SEMINAR ON NATIONAL ENERGY SECTOR MANAGEMENT

Held at Capanda, People's Republic of Angola
29 July to 3 August 1991

A REPORT OF THE PROCEEDINGS

August 1991

NVE
Norwegian Water Resources and Energy Administration

Secretariat of State in the People's Republic of Angola
Abstract
A seminar on national energy sector management (NESMA) was organized in Angola, August 1991 by the State Secretariate of Energy and Water (SSEW) in Angola, assisted by the Norwegian Water Resources and Energy Administration (NVE). The purpose of the Seminar was:
"Based on experience from Norway and elsewhere to inform on and discuss policy, legal framework and institutional structure of the energy sector of Angola and to strengthen the capabilities of the top management institutions on this issue".
The program went over three full days. It was divided in four main themes: Energy policy, Energy sector economy, Energy sector legal framework and Energy sector institutional structure.
The seminar was attended by 40 participants, 26 from the energy sector in Angola, 7 lectures and moderators from Norway, 1 from the United States and finally representatives of the electricity sector of Brazil, France and Portugal. The secretariate of SADCC/TAU was also represented.
The contributions from the Norwegian lectures were based on a common background. Whether they concerned policy, economic matters, legal framework or institutional structures they were consistent and compatible with one another. The main objective was to reflect important principles from the four themes treated at the seminar. This compatibility or harmony would have been made by contributors coming from different countries.
To prevent that the seminar would be a one-sided affair very valuable contributions were made by participants from the other countries. On each main subject, information was given by lectures from Angola.
This report contains condensed versions of the contributions from the written and verbal submissions made.
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_Organizers:_

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On Sunday 28 July, the Seminar delegates were treated to an excursion to Pungo Adongo in the Pedras Negras. This picture, the picture on the front page and the accounts of King Ngola Ati II of the Ndongo, who established a fortified camp there in resistance to colonial rule, bring reflections on the past history of Angola. The footprints made by people who walked on our planet thousands of years ago, forever imprinted on a unique rock formation, are a poignant reminder of our human heritage.

This visit represented an intermezzo of culture which was appreciated by everyone.

Hon. Quelhas Mota, State Secretary of Energy and Water Affairs.
Chairman of the Seminar.
The African economy has not developed as fast as was hoped some time ago. This concerns everyone engaged in the problems of development both in and outside Africa.

In November 1990 the African Development Bank, together with various cooperative agencies assembled representatives from all African countries in order to discuss matters relating to energy. Of the many items discussed were also the items high on the agenda during the NESMA Seminar in Angola. A feeling has become prevalent amongst people involved with the energy sector in Africa and amongst people from other countries who have acquainted themselves with conditions there, that there is a need to look more closely at the institutional structures in charge of supplying energy in African countries. These structures are predominantly centrally controlled, through bodies which are directly tied to the relevant ministries. A restructuring of this system with the emphasis on the concept of "helping people to help themselves" might lead to greater efficiency and more initiative being displayed by people working within the energy sector.

An obvious start would be to assess the energy resources available in any one country, and on this basis attempt to set out the course of future energy policy. In order to establish rules for institutions and personnel, there must be a legal framework supporting the required policy with maximum efficiency. Finally, it is important to arrive at appropriate institutional structures - from ministries through professional authorities to commercial executive bodies in charge of energy supply. This structure should embody both necessary control and coordination as well as scope for personal freedom and development at all levels, thereby bringing about a desire and a momentum for development.

This is an ambitious goal. We, who had the task of organizing the NESMA Seminar never lost sight of this very goal. We feel that the Seminar resulted in a start of the processes necessary to reach this goal in Angola. There is still a long way to go, but as the saying goes:"well begun is half done"!

Asbjorn Vinjar,
Norwegian Water Resources
and Energy Administration,
August 1991

Francisco Meireles
State Secretariat of
Energy and Water

Seminar Coordinators
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1. INTRODUCTION

1.1 The Seminar

Since 1983 the Government of Norway has been assisting the operation of the Technical and Administrative Unit (TAU) of the Southern African Development Co-ordinating Conference (SADCC). This Unit undertakes Angola's responsibility for regional energy co-ordination within SADCC. Since 1987 Norway has given technical assistance to the energy sector in Angola on a bilateral basis. This assistance is extended under a new agreement signed between Angola and Norway in April 1991. In August 1990 a Seminar on Integrated Petroleum Resource Management (PETRAD) was held in Luanda with Norwegian assistance. This was to discuss major development issues in the petroleum sector. As Norwegian assistance was to be extended to the electricity sector under the new agreement it was decided to arrange a similar Seminar aimed at addressing management and development issues within the energy sector. A Seminar programme was worked out from August 1990 to March 1991. It was originally intended to hold the Seminar in April but this was postponed due to the on-going peace negotiations.

A Seminar on National Energy Sector Management (NESMA) was therefore held at Capanda in Malanje Province in the People's Republic of Angola from 29 July to 3 August 1991. The Seminar was held under the joint auspices of the State Secretariat of Energy and Water (SSEW) of the People's Republic of Angola and the Norwegian Water Resources and Energy Administration (NVE). Financial support for the Seminar was provided for through the support programme agreed upon between the Ministry of Energy and Petroleum of Angola and the Norwegian Agency for International Development (NORAD). In addition the Capanda Hydro-power Project where the Seminar was held made major contributions in terms of transport, board and lodging for the delegates.

The Seminar objectives were as follows:

"Based on experience from Norway and elsewhere to inform on and discuss policy, legal framework and institutional structure of the energy sector and to strengthen the capabilities of top management people from the Ministries and main energy supply institutions on this issue"

The detailed Seminar Programme is attached at Annex 1. The following four themes were discussed in detail:
Theme 1: Energy Policy: Monday 29 July
Theme 2: Energy Sector Economy: Tuesday 30 July
Theme 3: Energy Sector Legal Framework: Tuesday 30 July
Theme 4: Energy Sector Institutional Structure: Wednesday 31 July

The Seminar was attended by about 40 delegates from Angola, Norway, Brazil, France and Portugal. A list of delegates can be found in Annex 2 to this Report.

The plenary sessions of the Seminar were chaired by His Excellency Joaquim Quelhas de Mota, Secretary of State for Energy and Water in the Government of Angola. The Seminar Co-ordinators were Mr. Francisco Meireles of SSEW and Mr. Asbjørn Vinjar of NVE. The official closing ceremony was performed by His Excellency Joao Ernesto dos Santos (Libertade), Governor of Malanje Province.

The NESMA Seminar came at a particularly fortunate time in Angolan history. Traditional organisational structures are now being questioned not only in Angola, but elsewhere in the world, particularly in Africa. These questions were raised in a conference for the whole of Africa in Abidjan in November 1990.

1.2 The Contributions

A total of 25 written papers were contributed to the Seminar and presented verbally by their authors. Some six Working groups met during the course of the Seminar and presented their findings. In addition some 11 Conference Room papers were submitted. As a preparation for the Seminar, Norconsult International A.S., prepared a document entitled, "An Overview of the Energy Sector in Angola". A list of the written contributions made to the Seminar is set out in Annex 3.

It is clearly impractical to reproduce all the material submitted to the Seminar in extenso. It has therefore been decided to produce condensed versions of the contributions from the written and verbal submissions made. These are set out under the four Seminar themes in the Chapters which follow. The Report also tries to draw from the Seminar some lessons for Angola in its findings.

1.3 Angola To-day

It is more or less impossible to understand energy issues in Angola to-day and the problems it confronts without considering the country's current political situation. Few African countries have experienced a more turbulent history since Independence than Angola. Few outsiders can be aware of the immensity of the problems confronting Angola.

In 1975 Angola was more or less abandoned to its fate by the Portuguese colonial power which was itself in a process of revolutionary change. Since then the country has been ravaged by a Civil War for all the 16 years of its Independence. This has
been intensified by Great Power rivalry. About half a million Angolans have died because of the war. Another 750,000 have been displaced to become refugees in their own country.

A comprehensive peace agreement was signed on May 31, 1991 bringing Angola into a period of peace of which it has no experience. As a country Angola has never had an opportunity to build a nation. Now with peace it is faced not only with a nation-building exercise but also a reconstruction effort with few parallels elsewhere in Africa. One small example from the water sector will illustrate this. Between 1951 and 1974 over 300 hydrological stations took regular measurements on every major river course in Angola. Since then only 7 stations have kept any sort of records at all.

In addition to the challenges of national-building and reconstruction, Angola is also facing a third challenge. That is the transition from a one-Party state to a multi-party democracy. A number of some 20 political parties are expected to contest Angola's first free elections in November 1992. These political changes also imply that the Constitution will have to be redrafted with all the consequences for existing laws.

The challenges facing Angola are therefore even greater than those, for example, confronting central and eastern European countries which, after all, have experienced a period of peace for over 40 years.

Nonetheless it appears that Angola is at a point of take-off in its newly liberated situation and peace achieved. While central and local authorities face enormous challenges, there is also a great feeling of optimism so that there can be no doubt that the NESMA Seminar came at very much the right time.

It is therefore within such a perspective that we should view the results and findings of this Seminar. We must bear in mind the enormous problems confronting Angolan society to-day and make appropriate allowances. The problems confronting the electricity sector also face water, sanitation, transport, health, education and other social sectors. We should also bear in mind that this Seminar was the first opportunity anyone has had to make a reasoned and objective assessment of the electrification process in Angola to-day.
2. ENERGY POLICY

2.1 Contributions on Energy Policy

A total of 11 papers were delivered on the theme: Energy Policy. These ranged from descriptions of rural electrification in various countries to accounts of power co-operation agreements between various countries. Two Working Groups met to discuss the topic: "Rural Electrification of Angola including possible Use of New and Renewable Sources of Energy".

2.2 Opening Remarks

The seminar was opened by H.E. Joaquim Quelhas de Mota, Secretary of State for Energy and Water. He welcomed participants to Capanda and to Malanje Province. He expressed great hopes for the outcome of the Seminar as Angola was moving to a multi-party democracy with the end of the War. He said it was the duty of all participants to discuss the electrification of Angola very thoroughly. He felt the international input from participants from Norway, Brazil, France and Portugal would be particularly important. He paid particular thanks to NORAD and NVE for making the Seminar possible.

2.3 The Electrification History of Norway

Professor Vidkunn Hveding, ex-Minister of Petroleum and Energy of Norway delivered this paper. He tried to draw lessons for Angola at this important juncture in its history. Physically and climatically there were few similarities between Norway and Angola. However both countries were rich in hydro-power resources which had proved the basis for Norway's electrification. Development of electricity began early in Norway and Hammerfest, the world's most northerly town, had a supply in 1891 at the same time as Paris. By 1920 64% of Norway's population had access to electricity --- the highest penetration rate in the world at the time. Throughout its history Norway has continued to hold this position. To-day Norway has the highest annual per capita consumption of electricity in the world: 25,000 kWh. As a producer, this puts Norway amongst the five largest hydro-power nations in the world, and on a level about twice the hydro-power production of the whole of Africa.

Technologically Norway has advanced very rapidly and over half the world's underground hydro-power stations are in Norway. However what concerned Professor Hveding was not technology but organisation. Developing to-day's organisation in Norway had been a long process where Norway had met the same challenges and issues which Angola will also meet.
Norway was, and is a rural society and electric power generation and distribution developed in a dispersed manner. Initiatives were taken by local groups and authorities. State involvement was very limited in the beginning. Small local grids were linked up to one another.

However the State did intervene at an early stage on legislating for the development of water-courses. A law regulating rights to acquire hydro-power sites was enacted in 1906 and a law on regulation of rivers was enacted in 1917. The general Energy Law of 1990 (which was translated into Portuguese for the Seminar) lays down the updated legal framework for the organisation of the energy sector in Norway. These laws are administered by the Norwegian Water Resources and Energy Administration.

The State has also been encouraging co-operation between decentralised generating units. In 1932 a national power pool was formed. To-day, the State Power Board generates about 30% of the power consumed in Norway and is responsible for 90% of major transmission lines, but performs no distribution of electricity to domestic consumers. That is the duty of some 230 units - large and small - besides some wholesale and production units. It was possible that Angola might be able to learn from this decentralised organisation model for the electricity sector.

2.4 The Need for Renewable Energy Policy and Strategy in Angola

Felix Matias de Neto, National Director of Water Resources in the Secretariat of State, then delivered this paper. He looked first at the use of energy and the Energy Balance in Angola. Some 56% of the energy used in Angola came from fuelwood. 42% came from petroleum and 2% from electricity. Angola's consumption of energy is put at 2,108 kilotonnes oil equivalent (ktoe) whilst production is 19,767 ktoe. This excess of production over consumption is accounted for by Angola's petroleum production. Few African countries enjoy such a comfortable margin of excess of energy production supply over demand. Average energy consumption per capita in Angola is 234 kgoe, but this masks wide disparities between urban and rural areas. This leads to a wide gap in living standards.

It was maintained that lack of access to energy sources has led to rural to urban migration and rural depopulation. This has created major socio-economic problems in urban areas. It has also meant declining production in rural, agricultural areas. People move to the coast but there are fuel shortages there. If the energy problem could be solved in Angola, the population distribution problem could also be solved.

About half the wood used in Angola is consumed in the form of charcoal. Wood is regarded as the most reliable fuel in Angola because of the lack of alternatives. Angola has huge potential energy resources in the form of waterfall sites and petroleum, but it will take many years before these can be commercialised on a wide-scale basis. Fuelwood will therefore continue to play
an important role. The paper goes on to discuss the use of New and Renewable Sources of Energy (NRSE) with particular reference to windpumps, solar systems, photovoltaic systems and handpumps. The paper concludes with a discussion of desirable elements of energy policy and strategy for Angola.

2.5 New Technologies in Rural Electrification in Brazil

Mr. Joao Pegado of the Brazilian electrical company, FURNAS then presented a paper on Brazilian experience in rural electrification. FURNAS is one of four regional electricity companies in Brazil. It serves the most developed south-east corner of the country. FURNAS has invested over US$ 1,000 million in rural electrification between 1974 and 1988. This has given about 400,000 connections to over 1 million households. Most of the loan financing has come from the Inter-American Development Bank. About 50% of the funding comes from loans and 30% comes in subsidies. Average consumption per household per month is about 350 kWh. Much of the development has been based on co-operatives.

Rural electrification in Brazil was characterised by high levels of investment, low initial levels of consumption and subsidised tariffs. Mr. Pegado concluded by giving technical details of the FURNAS system.

2.6 The Challenge of Rural Electrification

Dr. Frank Denton, recently of USAID and with extensive field experience of the Philippines rural electrification programme, delivered the paper.

The United States has given extensive help to rural electrification in developing countries e.g. Bangladesh, Bolivia, Costa Rica, Ecuador, India, Indonesia and the Philippines. American experience has shown that rural electrification can be very successful in modernising agriculture and in bringing rural people into the national mainstream.

Most of those who are given access to electricity will choose to use it, although one has to get over the initial high cost of wiring. Electrification has little direct effect on agriculture but has considerable impact on crop processing, equipment repair, small enterprises, handicrafts and small industry. Neither schools or health centres experience a major impact from electrification. However power is most commonly used for security and street lighting. The biggest positive impact noted by the speaker was the introduction of television. This introduces progressive new ideas to otherwise isolated rural people.

In the Philippines about 60% of households found they could afford to be connected. Rural electrification was organised in consumer co-operatives in the Philippines and about two-thirds of these were successful. To be successful rural electrification has to be introduced into areas of relatively high population density. Experience showed that in such areas costs per connection were about US$ 200. Assuming a 20 year life, 8%
interest rate and 50 kWh consumption per month, the cost per kWh ought to be around 3 US cent. This frequently makes electricity the least cost source of rural power.

2.7 Strategy for Electrification of Rural Centres and Rural Areas

Asbjorn Vinjar put forward some provocative thoughts on the nature of rural electrification in Africa. This was based on a paper delivered to the Pan-African Seminar on Energy Strategy for Africa in Abidjan in November 1990. The participants had pointed to the need to mobilise human and institutional resources rather than physical ones alone. The emphasis on purely physical resources was responsible for many of the failures of electrification in Africa.

In Africa electrification had been based on highly centralised systems which perhaps fitted the African environment better, but experience from many countries showed that a decentralised system was likely to make for more successful rural electrification programmes. Vinjar challenged delegates to try to answer a number of basic questions on electrification as to the role of subsidies, when an area should be electrified and so forth.

2.8 Water Resources Management in Norway

Pal Mellquist of the Norwegian Water Resources and Energy Administration then presented two papers on Water Resources Administration and Hydropower Development in Norway. He attempted to draw lessons for Angola from the Norwegian experience.

He pointed out that responsibility for water administration in Norway was highly fragmented and he estimated that eight out of the 16 Ministries in Norway had some responsibility pertaining to some aspect of water administration. The Ministry of Health and Social Services was responsible for potable water whilst the Ministry of Petroleum and Energy was responsible for industrial water because of the very close links between industry and hydropower which were mutually dependent. A Ministry of Environment had been established in 1972. It was important that an appropriate management structure and the relationship between Ministerial responsibilities were properly worked out.

Norway was fortunate in one way in that it was a small country with a very homogeneous population. Staff in the water sector numbered not much more than 250 persons most of whom knew or knew of the others. This made co-operation much easier. However a major emerging problem (one which was common to most mature democracies in the West) was the complex management structure and increasingly complicated issues which have to be decided upon. In most major issues there are now so many different aspects to be considered and so many well formulated arguments on both sides, that it becomes increasingly difficult for politicians to take decisions at all. This had led to what Mellquist termed as "decision-paralysis".
Mellquist then turned to what lessons, if any, Norway could offer to Angola. He acknowledged the differences between the countries, but pointed out that Norway too was a poor country with limited capital and expertise when it embarked on its electrification programme at the beginning of this century. He advised Angola to consider the following points:

- The country should concentrate its powers of decision (avoid "Decision paralysis")
- They should establish an agency responsible for environment and water
- They should gather and process whatever physical data they can, particularly to re-establish a methodical and exact recording and processing of basic hydrological observations
- All available data should be taken in account in planning for the water sector in Angola.

2.9 Hydro-Power Development

This paper by Pål Mellquist was not delivered verbally and dealt with water resources utilisation in Norway, conflicts between hydro-power and other interests and with the major and minor effects of hydro-power development

2.10 Energy System Development Principles

This paper was prepared by Asbjorn Vinjar. Because of the shortage of time available it was not presented verbally. It enunciated the basic principles governing energy system development. The paper concluded by calling for an informed and independent institution to be responsible for applying the basic rules and principles of system development on a national basis. This paper addresses non-specialised people and politicians who have to deal with questions related to energy supply, energy systems and energy sector management. It is a means for fundamental understanding as to what energy is and how energy processes work.

2.11 Power Co-operation with Neighbouring Countries: The Case of NORDEL

Gunnar Vatten who is Director-General of the State Power Board of Norway described the activities of NORDEL, a system of power co-operation between the five Scandinavian countries: Norway, Sweden, Finland, Denmark and Iceland. The first Nordic energy agreement started in 1915 and NORDEL was established in 1963. At that time the combined installed capacity of the five countries was 24,000 MW. Now Norway alone in 1991 has an installed capacity of 27,000 MW.

In western Europe the AC-grids of 12 different countries are inter-connected. It is noticeable now in Europe that regional energy co-operation agreements are developing all over the continent. With the liberalisation of central and eastern Europe,
these countries are wishing to link up with western European energy systems.

The inter-connected NORDEL system now comprises power plants and high voltage grids in Norway, Sweden, Denmark and Finland. The grids are of uniform design and are connected by 19 major links.

Mr. Vatten described the institutional set-up of NORDEL, which consists of selected persons from the main power utilities, and a few from the energy authorities in the respective Nordic countries. NORDEL is as an advisory body completely independent of the national political systems in the constituent countries. The NORDEL permanent staff is very small, and the Secretariat rotates between the five member countries for a period of three years. NORDEL owns no supply system components and do not sell or buy power. Recommendations from NORDEL has often led to agreements between commercial units on strengthening power exchange through new transmission ties.

Very large economic benefits have been obtained from this power co-operation since, in an inter-connected system, reserve capacity can be reduced without reducing security of supply. In addition developing national power systems as a unified systems leads to considerable savings by avoiding unnecessary duplication. A new issue now being discussed is the role of the huge quantities of natural gas discovered off the Norwegian coast. How and where this will be processed and how it will impact on electrification strategy is still being studied.

It should be noted that the Nordic countries have very strong historical traditions of mutual co-operation in many different fields including the political one. The NORDEL system has clearly been able to benefit from these traditions. Even so it is still noticeable that five different countries are involved in such a close co-operation.

2.12 Power Co-operation in the Southern African Region

Einar Jordanger of the Technical and Administrative Unit (TAU) of the Southern African Development Coordination Conference SADCC gave this paper. SADCC is a body charged with regional co-operation in the fields of energy, agricultural research and livestock production, soil and water conservation and tourism, fisheries, forestry, wildlife, transport and communication manpower development, industry and trade, mining and food and agriculture in Southern Africa. SADDC has ten member countries as follows: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe. Given the rapid pace of political developments in southern Africa, it is now possible to visualise Zaire and South Africa as future members of SADCC.

Angola, as the major petroleum producer within SADCC has been charged with promoting energy co-operation, and TAU was set up in 1982 to assist in this co-ordinating role. TAU has departments
dealing with electricity, energy conservation, petroleum/coal and woodfuel and New and Renewable Sources of Energy.

A SADCC Electricity Strategy was approved in June 1991 and this will lay the basis for future co-operation between the members. Inter-connection of systems is so far limited although the current 330 KV connection between Zambia and Zimbabwe is likely to form the backbone of a SADCC inter-connected system. Considerable development of national 330 KV networks will be needed to develop a regional system. Angola is likely to link in through the Capanda Hydropower Project despite the long transmission distances involved. A feasibility study is currently being conducted into the potential for feeding power from Cabora Bassa in Mozambique into the SADCC system in Zimbabwe.

Various other smaller SADCC regional co-operation projects are being promoted by TAU. These include a Transmission System Computer Model for member countries, a regional hydroelectric hydrological assistance programme and the development of a regional training centre for technicians and operators at Kafue Gorge in Zambia.

Currently there is a surplus of electrical energy within the SADCC region which has come about because of the failure or poor performance in industrial and mining sectors throughout the region. A priority for all countries is therefore to increase the market for electrical power by increasing industrial and mining loads.

2.13 Energy Co-operation Between Angola and Neighbouring Countries

Francisco Meireles National Director of Energy in the State Secretariat of Energy and Water Resources in Angola gave this paper.

He gave an outline of Angola's activities within SADCC and its bilateral agreements in the energy field with neighbouring countries. Angola is already co-operating with Namibia under a SADCC agreement. Also under SADCC Angola was involved in a project to improve the management of the Zambezi River Basin of which Angola is a part.

Mr. Meireles outlined the broad benefits coming from interconnection in terms of emergency supplies, economy and sales of excess production. In the particular case of Angola Mr. Meireles felt that regional co-operation would be of considerable benefit to Angola if its system could be linked into that of Namibia, Botswana and, eventually South Africa which represented an enormous future potential market.

On bilateral links with neighbouring countries Mr. Meireles indicated that links had already been established between Cabinda (in the north of Angola) and Pointe Noire in the Republic of the Congo. New links were also being forged between northern Angola
and the Zaire system and between eastern Angola and western Zambia. Angola's most active bilateral co-operation was along the border with Namibia where preparations were being made to develop supplies for border towns and areas.

2.14 The Findings of the Working Groups

The Plenary Session was then followed by two and a half hours of group work. Two parallel Working Groups were established and both discussed the theme: "Rural Electrification in Angola including the use of New and Renewable Sources of Energy". Group 1 was chaired by Mr. Felix Matias Neto and Group 2 was chaired by Mario Fontes. The findings of the Working Groups follow:

Group 1 had the following main findings:

a) A Rural Electrification programme is essentially a long-term one which will take many years to implement

b) A programme must be related to economic potential. In other words it should start in the most favourable areas first.

c) A programme should use subsidies only in the last resort and should try to start without subsidies. If they are used, subsidies should only be temporary.

d) A programme should base itself on local initiatives although a national agency should be available to co-ordinate/regulate it.

e) A programme should be based on existing systems and build on them (start with rehabilitation first)

f) All programmes should contain a national component which can be supported by an external component.

g) It is difficult to apply conventional cost/benefit analysis to rural electrification programmes

h) New and Renewable Sources of Energy (NRSE) can be appropriate in some cases e.g. solar for specific or marginal projects

i) Programmes are particularly important for certain specialised uses e.g. schools, clinics and health centres but can be very expensive for single households.

j) Rural electrification cannot solve all development problems but can support development efforts in many sectors.

Group 2 had the following findings:

a) Programmes should concentrate on the rehabilitation of existing facilities and on projects which are economically viable.
b) It is important to lend support to local groups in order that they take local initiatives to improve their own situation. It is therefore very important that local groups participate in rural electrification. Rural electrification must not be seen as a "gift" from central Government.

c) Cost-benefit analysis is possible on occasions, but generally it is difficult to apply.

d) It is important to identify the point at which local communities will seek assistance with rural electrification. Local communities seek assistance at different points in time with water, health, roads, electrification etc.

The main conclusions of the two groups were very similar and inter-connected. It is certain they will be of great value in helping the Government to make decisions about the energy sector in the future. The experience of Norway (a small country with large energy resources but, originally little capital) could well be relevant to Angola's future rural electrification policies. The experience of decentralised local initiatives in Norway could well be relevant.
3 ENERGY SECTOR ECONOMY

3.1 Contributions on Energy Sector Economy

Some four papers on Energy Sector Economy were delivered to the Seminar. These came from Norway, United States and Angola and dealt with energy pricing, tariffs, subsidies, financing and the role of industry as a bulk market for power.

3.2 Energy Pricing, Taxation, Subvention Programs, Financing: Views from Norway

Eivind Kindingstad of the Norwegian Water Resources and Energy Administration introduced this paper which related particularly to the electricity sector. He said the main economic objectives in Norway were to achieve economic efficiency in the energy sector, to control monopolies and to even out prices by subsiding high cost rural areas. The main principles were as follows:

- revenues should secure present and future supplies of energy
- prices should be sufficient to secure efficient development of energy resources: they should approach the long-term marginal cost i.e. build cheapest projects first
- prices should maintain existing equipment
- energy prices should reflect environmental costs
- energy prices can be used to promote rural development policy

Such principles are relevant for all countries whether Norway, which is well developed, or Angola which is only just starting up its development in many areas.

In Norway petroleum products are sold at market prices by independent oil companies. Electricity tariffs are set by the owners of local utilities, usually municipalities, and are determined by the utilities' individual cost structures. The setting of prices of bulk power is led by the main supplier, the State Power Board. There is also a "spot market" in electricity for the exchange of short term "occasional power". Export prices are set by principles recommended by NORDEL and on bilateral agreements. The new Energy Law, which came into effect in January 1991, seeks to create a system whereby electricity pricing on the internal market will be based even more on prevailing market conditions.
There are consumption taxes and environmental taxes on energy in Norway. Consumption taxes are variable and are used to even out price differences between different parts of the country. State assistance is also available to subsidise supply in remoter areas with inherently higher costs/prices.

New electricity projects to-day are generally financed through loans in domestic or foreign banks to the individual power company. This can be done as the credit rating of the Norwegian power companies is generally good. Previously however, much of the huge investment capital needed to finance large-scale hydro projects was borrowed in foreign capital markets by the Norwegian State on behalf of smaller companies.

3.3 The Concept of Energy Pricing, Subvention and Financing

Dr. Frank Denton then went on to deliver this paper. He had spoken against subsidies in the energy sector in his previous paper (see 2.6) and now wanted to amplify his reasons for doing so. Both Philippines and USA which he knew well had suffered from price distortions within the electricity sector.

Dr. Denton had recently carried out exhaustive studies of the economic performance of countries with open economies based on manufactured goods, and countries with centrally managed countries based on exploitation of raw materials. Centrally planned economies based on subsidy had performed well in the 1960s but had fallen off badly in the 1980s. Examples of such economies were Ghana, Philippines and Argentina. On the other hand open market economies based on manufactured good production e.g. Turkey, Hong Kong and Korea had maintained performance throughout the 1980s. Performance in countries with few if any subsidies was consistently better than those with subsidies. This had social ramifications e.g. levels of infant mortality. In a comment to Dr. Denton's paper Professor Hveding supported the thesis and stated that a recent extensive survey by IMF confirmed Denton's views.

Dr. Denton said that the above discussion showed why the primary objective in energy pricing should be economic efficiency. Energy prices therefore have to be set equal to the long-run marginal costs of power. It is, of course, not easy to determine what real long-run marginal costs are. It was best to look to the experience of countries with open economies. While economic efficiency often applies pressure to bring prices up by discouraging subsidies, there is also a pressure to keep prices down by controlling the tendency for monopolistic energy agencies to incur higher costs than are necessary.

3.4 The Tariff System in Angola

Mario Fontes, Director of Planning and Development in the State Secretariat for Energy and Water Resources then presented a paper on the current system of tariffs and financing in Angola.
The legal framework for a national electricity framework was in place, but in practice the War had distorted everything. The main companies in Angola which produced and distributed electricity were as follows:

SONEFE - Provinces of Malanje, Kwanza Norte, Kwanza Sul, Bengo and Luanda

ENE - Production in Bengu and Moxico. Production, Transport and Distribution in Provinces of Cabinda, Uige, Kwanza Sul, Huambo, Bie, Huile and Namibie; Distribution in Malanje

EDEL - Distribution in Luanda City

CELB - Distribution in the cities of Benguela, Lobito, Catumbela and Baia Farta

ENDIAMA - Production, Distribution and Transport in Province of Lunda Norte

CABINDA GULF OIL - Transport and Distribution in Cabinda

In addition there are a few isolated systems operating throughout the country.

Tariffs are still based on Portuguese legislation from before Independence. There are nine different tariffs based on who the user is. It was difficult to obtain an overview of the financial situation of each of the companies. However the electricity utilities had major problems with collection of revenue and great problems with staffing and with accounting and billing. A completely revamped system was needed. One problem was that Government had subsidised city dwellers for many years. Tariff levels now no longer reflected costs of service, and there was extensive illegal connection. It was estimated that there are 18,000 illegal connections in Luanda alone. Most of the problems could be attributed to the dislocation caused by the war. It should also be pointed out that performance varied widely from district to district. Much depended on the personalities of local staff whether revenue was collected and funds were available.

The State Secretariat were well aware of the problems associated with the existing tariff system. Putting these right, however, was an enormous task. A future system should be based on long-term marginal costs, a more or less uniform system of tariffs across the country and a system of tariff reductions to permit electrification of less developed areas (cross-subsidy).

3.5 Energy for Industry

Eivind Kindingstad then presented this paper which outlined Norway's experience of promoting co-operation between industry and hydropower development. Energy is essential as a basis for most industrial, but industry itself then starts to develop its own momentum. The basic problem, however, is to get started. It can be risky to depend on international financing. The biggest
projects are the most economic, but the difficulty is to find a big enough market for the power. This means that one often has to operate at a low level of capacity utilisation in the initial stages. This might be solved by selling bulk power to other countries through regional co-operation (which has already been discussed). Another way is to promote Industrial/Hydropower Joint Ventures. This way it is possible to promote development in one's own country. Joint Ventures can attract foreign capital, know-how and investment, and could be very relevant for a country like Angola with large potential power resources and untapped mineral resources. Rural electrification can be a useful spin-off of such joint ventures although it should be run by a separate company.

Kindingstad then presented two main examples of exactly this type of Joint Venture from Norway. At the end of the 19th century, Norway was a country with a poor economy and very little development of its natural resources apart from power potentials. However, about this time a market for chemical fertilisers became available and two Norwegians developed a process for synthesising ammonia from atmospheric nitrogen through the use of large amounts of electric power. This was the beginning of Norsk Hydro which is one of the biggest chemical companies in the world. Much the same happened with the aluminium smelting industry. The metallurgical industry was very competitive but Norway's cheap power gave it the edge. Aluminium now accounts for 35% of all Norway's non-oil exports. Norway now also exports aluminium technology and know-how.

Kindingstad summarised what the advantages of Joint Ventures had been to Norway as these could be of considerable interest in the Angolan context. These were as follows:

- Economies of scale in power and industrial production could be exploited
- Risks to both the power producer and industrial investors were minimised by the existence of long-term contracts
- Much needed foreign exchange was obtained from industry selling at internationally competitive prices
- Industrial investment brought in much needed foreign technical, financial and market competence to the Norwegian economy
- Joint ventures developed close to hydropower sites became important elements in rural development programmes

3.6 The Findings of the Working Group

After the conclusion of the Plenary Session a Working Group met to discuss the theme: "Energy and Economy in Electricity, including problems of tariffs. The moderator of the Working Group was Simao Paolo, Deputy Director of ENE."
The Working Group's findings were as follows:

- The role of private capital will be very important in the future of the electricity sector in Angola. This is particularly so in generation and production. However, it is difficult to say at the moment just what the interest in investment will be.

- Major industrial consumers should be encouraged to invest in Angola through Joint Ventures especially in metal processing.

- Tariffs should be based on the long-term marginal cost of an efficient enterprise.

- Uniform tariffs were preferable to differentiated tariffs because of the ease of administration.
4 ENERGY SECTOR LEGAL FRAMEWORK

4.1 Contributions on Energy Sector Legal Framework

Two contributions were made on the legal framework for electricity development. One set out the current position in Norway. The other attempted to summarise the present situation in Angola. During this same session a paper was delivered on the on-going Capanda Power Project where the Seminar was situated. An account of this paper is also included here, for the sake of completeness.

4.2 Energy Sector Legal Framework - the Norwegian Experience

This paper was given by Mr. Trond Ljøgodt of the Norwegian Water Resources and Energy Administration.

Water in the rivers of Norway has been used for many centuries for all sorts of purposes e.g. for drinking water, for powering flour mills and sawmills, for fishing, for floating timber, for transport, for recreation etc. Rivers were owned by individuals and their use was regulated by age-old traditions and laws. Of necessity, a basic rule has been that conditions in the river cannot be altered in any way so that they affect adversely neighbouring interests.

However the advent of industrialisation, hydro-electricity and the building of large dams towards the end of the 19th century radically affected this situation. The rights and potentials of river proprietors would necessarily be affected. New legislation was needed to protect the rights of users and to promote the interests of industrial developers. In particular there was a need to develop powers to expropriate rivers. The first law was established as early as 1887 and the next one came in 1917.

A revised version of the 1917 Law is still in force. It gave the Government energy and water authorities the power to regulate and control the development of water courses. This Law, known as the Law of Concession, enabled them to control the activities of foreign investors and to ensure that Norwegian manpower resources were employed in any hydro-power developments. Because of the desire to keep national resources within national control foreign investors were required to seek a concession to develop hydro-power (and other natural) resources.

Safety regulations governing the use and application of electrical installations and equipment were first introduced in 1892 and have been continuously up-dated.

Another important law to facilitate hydropower development has been an Expropriation Act of 1959. This was introduced in order
to enable Government to expropriate land if and when necessary in order to secure a public electricity supply.

4.3 The Legal Framework of the Electricity Sector in Angola

This paper was delivered by Arlindo Almeida, Director of Legal Department of the State Secretariat for Water and Energy. The first law governing electrical production in Angola was a Portuguese one from 1944 which was largely designed to promote industrial development. It had three aspects. The first was to promote production, distribution and transport of electricity. The second aspect concerned the setting of tariffs, and the third aspect dealt with security and rules of operation.

The Law of 1944 laid down policy and this was followed up by Decree 43335 which tried to reform the law to reduce conflicts between users and to co-ordinate activity within hydropower development. There was also a need to control development and developers.

After Independence Angola introduced no new legislation, but Article 62 of the Constitution revoked all previous legislation which was not in accordance with that Constitution. In 1980 ENE was created by Decree and all the previous Portuguese owned private companies were nationalised, and put under ENE. Before Independence the Junta de Elecrificacao was a very important organisation which controlled electrical development.

There is urgent need for a re-codification of the laws and a clarification of the laws covering electrification. There is also a need to define the different roles of different organisations. There is a need to adjust State organisations in order to provide greater local autonomy. It has been stated that the electricity sector is one sector which the present Government will not privatise in the immediate future.

4.4 A Description of the Capanda Power Project

Mr. Jose Sonnenberg Fernandes, Director-General of GAMEK (Gabinete de Approveitamento de Medio Kwanza), the organisation overseeing the development of the Capanda Project then gave delegates a lecture on the nature and progress of the Capanda Project. Prior to this lecture the Seminar delegates had been given an extended tour of the construction site on Sunday 28 July.

The proposed installed capacity of the Capanda scheme is 520 MW. Four major entities are involved. That is GAMEK (the Angolan organisation responsible for management of the project), FURNAS a Brazilian electricity organisation responsible for planning and design of civil works, TPE (Technopromexport) a Soviet firm responsible for mechanical equipment and Odebrecht the Brazilian civil contractor. A concrete gravity dam has been selected. The project started in 1982 and work on the site began in 1987. Commissioning is scheduled for 1994. Some 2,100 Angolans are employed, 500 Brazilians and 100 Soviets. A jet runway capable of taking Boeing 737s is in operation. The project produces much
of the vegetables requirements of the workforce. Considerable construction work has also been carried out in Luanda in connection with housing and provisioning of the project. The project is now (by Aug.1991) up to approximately 90 per cent completed. The first unit is expected to be operating in (June) 1993,* when it has to be connected to the northern grid system through a transmission line to Canbambe.

4.5 Findings of the Working Group

After the conclusion of the Plenary Session a Working Group met to discuss the theme: "Legal Framework of the Electricity Sector". The moderator of the Working Group was Arlindo Almeida. The Working Group had the following findings:

- It is necessary to define the role of the State in production, transmission and distribution of electricity in Angola

- A new general law covering electricity is required in Angola. It should have the following attributes:
  . It should promote economic development
  . It should lay down the principles for the sales of energy
  . It should define the nature of institutions: who is who, and who does what?
  . It should tackle the question of exploitation of resources
  . It should resolve potential conflicts between different users
  . It should define the State's role in the supervision of utilities
  . It should set out potential risks and security arrangements

- The following actions for the immediate future are required:

  . Problems have to be identified
  . Terms of Reference for the drafting of a new general law should be produced
  . A draft Law should be drawn up
ENERGY SECTOR INSTITUTIONAL STRUCTURE

5.1 Contributions on Energy Sector Institutional Structure

Some nine separate contributions were made on separate aspects of institutional structure within the energy sector. Contributions came from Angola, Brazil, France, Portugal and Norway.

5.2 Monopolistic versus Competitive Activities

This paper was given by Asbjørn Vinjar. His paper was complemented by several drawings. Within production/generation there can be many competitors but the national power transport system has by nature to be a monopoly. The major power market can be open to several competitors whereas regional transmission will be a monopoly. Local distribution is also a natural monopoly. The Energy Act of Norway of 1991 deals with all these activities and relationships in detail. The Monopolistic/Competitive structure is reflected in the new Act. Mr. Vinjar then set out the principles governing the authorities' control over monopolies in general. This was also illustrated by a drawing. In principle monopolies should be self-financing.

Mr. Vinjar had also produced a document on "The Role of Energy Authorities - Interrelationship with Commercial Units" which he mentioned very briefly and which would be dealt with further by professor Hveding in his last contribution, see 5.10.

5.3 A View on Power Authorities

This contribution came from Dr. Frank Denton. He based his contribution on his experience from United States, World Bank, Asian Development Bank and the Philippines. His theme was that many public sector decisions are based on personal reasons rather than on considerations of the public good. Many distortions in public sector activities arise from this fact. A central issue was how to structure incentives in order to bring personal objectives into line with the public good. This problem had been studied in the United States under "public choice theory", and Denton presented some of the findings of a leading exponent of this, Niskemann. Bureaucrats and businessmen are not so different. Businessmen need incentives but it is assumed that the
public good is sufficient incentive for the bureaucrat. This is not necessarily so. He then drew example from the United States on the efforts to control monopolies and to ensure that public servants worked for the public good in public authorities. He brought forward the examples of a Public Power Board, Public Hearings and Monopolies. He said the basic principles were to encourage competition, create a system of open information and to seek out alternative solutions. He recommended strongly the incorporation of the principle of competition by comparison into the activities of power authorities. He felt that centralised organisations operating remotely from the consumer rarely brought out the best in the bureaucrat.

5.4 The Experience of FORNAS, Brazil

Mr. João Augusto of FURNAS then presented the Brazilian viewpoint. He described in some detail the electricity system in Brazil and its institutional structure. There are 4 major regional power authorities in Brazil of which FURNAS is one. Their activities are co-ordinated by Electrobras. Regional authorities have to cooperate because of the enormous size of Brazil and because of the seasonal climatic variations. There are 73 power organisations in Brazil as follows:

- Regional companies: 4
- State companies: 26
- Local companies: 42
- Multinational (Itaipu): 1

This system has been operating relatively successfully for about 25 years. However recently they have begun to experience problems as follows:

- They have had great difficulty in raising financial resources because of the general economic problems experienced by Brazil
- Tariffs have been insufficient and there has been a poor control of inflation
- There has been a major loss of Federal political power
- The overall payment system between companies/authorities has broken down because of the problems described above
- The bigger States want more projects but do not have the potentials and so have to look to smaller sites.

A new institutional model is now under active consideration. Basically several private companies will be encouraged to produce power as cheaply as possible and sell it to a National Grid at a standard national purchase price. The National Grid will then
sell to various competing distributors who will compete with each other to sell at the cheapest possible price.

The new system as proposed will be quite disruptive. It implies a tremendous reorganisation and dislocation. It also implies moving away from a standard national tariff throughout Brazil. This will cause different prices throughout Brazil which may cause much hardship.

5.5 The Experience of EDF, France

The Viewpoint of France was then put forward by Mr. Jacques d'Esteve de Pradel of Electricite de France. Electricity in France is provided by a parastatal Electricite de France (EDF). It was established in 1946 immediately after the Second World War. At that time France nationalised the then existing multitude of electricity companies. It had three tasks i.e. to rebuild existing systems, to provide families in France with electricity at the same price and to design, build and operate new facilities. The two first targets were achieved by the end of the 1950s. Because of the dangers of dependence on Gulf oil, France decided to depend more on nuclear. 75% of France's electricity is generated from nuclear power and it has the cheapest electricity (lowest sales price) in the world.

EDF has 122,000 staff, an installed capacity of 100,000 MW, 27 million consumers and an annual budget of FF 147 billion. It is still a parastatal but is subject to competition from the private sector. It now has a 4 year contract with the French Government. Main conditions are to reduce the cost of electricity by 1.5% per annum and to reduce EDF debt by FF 20 billion. It has developed a Strategic Plan to develop economic and efficient management through decentralisation and so-called "Centres des Resultats". It is also keeping its marketing and engineering efficiencies updated and is also charged with co-operating with overseas companies through aid programmes. It is currently assisting Angola.

5.6 The Experience of EDP, Portugal

The Viewpoint of Portugal was then put forward by Mr. Vaz da Silva from Electricidade de Portugal (EDP). EDP is a vertically integrated company whose structure has some relevance to Angola. It had the same set-up and legal basis as Angola until 1975. It is organised in numerous divisions. It has an installed capacity of 6,600 of which half is hydro. It has 19,000 employees and hopes to reduce this to 16,000. Independent producers provide less than 0.1% of Portugal's power. One of Portugal's main problems is the big variations between wet and dry years.

EDP was created in 1976 after the nationalisation of all previous 13 power companies. In 1988 a new law allowed competition in the electricity sector and EDP was converted to a limited company.
EDP are seeking greater efficiency and feel they can achieve greater efficiency if they introduce more competition.

Mr. da Silva had the following recommendations for Angola:

- A new technical body for planning, financing, training, accounting and law should be created
- Existing companies should be restructured to specialise by business and by region
- Companies should require to put up strategic plans and budgets
- A separate body is required to build and operate isolated systems
- Portuguese speaking experts should be recruited
- Finance will be required

5.7 *Energy Supply Units Structure*

Mr. Gunnar Vatten then presented his paper on Energy Supply Units Structure.

5.8 *Industry's Involvement in the Energy Sector*

Eivind Kindingstad then presented an abbreviated version of his paper on "Industries' Involvement in the Energy Sector"

5.9 *Angolan Energy Sector - Institutional Structure*

Mr. Francisco Meireles presented this paper. He first outlined the main aspects of the Structure. These were as follows:

- On the technical/organisational level there were varied tariffs with no reasonable basis, there was no rational system of transmission and there was a complete lack of plans

- On the administrative level there was a heavy concentration on financial relations, a desire for greater local participation in decisions on generation and transmission, a transfer of responsibility from ENE when it has problems and a great lack of qualified technical manpower especially up-country

- On the Material and supplies level there were problems with the imports of supplies and the concentration of the supplies market on Luanda

- On the Human Resources level there was an almost total concentration on Luanda, there was a lack of facilities for working in the Provinces and contracts were of very short duration, there was virtually no specialisation, there was
a lack of exchange of available facilities, it was almost impossible to get strategic decision made and there was very little use made of exchange of experience.

Mr. Meireles then examined possible Alternative Organisations. The following principles should be observed. Organisations should have clear physical links from producer to consumer, distribution should often be regarded as a monopoly, it is very difficult to attract private investment without an agreement on tariffs, electricity projects have long investment and long lead times. Organisations should develop policies for the quality of service, the security of installations, expansion and development and tariffs.

5.10 Energy Sector Government Structures

Professor Vidkunn Hveding then presented his views on Energy Sector Government Structures. He reminded the audience that there were "many ways of skinning a cat". However his experience was also that there are several universal truths about Government structures which do exist.

Government operated on three basic levels i.e.:

- Operational
- Guidance/control
- Formulation of Policy

These corresponded with the three tier structure proposed by Mr. Vinjar i.e.

- The Monopoly or the Company
- The Directorate
- The Cabinet/Ministry

However it was his observation that upper level organisations had a tendency to invade the "territories" of lower level organisations and to interfere with the activities of the lower level bodies. Whether the purpose is to expand their territories or merely to keep a closer watch on their subordinates, this process towards centralisation should be resisted. Hveding's own experience as a Minister was that Ministries should have a small and competent staff and that the detail has to be delegated to the Directorates or operational organisations. Translation of policy into reality was the duty of the Directorate.

It was very important to look out for overlaps between Ministries (see Mellquist's contribution under 2.8). It was Hveding's experience that confusions over functions caused great problems. It was Hveding's opinion that the main incentive for a person was to give him a work responsibility. By exercising responsibility he showed that he was able to survive. Decentralisation is not merely a matter of economic efficiency. Government organisations are living organisms where everyone must be given an opportunity
to participate in the decision-making process. It is thus up to national leaders to ensure that the country's human potential is mobilised through adequately decentralised structures.

5.11 Findings of the Working Groups

The Seminar then divided into two Working Groups. The theme for discussion was: The Institutional Structure for the Electrical Sector in Angola.

Group 1 had the following findings:

a) The current system of strongly centralised planning should be abandoned and the utility companies themselves should do their own planning. Co-ordination between the companies should largely be effected by the companies themselves.

b) Whatever overall institutional model is adopted, all measures which are thought to be necessary should be adopted.

c) A system of vertical integration should be adopted for the utility companies, although the larger companies may be permitted to operate outside such a system.

d) There is a need for an independent institutional structure with the following attributes:

- Powers over concessions and administration
- Powers to set tariffs
- Powers to introduce standardisation
- Powers to impose the relationships between utility companies

e) Three independent utility companies should be established to cover the North, Centre and South of Angola.

f) EDEL and ENCEL should remain as utility companies at the moment.

g) Wherever practical isolated electricity systems should be managed by the local authorities in the area.

h) An analysis should be made of the need for an organisation with the following roles:

- Financing
- Support to training
- Strategic Planning
- Support on Procurement
- Technical Assistance
i) A system of independent accounting and auditing should be established as soon as possible.

Group 2 had the following recommendations:

A. Short-Term/Immediate

a) It would appear preferable to maintain the present system but to improve the efficiency of the utility companies.

b) A new organisation may have to be set up to co-ordinate the utility companies. The companies should co-operate with one another for the public good.

c) An Institute should be created to co-ordinate the activities of central Government and the regional authorities.

B. Medium-Term

a) In the medium/long-term there should be a restructuring of the institutional framework

b) One should investigate potential institutional models in other countries and select that one which best suits Angola. It could well be that this will be a mixture of models.

c) The State Secretariat for Electricity and Water should be strengthened and given more capacity.

Different views expressed by the two groups are quite natural taking into account the very nature of the problems discussed.

The working group discussions should only be seen as the start of a process on clarifying the best institutional structure for the energy supply of Angola.
6. MAJOR ISSUES EMERGING FROM THE SEMINAR

6.1 General

This Chapter sets out some of the major issues emerging from the Seminar. It does so by summarising the various issues raised in the Working Groups, the Final Statements made at the Seminar and in a Summing Up Meeting held between the Secretariat of State for Electricity and Water and the Norwegian Water Resources and Energy Administration. This illuminates various points raised.

6.2 Working Groups

Many hours of thought went into the discussions of the Working Groups. However some four main issues emerged as particularly important. These were as follows:

(a) Rural electrification should begin where there is an economic basis for it and where there is a will for it. Initiatives should therefore come from the local level and it should therefore be of a decentralised nature. In Angola it is important to start with rehabilitation/reconstruction of existing schemes. Because of the enforced isolation of local communities in Angola caused by the War, many such communities have been thrown back on their own resources and were often well able to develop local schemes. Norwegian historical experience of electrification in rural areas is perhaps quite relevant in this case.

(b) Tariffs should be based on the long-term marginal cost of an efficient enterprise. It was imperative to sort out the current confusion with regard to tariffs and payment for supply.

(c) Because of Angola's very considerable hydro-power potential, there is probably scope for joint ventures with foreign investors in power-intensive industry.

(d) There is a need for comprehensive legislation governing all aspects of electric power in Angola. There is also a need to define precisely the roles of the State and other agencies in production, distribution and transmission of electricity in Angola.

(e) There is a need to modify the current highly centralised planning system governing the electricity sector in giving more autonomy to local companies and to local authorities. There is therefore a need to rethink the current institutional model, to investigate other possible models and to come up with a new institutional structure more suited to a post-war, democratic Angola.
6.3 **Final Statements**

The following main points emerged from summing up statements made on the final day of the Seminar:

(a) Mr. Vinjar said that purposely contributions to the NESMA Seminar from Norway came from people with similar backgrounds and experience and were therefore compatible and homogeneous. However, there has been a wide convergence of views from contributors from different countries and different backgrounds. There appears to have been a lot of agreement on matters of energy policy, legal framework, financing and institutional framework. The entire Seminar was suffused by the feeling of optimism which permeates Angola after the ending of a brutal and bloody Civil War. The NESMA Seminar could therefore not have happened at a more opportune time for the country. The success of the NESMA Seminar in Angola suggested it might be possible to replicate it in other countries where the question of national energy sector management was an important issue.

(b) The Secretary of State felt that the Seminar had done much simply by giving people time to sit down and think about and discuss fundamental issues on energy policy and institutions. He also suggested the possibility of some continuity. He thought this might be possible by establishing an informal "NESMA Club" of delegates willing and interested to pursue some of the ideas discussed in the Seminar.

(c) The Consul-General of Norway made the point that Norway has had a continuous programme of assistance to Angola over several years and that a new Electricity Adviser is shortly to be appointed to the Secretariat of State. This augurs well for future co-operation.

6.4 **Summing-Up Meeting**

A summing up meeting was held between the Secretariat of State and the Norwegian Water Resources and Energy Administration in Luanda on 1 August. The following were the principal findings:

(a) A seminar of the NESMA type was particularly useful to Angola with so few material and human resources, and it has started a process in the Secretariat of State which would continue to grow. It was preferable to follow-up by organizing more seminars or workshops in Angola rather than to send people from Angola abroad.

(b) There was a definite need to continue the NESMA process in some form or other so that the real problems confronting Angola to-day can be tackled and solved. It might also be linked to some aspects of Angola's culture, re. for example the visit to the archaeological sites at Capanda or Pedras Negras. It was not necessary to bring a big delegation for future follow-ups in the form of workshops or seminars on more limited subjects. One or two people would do. A continuation of the process would give
Angolans some idea of what they could look forward to and what they ought to be aiming for.

(c) Angola is facing a desperate shortage of skilled manpower in the energy sector, and the reconstruction and rehabilitation problems are quite enormous. There is great need for technical assistance, especially of experienced, practical people.

(d) The Seminar appeared to adopt the idea of decentralisation as a basic principle. Because of the divise nature of the War, most provinces have had to be autonomous, and decentralised development was more or less inevitable.

(e) Because of the urgency of the problems confronting the country the Secretariat of State is developing urgently an institutional model for electricity management. In addition a new system of electricity tariffs was likely to be introduced by the end of 1991.
SEMINAR PROGRAM

STATE SECRETARIATE OF ENERGY AND WATER, ANGOLA

in co-operation with

NORWEGIAN WATER RESOURCES AND ENERGY ADMINISTRATION

Seminar on National Energy Sector Management
(NESMA-Seminar)

Angola, 29.07. - 1.08.1991

SEMINAR OBJECTIVES

Based on experience from Norway and elsewhere to inform on and discuss policy, legal framework and institutional structure of the energy sector of Angola and to strengthen the capabilities of top management people from the ministries and main energy supply institutions on this issue.

Speeches at the
Closing of the seminar 1.08.91

by

- Asbjørn Vinjar, NVE with consequive translation to portuguese by Francisco Meireles, SEEA - Co-ordinators of the Seminar
- Hon. Quelhas Mota, State Secretary, Chairman of the Seminar
- Frode Mauring, Norwegian Consul to Angola
- Hon. Coronel João Ernesto Liberdade, Governor of the Province of Malange
SEMINAR PROGRAM

SEMINAR-ORDINATORS: Eng. F. Maireles, National Director of Energy, SEEA
Mr. Asbjørn Vinjar, NVE

Sunday July 28, 1991

Morning: Arrival Capanda by plane

Technical visit of the Capanda hydropower plant, construction site

1230 Lunch

Afternoon: Tour to Pedras Negras and the village of Pungo Andongo

Monday 29th July 1991

0.1 0830 Opening of the seminar
  By: State Secretary Hon. J. Quelhas Mota, SEEA

0.2 0930 Review of Seminar Program and Workshop Arrangements

THEME 1: ENERGY POLICY

Chairperson: State Secretary Hon. J. Quelhas Mota, SEEA (during the whole seminar)

1.1 0915 The Electrification History of Norway—salient features of possible interest to Angola
  By: Professor Vidkunn Hveding

  0945 Coffee Break

1.2 1000 New and Renewable Sources of Energy in Rural Development
  By: Felix Nathias Neto, National Director of Water, SEEA

1.3 1015 New Technologies in Rural Electrification
  By: Representative from Furnas, Brasil

1.4 1030 Rural Electrification
  By: Frank H. Denton

1.5 1115 Water Resources Management in Norway and Hydro Power Development
  By: Pål Mellquist

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1.8 1200 Energy System Development Principles
By: Asbjørn Vinjar

1230 Lunch

1.9 1400 Power Co-operation with Neighbour Countries
By: Gunnar Vatten

1.10 1430 Energy Cooperation in the Southern African Region
By: Einar Jordanger, Electricity Adviser SADCC/Energy - TAU

1.11 1450 Energy Cooperation between Angola and Neighbour Countries
By: National Director of Energy, SEEA, Eng. Meireles

1515 Coffee Break

1530 Introduction to Working groups and Plenary Discussions on "Rural Electrification of Angola including possible use of New and Renewable Sources of Energy"
Moderators in two working groups:
1. Felix Neto, National Director of Water Affairs, SEEA
2. Mario Fontes, Director of Department of Planning and Development, SEEA

Resource persons from Norway and other guests

1730 Summing-up of Discussions by the Moderators

1800 End of first day's working session

Tuesday 30th July 1991

THEME 2: ENERGY SECTOR ECONOMY

Pricing, Energy Taxation, Subvention Programs, Financing

2.1 0830 Views from Norway
By: Eivind Kindingstad

2.2 0845 Views from USA and elsewhere
By: Frank H. Denton

2.3 0900 Tariff System in Angola
By: Mario Fontes, Head of Planning and Studies Department, SEEA

2.4 0930 Views from Financing Institutions
By: Representative of ADB (Not present)

1000 Coffee Break
Energy for Industry
By: Eivind Kindingstad

1045 Plenary Discussion

1230 Lunch

THEME 3: ENERGY SECTOR LEGAL FRAMEWORK

3.1 1400 Energy Sector Legal Framework - Principle Views
By: Trond Ljøgodt

3.2 1430 Energy and Water Sector Legal Framework in Angola
By: Arlindo Almeida, Head of Legal Department, SEEA

1500 Coffee Break

1530 Working Groups - themes 2 & 3
1. Energy and Economy in Electricity, including problems of tariffs
   Moderator: Simao Paulo, Deputy Director, ENE, Admin. and Finance
2. Legal Framework of the Electricity Sector
   Moderator: Arlindo Almeida, Head of Legal Department, SEEA

Resource persons from Norway and other guests

1730 Summing-up of Discussions by the Moderators
1800 End of second day's working session

Wednesday 31st July 1990

THEME 4: ENERGY SECTOR INSTITUTIONAL STRUCTURE

4.1 0830 Monopolistic versus Competitive Activities and The Role of Energy Authorities - interrelationship with commercial units
By: Asbjørn Vinjar

4.2 0845 A view on power authorities
By: Frank H. Denton

4.3 0900 The Experience of ENDESA, Spain
By: Representative of ENDESA (Not present)

4.4 0910 The Viewpoint of FURNAS, CESA, Brasil
By: Representative of FURNAS

4.5 0920 The Viewpoint of EDF, France
By: Representative of EDF
4.6 0930 The Viewpoint of EDP, Portugal  
   By: Representative of EDP

4.7 0940 The Viewpoint of Namibia  
   By: Representative from Namibia (Not present)

0950 Coffee Break

4.8 1005 Energy Supply Units Structure  
   By: Gunnar Vatten

4.9 1030 Angolan Energy Sector - Institutional Structure  
   By: Eng. F. Meireles, SEEA

4.10 1100 Industries' Involvement in the Energy Sector  
   By: Eivind Kindingstad

1130 Plenary Discussion

1230 Lunch

4.12 1400 Energy Sector Government Structure  
   By: Vidkunn Hveding

Coffee Break (in the working groups)

1500 Working Groups - theme 4
   1. Institutional Structure of Energy Utilities  
      Moderators: Silva Neto, General Director, EDEL  
                  F. Meireles, National Director of Energy, SEEA
   2. Institutional Structure of Angolan Government in Energy  
      Moderator: Arlinda Almeida, Head of Legal Department, SEEA

1700 Plenary Discussions

1800 End of third day's working session

Thursday 1st August 1991

Morning: Closing of the seminar  
   Speeches by:
   A. Vinjar
   Hon Q. Mota
   F. Mauring, Norwegian Consul to Angola and  
   Hon J.E. Liberdade, Governor of the Malange Province  
   Visit to local memory and rite site near the Capanda plant

Afternoon: Return to Luanda by plane

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LIST OF PARTICIPANTS

1. Joaquim Quelhas Mota, State Secretary of Energy and Water Affairs
2. Francisco M. Meireles V. Junior, National Director of Energy
3. Felix Matias Neto, National Director of Water Affairs
4. Mário Fernando M. Fontes, Director of Planning and Development, SEEA
5. Arlindo de Almeida, Director of Legal Office, SEEA
6. João Bento da Silva Neto, General Director of EDEL
7. José Sonnenberg Fernandes, General Director of GAMEK
8. Rui Gurgel, Director of the Electrical Department, UAN
9. Rui Tito, Adviser DNE, SEEA
10. Orlando José Veloso, Adviser DNE, SEEA
11. Adão Pio, Economist, SEEA
12. Filomena Vasconcelos, Economist, SEEA
13. Fransisco Talino, Engineer, SEEA
14. José de Oliveira, Revista Energia (Energy Magazine of Angola)
15. Simão Paulo, Deputy Director, ENE
16. Helder Cruz, Deputy Director, ENE
17. Simão Cacete, Engineer, ENCEL
18. Diógenes Oliveira, General Director of NOCAL
19. Jordão Bartolomeu, National Director of Petroleum
20. António Martins, Economist, EDEL
21. Egídio Oliveira, EDEL
22. Kayaya Kahala, Ferrangol UEE
23. Paulo Matos, General Manager, SONEFE
24. Eduardo Nelumba, Engineer, SONEFE
25. Manuel Duque, Director of Resizing Department, Ministry of Planning
26. Einar Jordanger, Electricity Adviser, SADCC/TAU (Norway)
27. João Augusto, Furnas C.E.S.A. (Brazil)
28. João Pegado, Furnas C.E.S.A. (Brazil)
29. Vaz da Silva, Administrator of EDP and PCA Internet (Portugal)
30. João Ricardo, Deputy Director of Planning, EDP (Portugal)
31. Vilar Correia, Technical Assistance to SEEA from EDP (Portugal)
32. C.M. Apanom, Representative of CCCE in Luanda (France)
33. Jacques d’Estève de Pradel, Area Manager Africa, EDF (France)
34. Asbjørn Vinjar (Norway)
35. Vidkunn Hveding (Norway)
36. Gunnar Vatten (Norway)
37. Mike Fergus (Norway)
38. Eivind Kindingstad (Norway)
39. Pål Mellquist (Norway)
40. Trond Ljøgodt (Norway)
41. Frode Mauring, Norwegian Consul in Angola and Project Manager of the Norwegian Assistance Programme to SEEA (Norway)
42. Frank Denton (USA)

Administration:
Filomena Borja (Secretary)
Filomena Lisboa (Translator)
Gina Queinôs (Translator)
### NESMA-SEMINAR, Angola 1991

Conference Room Papers

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Seminar on Rural Electrification and Norwegian Development Assistance, Holmen, March 14-15, 1989. 01-89


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