. During field missions, the project manager should review in detail the content and structure of the project with the national key decision makers and energy planning staff. During this process, he or she should also, in co-operation with the visiting decision makers, identify the future main focal point (or points) both in terms of organization and of person(s). If possible, *only one person per country should act as centralized focal point.* The calibre of this person is an important step towards project success. The person acting as focal point should be motivated, technically knowledgeable, be at a sufficient level to take practical decisions during the project activities, and have easy access to top level decision makers of the country.

The creation of the national working teams is the next important task. Our experience shows that the better working teams do not exceed four or five persons and it is important to include representatives of different national organizations so that all points of view are reflected and conflicts are avoided at the time of the publication of the results.