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# **ENERGY**

## **SOUTHERN AFRICAN DEVELOPMENT COMMUNITY**



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**Lilongwe, Republic of Malawi  
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## PROJECT NUMBERING SYSTEM

Projects are identified using an alphanumeric numbering system

The first three letters indicate the member State

AAA	-	Regional	NAM	-	Namibia
ANG	-	Angola	SWA	-	Swaziland
BOT	-	Botswana	TAN	-	Tanzania
LES	-	Lesotho	ZAM	-	Zambia
MAL	-	Malawi	ZIM	-	Zimbabwe
MOZ	-	Mozambique			

The first digit defines the Sector

0	-	Overall Coordination/Multimodal
1	-	Petroleum
2	-	Coal
3	-	Electricity
4	-	New and Renewable Sources of Energy
5	-	Woodfuel
6	-	Energy Conservation

The second digit is a serial number

## A B B R E V I A T I O N S

ADB	= African Development Bank
AGIP Spa	= AGIP Spa
AIDAB	= Australian International Development Aid Bureau
ANG	= Angola
AUS	= Australia
AUST	= Austria
BADEA	= Arab Bank for Economic Development in Africa
BEL	= Belgium
BOT	= Botswana
BRA	= Brazil
CAN	= Canada
CBI	= Confederation of British Industries
CFTC	= Commonwealth Fund for Technical Cooperation
CHI	= Peoples Republic of China
CITES	= Convention on International Trade in Endangered Species
DEN	= Denmark
EEC	= Commission of the European Communities
FAO	= Food and Agriculture Organisation of the United Nations
FIN	= Finland
FRA	= France
FRG	= Federal Republic of Germany
IBRD	= International Bank for Reconstruction and Development
ICAO	= International Civil Aviation Organisation
ICE	= Iceland
IDA	= International Development Association
IDRC	= International Development Research Centre
IDU	= Industrial Development Unit of the Commonwealth Secretariat
IFAD	= International Fund for Agricultural Development
ILO	= International Labour Organisation
IMPOD	= Import Promotion Office for Products From Developing Countries
IRE	= Ireland
ISNAR	= International Service for National Agricultural Research
ITA	= Italy
ITB	= International Tourism Board
ITU	= International Telecommunications Union
JAP	= Japan
KUW	= Kuwait Fund
LES	= Lesotho
MAL	= Malawi
MOZ	= Mozambique
NAM	= Namibia
NET	= Netherlands
NOR	= Norway
NORDICS	= Nordic countries
OPEC	= Organisation of Petroleum Exporting Countries
POR	= Portugal
PTA	= Preferential Trade Area for Eastern and Southern Africa
SADCC	= Southern African Development Coordination Conference
SAFTTA	= Southern African Federation of Travel and Tour Associations
SAREC	= Swedish Agency for Research Cooperation With Developing Countries
SATEP	= ILO Southern African Team for Employment Promotion
SPA	= Spain
SWA	= Swaziland
SWE	= Sweden
SWI	= Switzerland
TAN	= Tanzania
TAZARA	= Tanzania Zambia Railway Authority
UAPTA	= Unit of Account of the Preferential Trade Area
UK	= United Kingdom
UNDP	= United Nations Development Programme

UNIDO = United Nations Industrial Development Organisation  
USA = United States of America  
USSR = Union of Soviet Socialist Republics  
WB = World Bank  
ZAM = Zambia  
ZIM = Zimbabwe

1     **EXECUTIVE SUMMARY**

1 1    The importance of the Energy Sector in the overall development of the national economies of SADC member States is widely recognized. But if the abundant energy resources existing in the region can be exploited, and developed for the benefit of all SADC countries it is extremely important to agree on regional plans and strategies which are consistent with those which are developed on a national basis.

Over the 14 years of SADC existence, experiences were gained showing clearly the real and potential benefits which can be derived from regional cooperation.

The most important event organized by the Sector, was the Energy Workshop, held in Windhoek from 11 to 15 April, 1994. The workshop was attended by various professionals from the different economic sectors, both public and private. Important conclusions and recommendations on the future regional cooperation in Southern Africa were reached by the participants. For example, in general terms, the workshop recognised the need for the existence of a regional Coordinating body for the SADC Energy Sector and identified in all sub-sectors, suitable areas for regional cooperation.

In this context, the workshop recommended that the Energy Sector Technical and Administrative Unit (TAU) be transformed into an Energy Commission, with properly staffed and financed divisions in the different energy sub-sectors is currently being developed.

1 2    Issues related to regionality, prioritisation, sharing of mutual benefits, least-cost alternatives and suitable internal resource mobilization have been some of the key issues involved in the development of the regional energy cooperation in SADC. Obstacles such as, lack of full trust in sharing regional benefits, lack of harmonization between national and regional plans and policies, insufficient resources to implement the various projects/programmes can be indicated as constraints which still need serious attention since they have hampered the smooth development of regional cooperation.

1 3    However, the Energy Sector is promoting some regional projects which show that regional cooperation can be achieved if joint efforts are actively pursued. Examples are Projects AAA 3 8 and AAA 3 7 (in the Electricity Sub-Sector), Project AAA 1 5 (in the Petroleum Sub-Sector), Project AAA 5 15 and AAA 5 17 (in the Woodfuel Sub-Sector).

1 4    Power Cooperation has been the main issue for the Energy Sector over the last two years. The decision of the SADC Energy Ministers, ratified by the SADC Council of Ministers allowing the Sector to initiate contacts with non-SADC institutions, like ESKOM from South Africa and SNEL from Zaire, linked with the most recent developments in the Region, opened a new era of cooperation in the SADC Energy Sector's history. A TAU

delegation including some Chief Executives from SADC Power Utilities visited ESKOM in March 1994 to discuss opportunities for broader cooperation in Southern Africa

The growing awareness, among the key-players in this sub-sector of the huge potential benefits arising from an extended cooperation made things to develop very quickly over the last year. The result of this is the preparation of a draft Power Pool Agreement under the initiative of four regional power utilities, including ESKOM, that when fully developed will constitute undoubtedly the ultimate objective and the most remarkable achievement of the Power Sub-Sector

- 1 5 Another major concern of the Energy Sector continues to be the mobilization of suitable financial and human resources to support the implementation of the SADC Energy Programme of Action. The implementation of the various projects/programmes has been heavily reliant on external resources provided on a grant basis by the ICP. This has developed into a dependence syndrome which needs to be reversed. The present situation calls for a more conscious attitude and the need to seek new measures to ensure funding of future Energy Sector activities from sources within the SADC region

Although a suitable financial strategy is required for the whole Organization to deal with this issue, one of the measures which can be already established is the application of a more severe prioritisation of the Sector's projects/programmes. This should obviously lead to a considerable reduction of the projects portfolio, as well as to the implementation of those unique projects which are really important and relevant for the region. The Energy Sector has initiated this exercise and even in future, there will be a periodical review of the programmes and activities

- 1 6 The tables of funding status show that the current portfolio consists of 60 projects, with a total value of about USD 820 million. All in all funding has been secured amounting to USD 673 million, with USD 0 55 million under negotiation. Funding is sought for USD 146 million

The sector has 6 completed project while 6 projects have been suspended. During the reporting period 18 projects have been withdrawn or transferred to other sectors. The energy sector's funding gap is at 18%

- 1 7 Despite the difficulties previously referred to, some success can be reported as a result of the development of regional cooperation

- 1 7 1 The crucial regional project AAA 3 8- *Coordinated Utilisation of Electricity Generation and Transmission Capacities, including Pricing Policies*, is moving ahead into its phase III and the most concrete result is the "Draft Power Pool Agreement, prepared under the initiative of four

regional power utilities including ESKOM. On the other hand, the ongoing preparations for the implementation of the regional project AAA 3 2 "*Specialized Training in the Electricity Sub-Sector*" will provide the basis for the minimization of the shortage of specialized staff in the Power Sub-Sector activities

- 1 7 2 In the Petroleum and Gas Sub-Sector, the project AAA 1 5" *Joint SADC Petroleum Exploration Programme*" is now in its implementation phase and will provide a broader and better knowledge of the common sedimentary basins of the region , as well as the evaluation of the regional petroleum commercial potential In the downstream side, the Petroleum Down Stream Conference, took place in Maputo, August 1994 It provided the framework for the definition of least-cost supply systems for the region, possible joint procurement activities and required mechanisms for more efficient operations of the refining facilities In the gas field, one important study has been initiated to assess the potential economic benefits of the natural gas utilization in Southern Africa
- 1 7 3 A market study conducted to assess the applications and markets for solar photovoltaic systems in the SADC region proved to be feasible, particularly for the satisfaction of energy needs of the rural communities
- 1 7 4 The implementation of the regional projects AAA 6 2 *Energy Savings in Industry* and AAA 6 5-*Energy Management in Industry* have contributed to a greater awareness and sensitivity of both producers and consumers on the need to adopt effective measures of saving and utilization of energy and for the establishment of a regional pool of experts in this field
- 1 7 5 To tackle the problem of skilled manpower shortage to implement the regional programmes and activities, the Sector has succeeded in identifying a number of projects or activities to deal specially with the training component and capacity building Some of these are to be initiated (AAA 0 8-in the energy planning, AAA 4 11 in the N R S E, AAA 5 17-in the woodfuel sub-sector) and others are ongoing (AAA 1 2 in the petroleum sub-sector, AAA 3 2-in the electricity subsector)

## 2 REVIEW OF THE REGIONAL SITUATION

- 2 1 The Southern African energy system is characterized by a number of factors. Some of them worthwhile to mention are a relatively low level of commercial energy consumption, the major part of the energy requirements are met from wood, the SADC economies face an increasing dependency on imported oil, energy efficiency tends to be low, wasting existing scarce energy resources and an increasing demand from the rapidly expanding urban centres for large scale energy delivery systems.
- 2 2 The average annual per capita energy consumption is estimated at 14.3 GJ. There are however wide variations among the countries, depending on the nature of the economic activities.
- 2 3 Woodfuel continues to be the predominant source of energy, accounting for over 75% of the total final demand in the region. Malawi, Mozambique, Swaziland, Zambia and Tanzania have the higher consumption rates of woodfuel. The main consumers and their reliance on woodfuel to the total energy consumed are Household (96%), Agriculture (59%) and Industry (47%). Problems associated with woodfuel scarcity include environmental degradation, health hazards, economic hardship, lowering of living standards, and the decline of agriculture production. In spite of the growing scarcity of woodfuel, Southern Africa as a whole has large commercial energy resources like hydro power, coal, petroleum, natural gas and NRSE, which could if exploited efficiently, meet the demand of commercial energy for a long period and substitute woodfuel.
- 2 4 Commercial energy sources used in SADC include petroleum products, electricity and to a lesser extent, coal. The average consumption per capita of commercial energy is 4.5 GJ. There are wide variations in the per capita consumption which reflect the structure of economic activities in the various countries.

Hydroelectricity constitutes 63% of the net power supply in SADC. The total installed hydroelectric capacity is 7 548 MW, supplying a total of 24.410 GWh. Thermal generation accounts for 20% of the power supply with 7% being accounted for by power imports, mainly from South Africa. Electricity demand continues to expand which in turn calls for investments in new power and transmission facilities. Zimbabwe is the largest consumer of electricity, accounting for 42% of the total SADC consumption. Zambia is the second largest consumer, accounting for nearly 29%; the remaining eight countries account for 29%.

The structure of consumption of electricity in SADC reflects the intensity of electricity use in the mining and industry sectors in Zambia and Zimbabwe, respectively. In Zambia the mining industry accounts for 71% of total electricity use, while in Zimbabwe, industry accounts for 46%. At regional level, Agriculture accounts for 7%, Mining 32%, Industry 33% and the Household Sector 17% of total electricity consumption.

- 2.5 The annual consumption of petroleum in SADC is of the order of 5 million tonnes. Except for Angola which is an oil producing and exporter country, all the other SADC countries import 100% of their petroleum requirements. Nearly half of SADC oil requirements are met through imports of refined products and the rest are obtained from the refineries in Luanda, Dar-Es-Salaam and Ndola. The Transport Sector accounts for almost 50% of the total consumption of petroleum products, followed by Industry at 15%. Kerosine is the main petroleum product used as an alternative to woodfuel to low and middle income population for lighting in rural areas and for cooking in peri-urban areas. Liquefied petroleum gas (LPG) is widely used in urban areas for cooking, especially in Angola.
- 2.6 Proven coal reserves in Southern Africa are estimated at 122 955 million tonnes. South Africa, Mozambique and Tanzania are the bigger potential producers. However, the total production of coal in the SADC region has been very low compared with estimated total proven coal reserves of 1 737 MT. Coal is mainly used for electricity generation in South Africa which relies on coal for some 81% of its primary energy requirements. It is also used for electricity generation in Zimbabwe and Botswana and for mining in Zambia.
- 2.7 Proven natural gas reserves have been identified in Tanzania, Mozambique, Angola, South Africa and Namibia. Currently utilization of natural gas in the SADC Member States is low but, there are plans to intensify its use in the near future. For example, Tanzania is planning to construct a 5 MW electricity generation plant at Mnazi Bay and 200 MW plant at Dar-Es-Salaam using natural gas. There also is an ongoing regional study to assess the potential economic benefits of the utilization of the natural gas in the SADC region.
- 2.8 It is worthwhile to consider briefly how the energy scene in Southern Africa will change with the entry of South Africa into SADC. Coal is the most important source of energy in South Africa, accounting for over 80% of commercial energy consumption. Recoverable reserves of bituminous and hard coal are estimated to

be 55 000 million tonnes or about 10% of the world's reserves South Africa has an installed electricity generation capacity of over 40 000 MW ESKOM's share of this capacity is over 35 000 MW Although ESKOM has an excess capacity of 4 300 MW it is all expected to be used up by the year 2000 One of ESKOM's strategies for meeting South Africa's future electricity demand is the development of an interconnected regional grid Electricity interconnection has for some time formed the basis of cooperation, at bilateral level, between South Africa and some members of SADC Most of the SADC petroleum requirements in refined products are met by imports from South Africa There is no doubt that the entry of South Africa into SADC will change the SADC energy scene One of the first visible trends is the expansion of the energy trade already existing and the creation of new markets even including non-SADC countries

### 3 PROGRAMME REVIEW

#### 3 1 **OVERALL ENERGY SECTOR OBJECTIVES**

Although the effects on the Energy Sector working cycle of activities derived from the Community building process are not yet evident, it may be expected that it will change to give place to the allocation of the results to be obtained from the Protocol on the regional energy cooperation Overall criteria already exist in the form of the Declaration, Treaty and Protocol approved and signed by the Heads of States and Government and the major challenge for all the Sectors, Energy included, is to work out their realistic strategies and plans

Furthermore, given the changing environment in the Southern Africa region, derived from significant socio-political and economic transformations which occurred in the region, there is a need to incorporate the new elements in the overall Energy Sector strategy The sub-sectoral strategies have been revised to take into account the above referred transformations In the same line the Sector has initiated the revision of their Overall Strategy in order to take into account recent developments both inside and outside the region The revision of the Strategy will also take into consideration the main findings of the Energy Workshop

#### 3 2 **MAIN SADC ENERGY SECTOR EVENTS**

The main events held by the Sector over the reporting period can be listed as follows

- \* The 5th Electricity Subcommittee meeting, held in Gaborone from 5 to 7 October, 1993 ,

- \* The Petroleum Exploration Conference in Southern Africa, held in Windhoek from 19 to 21 October, 1993,
- \* The Energy Sector Working Group (ESWG), held in Gaborone on 26 January, 1994,
- \* The Energy Sector Workshop, held in Windhoek, from 11 to 15 April 1994,
- \* The 6th Electricity Subcommittee meeting, held in Arusha from 02 to 06 May, 1994,
- \* The kick-off meeting for the initiation of the feasibility study on the economic benefits of the natural gas utilization in the Southern African region

### 3 3 **PETROLEUM**

#### a) **Project AAA.1.5 - The Joint SADC Petroleum Exploration Programme**

This important project is now in its implementation phase. Funds for the promotion of the programme have been secured from Norway (NORAD).

A SADC conference on Exploration in Southern Africa was held in Windhoek, Namibia, from 19-21 October 1993. The main objective of the conference was to present and promote the Joint SADC Petroleum Exploration Programme to the international oil companies. The conference had a very good attendance both from the SADC member States and from the international oil companies. As a follow up of the conference a special task force has given separate presentations of the programme to several international oil companies at their headquarters. A meeting between TAU and the African Development Bank (ADB) from 15-16 March 1994, resulted in a joint Memorandum describing a combined finance package of USD 32 698 000 financing the first two phases of the programme. The package is made up of African Development Fund (ADF), donor funds, industry and national contributions. The national contributions are essentially in kind. Separate loan agreements have to be signed with the countries benefiting from the loan.

#### b) **Petroleum Downstream Conference**

The SADC Energy Ministers Meeting in June 1993 decided that TAU should arrange a Petroleum Downstream Conference. The Conference was held from 1st - 3rd August 1994, in Maputo, Mozambique. The conference was aimed at top management and business executives from National Oil Companies and governmental institutions in the SADC region. Participants also included representatives from the private oil industry in SADC and regional energy experts from government institutions, universities, leading consulting companies.

and financial institutions South Africa was also represented at the Conference

c) **Project AAA.1.2 - Regional Petroleum Training Centre, Sumbe**

The final report with recommendations for Phase II was issued in September 1993. However the implementation of recommendations given by the report are subjected to the evolution of the political situation in Angola.

d) **Project AAA.1.4 - Management Development and Specialist Training for the SADC Petroleum Sector**

New rules for financial assistance from EU to SADC have been approved and TAU has therefore in March 1994 resubmitted this project to EU in order to be funded under Lome IV Convention.

e) **Project TAN.1.3 - SADC Biostratigraphic Reference Collection**

Funding has been secured from NORAD. The Tanzania Petroleum Development Corporation (TPDC) is doing the work and the project is progressing more or less according to plans. A project meeting to review the results is planned for later this year.

3 4 **COAL**

The manning of the TAU-Coal Subsector with a highly qualified international coal utilization expert has, despite frequent attempts from TAU's side to find donors willing to pay for such an expert, not yet been accomplished. Last year TAU got positive signals from the German GTZ but after renewed contacts the situation with regards to the financing of such an expert is somewhat unclear. However, the SADC Secretariat and the German Government have agreed to redeploy the resources earmarked for an expert to be employed at TAU. This decision was taken due to the political situation in Angola and the fact that the resources were not utilised since 1989. However, it was agreed that if the political situation returns to normality in Angola, the German Government would replenish the resources accordingly.

3 5 **ELECTRICITY**

The electricity sub-sector is undergoing deep and radical changes, as the power utilities' initiatives to enter into closer and more formalised regional power cooperation is coming close to a reality. The most important issue over the last year has been the concept of a Regional Power Pool, which is intended to be a tool to ensure an optimum use of energy resources on a regional basis. The strong participation of South Africa following its democratisation process has also influenced the power pool preparations in

a very positive manner. A proposal for the formation of Southern African Power Pool' under the SADC umbrella, and with an active participation of TAU, will therefore be presented to the Energy Ministers in 1995.

The project AAA 3 4 - Regional Hydrological Hydroelectric Assistance Programme - Although some activities have been postponed due to various reasons, the implementation of phase 2, part I is progressing well. In the sixth PSC meeting that took place in Harare on 12 May, 1994, an extension to this phase gathered general consensus and was approved with small adjustments in both work plan and budget.

The project AAA 3 7 - SADC Transmission Systems Computer Model for Analysis and Planning - is being revitalised, following a renewed commitment from the funding agency. The project will have an important impact as a planning tool for the proposed 'Southern African Power Pool'.

The project AAA 3 8 - Regional Generation and Transmission Capacities, including Interregional Pricing Policies - is now being completed through the finalisation of its third phase, intended to assess the organisational, administrative and legal aspects of power cooperation. The process leading up to the proposed 'Southern African Power Pool' has been a major contribution to this phase of the project. It should be noticed that all tasks in this process were carried out by expertise from the region, without any support from external consultants. Priority for the remaining electricity projects are now given to studies and the implementation of inter-utility transmission lines, as a means to fulfil the objectives of enhanced regional power cooperation. In addition efforts are also maintained to ensure the successful implementation and completion of the regional training programmes of the electricity sub-sector.

### 3 6 NEW AND RENEWABLE SOURCES OF ENERGY

3.6 1 The NRSE has during the current reporting period mostly been involved in promoting the financing of various approved regional projects on its portfolio. Other activities included staff development and participation in regional and international NRSE conferences and meetings.

3 6 2. Contacts and results with International Cooperating Partners can be summarised as follows.

1 SADC Project AAA 4 11 "SADC Programme for Financing Energy Services for Small Scale Energy Users (Finesse)".

SADC-TAU in collaboration with the United Nations Fund for Science and Technology for Development (UNFSTD) made contacts with several ICPs in an attempt to secure funding for the Finesse Programme. The range of ICPs contacted include the Royal Netherlands Government, the Governments of Norway, USA, and Japan, as well as the World Bank and the African Development Bank (ADB)

All the ICPs have expressed strong desire to participate in the programme. Although final official approval is yet to reach SADC-TAU, Royal Netherlands Government has, in principle, approved to finance the entire project through UNFSTD. Discussions with USA, Japan and Norway are on-going, to secure an expansion of the Project to cover the entire region.

- 2 SADC Project LES 4 2 "Solar Photovoltaic Power Generation in Rural Areas in Lesotho"

The Belgium Cooperation Agency (A G C D ) has, in principle, committed funds for the implementation of this Project. A Belgium Consultant has already been selected to conduct a Feasibility Study. A mission has visited Lesotho this year to carry out the feasibility study. The principal output of the mission shall be a project design report for the solar photovoltaic implementation phase.

- 3 6 3 Public Awareness Activities and Cooperation. The NRSE section took part in a number of international conferences. The most important of these meetings were

- 1 **12th European Photovoltaic Solar Energy Conference**

The SADC NRSE Section presented two papers on "The Development of Photovoltaic Markets in the SADC Region" and "the Status of SADC activities in New and Renewable Sources of Energy" at the 12th European Photovoltaic Solar Energy Conference held in Amsterdam, Holland in April, 1994.

- 2 **REFAD (Renewable Energy for African Development) Mission:**

The section took part in the preparation and visit to America with an American NGO, REFAD. The REFAD Programme is a USA Government/Industry partnership to identify and stimulate sustainable markets for the use of Renewable Energy Technologies in the SADC region. The objective

of the programme is to serve as a catalyst for the technical, economic and social integration of renewable energy technologies into the policies of the SADC National Governments

**3 NORAD Mission**

The NRSE Section was involved in the preparation of the NORAD mission to the region. A team of four Norwegians visited Namibia, Tanzania and Zimbabwe in November 1993. The objective of the mission was to explore possibilities for support to the SADC NRSE activities.

**4 GEF (Global Environmental Facility) Solar PV Project in Zimbabwe**

The GEF Project is a UNDP/World Bank/UNEP Programme that provides grants for investment projects, technical assistance and research. The objective of the GEF Project is for Household and Community use in Zimbabwe to provide power directly to at least 9000 Zimbabwean homes over a 5 year period, and to do this in a way which will not degrade the environment. The programme is focused on developing a national solar energy delivery infrastructure, including training and support for local enterprises. The NRSE section has been in contact with GEF office in Harare in order to use the Zimbabwe experience in other SADC member States.

**5 SADC Energy Workshop**

The NRSE section was fully involved in the preparation and conduction of the above Workshop which took place in Windhoek in April, 1994.

**3 7 WOODFUEL AND OTHER TRADITIONAL FUELS**

3 7 1 The energy supply and demand trajectory in SADC member states has remained virtually unchanged from the situation reported in 1993. Biomass fuels in the form of firewood, charcoal, agricultural residues and agro-industrial wastes, continue to dominate the regional energy balance. In relative terms, biomass fuels accounted for 76% of the total primary energy demand in the year just ended. Commercial fuels account for the remaining 24%. The high preponderance of biomass fuels in the energy balance is largely a consequence of the relatively low end use energy efficiency levels of combustion systems with which these fuels are used. However, even when accounting for various end use energy efficiencies, the contribution of biomass fuels

remains a high percentage (58%) of total useful energy. Biomass is predominantly a household fuel where it accounts for over 96% of the total household primary energy requirements. A significant amount of biomass fuels are also used in tobacco curing and other allied agro-industrial processes. The share of biomass fuels in agriculture and industry is estimated at 59.7% and 47.7%, respectively.

3.7.2 Dependence on biomass fuels, which are largely available free of charge on customary lands, can be attributed to two principal factors. First, low per capita income in most countries entails that the majority of their people cannot afford the cost of commercial fuels. Secondly, because a significant proportion of commercial energy sources [such as oil] are imported at a very high foreign exchange premium coupled with the fact that the development of power and other indigenous energy resources require high concentration investment of finance capital and the supply of commercial energy sources is generally restricted to a small proportion of mainly urban dwellers. This investment pattern also entails high unit cost for commercial fuel, a phenomena which in turn puts them beyond the reach of the majority of people whose per capita income is low.

3.7.3 Numerous regional studies have demonstrated that the major dilemma facing wood reliant households and agro-industries is that as wood is increasingly becoming scarce due to rapid forest cover removal from land clearing for subsistence agriculture, cash cropping, urban settlements and commercial extraction for charcoal production and timber have to find alternative energy sources or perish. However, as indicated above, alternative fuels are either beyond their means and/or physically non-existent. This is an area which requires serious and urgent policy discussions at both national and regional levels.

3.7.4 It is against this background that the Woodfuel Sub-Sector has strengthened efforts to ameliorate the impact of increased woodfuel scarcity by engaging in both supply side and demand side management programmes in addition to putting in place mechanisms for public awareness for environmental issues as well as imparting basic skills in natural resource management and conservation. Among the most important accomplishments in these areas are summarised below.

3 7 5

**Demand Side Management Activities:** In July, 1993 the Woodfuel Department launched the implementation of SADC Project AAA 5 15 "Improvement Of Woodfuel End Use Efficiency In Small Scale Informal Industries." This is a demand side management project which aims at assessing the potential for improving end-use energy efficiency in wood reliant small scale industries. As a pilot activity, the project is focusing on two important sectors the food processing industry [ fish smoking ] and construction industry [brick burning]. Four countries, namely Angola and Tanzania are carrying out research in fish smoking and Mozambique and Zimbabwe are looking at brick burning.

3 7 6

**Skills Training Activities:**

In line with a request for financial support presented to the Netherlands Government [DGIS] in July, 1988, SADC-TAU received formal notification in October, 1993 of DGIS' firm commitment for the financing of SADC Project AAA 5 17 "Rural Energy Planning and Environmental Management Training Programme". Negotiations between SADC-TAU, DGIS, ESAMI and Twente University, which commenced in November, 1993 to March, 1994, culminated in the formulation of a mutually acceptable institutional framework for project implementation, development of a three-year workprogramme to guide project activities, signing of contracts and memoranda of understanding. In line with its efforts to raise public awareness in rural energy and environmental issues, the project's formal launching in June, 1994 began with a Ministers Seminar which coincided with the 19th Session of the SADC Energy Ministers Meeting which was held in Lusaka, Zambia. This will be followed up by another policy level seminar for Principal Secretaries, managers of parastatal, private and non-governmental organisations.

3 7 7

**Public Awareness Activities:** Apart from public awareness activities planned under SADC Project AAA 5 17, the department has also published and taken part in a number of international fora where SADC Energy Sector activities were publicised. The most significant of these include a technical paper entitled "SADC Launches Major Energy Conservation Programme" which was published in AFREPREN Newsletter of January, 1994. The paper is also to appear in the SADC Energy Bulletin of November 1994, and the Harare based Development Dialogue Newspaper. The department has just completed a booklet entitled

"Guide To A Regional Energy Efficiency Test Methodology In Small Scale Industries" which was discussed at a Workshop in Harare at the end of June, 1994 and will be disseminated in the region and abroad. Among the important international conferences attended include Medium Biogas Technology Development in Arusha, Tanzania, in December, 1993, Status Of Renewable Energy Technology Dissemination in Naivasha, Kenya where a paper of the Malawi Case Study was presented.

### 3 8 ENERGY CONSERVATION

- 3 8 1 The activities of the Department, in the period, besides the 1993/1994 EO/EM meetings, were centred primarily on promotional missions, to discuss with ICPs the funding of Encon projects, preparations for the 1993 ACC, in Harare, and the 1994 Energy Sector Workshop. With confirmation of the funding of projects AAA 6 5- Industrial Energy Management, and AAA 6 9- Demand-Side Management Opportunities in SADC Utilities, preparatory actions were taken to implement these two projects.
- 3 8 2 The member States have been visited, to discuss with them the implementation of the NEMCs (National Energy Management Committees). There are different stages of understanding the role of the NEMCs in the implementation of the project AAA 6 5 by member States. Some member States are waiting for financial support from TAU to implement the NEMC and the mechanism to achieve the goals of the project. By definition, the NEMCs will assist the CEA (Canadian Executing Agency) in identifying the needs of industry, developing and implementing training courses, disseminating information on energy management technologies, delivering energy management activities, and systematically collecting data on industrial energy consumption and energy efficiency gains.
- 3 8.3 The NEMC constitutes a very important body, not only for a better delivery of the project AAA 6-5, but as the ground for a national think-tank, for all other energy matters. Due to the importance of the NEMCs, at national level, the costs related to their establishment and activities will be borne by each member State. During the inception of the project AAA 6.5, each member state will establish its own NEMC and ensure that a Memorandum of Understanding establishing the NEMC is prepared and signed.

3 8 4 The funding of the project AAA.6.9-Demand-Side Management Opportunities for SADC Utilities, was confirmed at the beginning of the current year, by CIDA Inc Marbek Resource Consultants Ltd the CEA, for this project, and TAU Encon Department, started a mission to five member States, namely, Zimbabwe, Zambia, Namibia, Botswana and Mozambique. The remaining SADC countries will be visited in the near future.

After these visits, the information collected will be evaluated and presented in an interim report proposing a second phase of the project.

3 8 5 The project AAA 6 11-Energy Efficiency Improvements In SADC Heavy Industry, was approved by the Energy Ministers in 1993, in Windhoek. The objectives of this project are complementary to the project AAA 6 5, since the heavy industry was left out in this project. TAU approached donors like GTZ and UNIDO for funds to finance the implementation of this project. So far the expectations for funding the project are promising.

3 8 6 In the second half of this year, the activities concerning energy conservation/efficiency will increase substantially with the full implementation of the projects AAA 6 5 and AAA 6 9. Those two projects plus the AAA 6 11 represent the core regional programme, in conservation and energy efficiency in the years to come.

### 3.9 ENERGY PLANNING

3 9 1 Energy Planning activities in SADC promoted during the period July 1993 to June 1994 were directed on project-oriented energy economic analysis and dissemination of relevant information. It was expected that the initiation of the very important regional project AAA 0.8 "Establishment of a Regional Energy Planning Network" would provide a significant and qualitative jump for the development of the energy planning activities.

However, due to reasons beyond TAU's control (as stated under Chapter 4 - Current Status of Projects - Status of AAA 0 8) the project was not initiated, as planned. Therefore, the energy planning activities promoted over the reporting period were minimal.

3.9 2 The 1991 SADC Energy Statistics Yearbook was completed and distributed. The sixth in a series of Statistics Publication. The 1992 SADC Energy Yearbook was not produced, due to insufficient data from member States. In February 1994 TAU has sent to all Energy Contact Point reminder faxes related to this subject. In April 1994, TAU distributed at the Windhoek Energy Workshop a reminder for member States to submit to TAU the relevant data not later than May 1994 in order to have the 1992 draft ready for the summit. TAU unfortunately, has so far received some data only from Angola, Namibia and Botswana.

3 9 3 The Project AAA 0.8 when initiated and implemented will constitute the main framework in which the regional energy planning activities will be developed.

#### 4 CURRENT STATUS OF PROJECTS

##### 4 1 OVERALL COORDINATION

#### **Project AAA.0.3: General Support to the Energy Sector/Technical and Administrative Unit (TAU)**

The objective of this project is to provide technical and material support to facilitate the work of the TAU. This support involves procurement of materials, financial and technical assistance. The project is supported by Belgium, Brazil, Canada, EC, France, Norway, Portugal, Sweden and UK. TAU has signed specific Memoranda with Canada, Portugal, Belgium, EC and Norway. Altogether seven and a half-man years have been allocated to support TAU, including one full-time staff member from the region, have been financed under the project. It is anticipated that the need for external support will be phased out gradually as the TAU develops its own internal capacity. Norway has started phasing out its personnel from the middle of 1992, aimed at a reduction of two and a half-man years by the end of 1994. At the beginning of 1993, TAU has made some modifications on its structure, as well as, increased its staff in order to fill the gaps being left by expatriates.

#### **Project AAA.0.4: Energy Bulletin**

The objective of this project is to increase knowledge about the energy situation in the member States and improve the flow of energy-related information between and among member States, with a view to facilitating regional cooperation.

This is an ongoing project since September 1982. It receives financial and material support entirely from Angola. The printing of the Bulletin has been undertaken entirely in Angola since issue No 17 for April/May 1988.

The photocomposition is done by the Bulletin's own staff. The production of the Bulletin has been greatly facilitated by the equipment acquired with financial assistance from Canada. During 1991/92 three editions, Nos 23, 24, 25 and 27 have been produced using internal capacity. Edition No 28 is under preparation.

The Bulletin continued to experience editorial and technical/administrative problems during the year under review. Further, distribution of the Bulletin to member States continued to pose problems. Considerable difficulties continue to be experienced by TAU in the remittances of revenue realised from sale of the Bulletin by member States. In September 1987, Energy Ministers have agreed the transfer of such resources to Luanda, Angola. However, due to tied financial rules and shortages of foreign exchange in the member States, this decision has not been implemented up to now. The Portuguese edition of the Bulletin has been suspended, pending decisions on its future status as a SADC publication only. An internal TAU review is being done in order to assess the relevance of continuing to produce the SADC Energy Bulletin or consider to convert it into a Newsletter.

#### **Project AAA.0.5: Information Coordination System**

The project seeks to provide the Energy Sector Coordinating Unit with an effective tool for planning and analyzing various energy policy options. Priority is being given to economic studies. The data base will continue to be used as a tool to organize and store all information being collected, which serves as a basis for development of economic analysis. The Manual on Project Evaluation has been approved by the Committee of Ministers of Energy in Maseru in June, 1991. The 1989 SADC Energy Statistics Year Book has been published and the draft SADC Statistics Year Book for 1990 circulated to member States for comments. New guidelines for project definition, approval and promotion have been produced and approved by the Committee of Ministers of Energy in Maseru in June, 1991. The project has now been completed. However, further activities will be carried-out either with the budget provided by the Angolan government or within the framework of project AAA 0.8.

#### **Project AAA.0.7: Documentation Centre for the Energy Sector**

The objective of the project is to establish a professional filing system and an energy reference library at the TAU offices, to ensure proper management of the large flow of documents within the Energy Sector, ease access to and make the documents useful tools for sector planning and operations.

The Documentation Centre is still dependant on external backstopping services and advice due to lack of adequately experienced staff within the Unit. Efforts are continuing to enhance the internal capacity of the Centre to manage its operations. Financial support was secured from NORAD in 1991 to assist in the training of staff of the Centre. Training commenced in September 1991, and was completed in June 1992. The long-term (by 1994) aim for the Documentation Centre is to be self-sustainable.

#### **Project AAA.0.8: Regional Energy Planning Network**

The objective of this project is to enhance energy planning and computerised information processing capacity in member States and facilitate information flow between and among member States and the TAU. Financial support from Belgium has been secured. A meeting between the two parties took place in Maputo in January 1992, and an agreement was signed. The Sector Coordinator and the Belgian Government are working on the practical details to conclude the financing arrangements and the implementation of the project.

In order to ensure that the project is implemented under the best logistical conditions and given the suitable geographical location of Zimbabwe, providing easier travel inside the region, the Belgium Government has in August 1993, presented to the Government of Angola a proposal to implement the project from Harare, the additional costs to be covered by the Belgium Government. This proposal has been accepted by the Angolan Government in March 1994. One TAU representative will be based in Harare to manage and monitor the implementation of the project together with the Consulting Agency.

#### **Project AAA.0.10: TAU Offices**

The objective of this project is to construct permanent offices for the Sector Coordinating Unit. The project is being financed by Norway on bilateral basis. The design of the plans, financed by Portugal, is in progress.

### **4.2 PETROLEUM**

#### **Project AAA.1.2: Regional Petroleum Training Centre - Phase II**

The objective of the project is to train technicians for the Petroleum Sector using the training facilities at the Petroleum Training Centre at Sumbe, Angola. In order to foster maximum utilisation of the centre by member States, a Training Coordination Committee has been created to direct and support the school's management in the implementation of training programmes, including curriculum development, standardisation of entry qualifications. Phase I of the project was extended to the end of January,

1990 with funding in the sum of US\$0 3 million from the UNDP. The project is being supported by the Angolan Government pending the outcome of the short-term consultancy for Phase II of the project.

An evaluation of Phase I of the Project was carried out in November, 1989. A Tripartite meeting, involving Angola, Norway and UNDP, which was scheduled for July, 1990, was eventually held in Vienna on 22nd May, 1991. The meeting recommended continuation of the project, subject to the project demonstrating that there is demand in the region for the courses run at the school.

In order to confirm the demand for courses run at the school, the Committee of Ministers of Energy at its meeting in Maseru in June, 1991 decided that a short-term consultancy should be commissioned to:

- \* update the 1988 survey,
- \* review, design and recommend new course structure based on the 1988 needs assessment as up-dated by the consultancy,
- \* redefine the framework for the establishment of a regional course selection committee,
- \* develop a programme for seminars in consultation with regional utilities,
- \* specify the need and define mechanisms for the recruitment of additional staff, including external technical assistance,
- \* assess the needs for materials and equipment, taking into account courses/seminars/workshops to be mounted under Phase II of the project, and
- \* recommend Terms of Reference, including composition and mandate, of the national staff selection and development committee.

In January 1992, a meeting took place between SADC/TAU and UNIDO to review this project and delineate further activities. The short term project definition consultant was fielded in June 1992. At a Project Steering Committee meeting in Harare, in September 1992, the reports from the member States were collected and discussed. The resulting final report will contain recommendations for Phase II with an outline TOR and budget estimate.

The final report prepared in cooperation between UNIDO and TAU was issued in September 1993. The Government of Angola will assist in broadening the capabilities of Sumbe Training Centre in the areas of Petroleum and Environment to benefit the region. However the implementation of

recommendations given by the report are subject to the evolution of the political situation in Angola

**Project AAA.1.4: Management Development and Specialists Training for the SADC Petroleum Sector**

The objective of the project is to train and develop professional core of management staff for the national oil companies and the member States' ministries responsible for energy, promote and enhance regional cooperation in oil exploration, supply, refining, gas utilization and petrochemical projects, through mutual understanding of planning, development and economics of major projects in the oil, gas and petrochemical sectors, encourage standardization of exploration agreements, safety procedures, oil supply contracts, product handling procedures and product specifications within the region, for the purpose of enhancing international cooperation with non-SADC oil companies, and to reduce costs and losses

The project budget has been revised and SADC/TAU has resubmitted a formal request to the EC following the EC/ACP Conference held in Luanda, at the beginning of May 1992, seeking funding for this project

Subsequent to a request from the EC in December, 1992, a new revision of the TORs were made in January, 1993. The revision included a budget adjustment by some US\$0.7 million to give the current figure of US\$1.55 million. The new TORs were submitted to the EC.

**Project AAA.1.5: Joint Petroleum Exploration Programme**

The objective of the programme is to improve the geological database and allow individual member States to evaluate their petroleum potential. This will place the member States in a better position to formulate petroleum exploration strategies, and be well prepared for negotiations with international oil companies.

Funding in the sum of US\$0.75 million for Phase I has been secured from NORAD for the Task Force to define the terms of reference for the data collection programme, and establish a Project Steering Committee. Phase II, to finance the project steering committee, is estimated to cost US\$0.06 million and has been secured from Norway. Phase III, estimated to cost US\$0.29 million entails carrying out studies of the three basins, i.e., the Karoo, Rovuma and the East African Rift Valleys. Funding for Phase III is under negotiation with Norway. Phase IV will involve joint exploration data collection programme at an estimated cost of US\$50 million.

Promotion meetings of Petroleum Exploration Programme (PEP) were held during 1993/94 with key oil industry and with donors, eg ADB, UNDP/UNDES and the WB. The major promotion event was the Conference on Petroleum Exploration in Southern Africa which was held in Windhoek, Namibia, 19-21 October 1993. The Conference had a good attendance both from the SADC member States and from the international oil companies.

TAU is currently in contact with donors and development finance institutions to secure the necessary financial backing of the programme. A meeting between TAU and the African Development Bank (ADB) from 15-16 March 1994, resulted in a joint Memorandum describing a combined finance package of USD 32 698 000 financing the first two phases of the programme. The package is made up of African Development Funds (ADF), donor funds, industry and national contributions.

**Project ANG.1.1: Oil Supply from Lobito to the SADC Region**

The project has been suspended for reformulation.

**Project LES.1.1: Strategic Fuel Storage Facilities in Lesotho - Phase I and II**

The objective of this study is to design a project, including costings, and establish in Lesotho a strategic storage facility for fuel for at least four months consumptions.

The study (Phase 1) was started in March, 1990 and the final report was presented in May, 1991 and has been approved by the government of Lesotho. For Phase II, (Engineering Designs), the Terms of Reference (TORs) have been concluded by TAU, but awaits some inputs from Lesotho. During the SADC Petroleum Supply Efficiency (NOC) seminar in Windhoek in December 1992, the representatives from the ADB indicated that this project would be of interest for financing by the Bank. TAU has informed Lesotho accordingly.

This project has been in the Energy Sector's Project Portfolio more than two consecutive years without attracting any funding interest neither from inside nor outside SADC.

In addition, the new environment created in the Southern Africa Region with the establishment of a democratic Government in South Africa makes the objectives of the project outdated and consequently difficult to foresee any financial assistance for its implementation.

Therefore, in their last meeting held in Lusaka 23 June 1994, the Committee of Energy Ministers approved the withdrawal of the project.

**Project MOZ.1.3: CNG Pilot Project Study and a Larger Scale Vehicle Conversion Study**

The objectives of this project are as follows

(a) To establish the technical and economic feasibility of a CNG pilot in Inhambane comprising.

- a compression and refuelling station in Pande,
- CNG transportation fleet,
- refuelling station,
- an engine conversion facility at Inhambane,

at an estimated cost of US\$ 1 0 million

(b) To establish the technical and economic feasibility of a broad CNG conversion programme for

- transport,
- power generation,
- industrial and commercial sectors,

in Southern Mozambique and the Beira region at an estimated cost of US\$0 5 million

This project has been funded on a bilateral basis by Italy and is completed

**Project NAM.1.1: Oil Terminal in the Form of an Offshore Buoy at Swakopmund**

The objective of this project is to construct an oil terminal in the form of an offshore buoy at Swakopmund, to minimise Namibia's dependence on South African controlled ports. The project has three components

- (a) Phase I - The feasibility study which inter-alia will include ecological evaluation and cost estimates,
- (b) Phase II - Design of the structures based upon the results of Phase I,
- (c) Phase III - Construction of the Oil Terminal

This project has been in the Energy Sector's Project Portfolio more than two consecutive years without attracting any funding interest neither from inside nor outside SADC

In addition, the new environment created in the Southern Africa Region with the establishment of a democratic Government in South Africa makes the objectives of the project outdated and consequently difficult to foresee any financial assistance for its implementation.

Therefore, in their last meeting held in Lusaka 23 June 1994, the Committee of Energy Ministers approved the withdrawal of the project

**Project NAM.1 2: Prefeasibility Study For Strategic Petroleum Storage Facilities in Namibia**

The objectives of this project is to study and compare the technical feasibility, location, capacity and economic viability of constructing a new national strategic petroleum product storage facility in Namibia

This project has been in the Energy Sector's Project Portfolio more than two consecutive years without attracting any funding interest neither from inside nor outside SADC

In addition, the new environment created in the Southern Africa Region with the establishment of a democratic Government in South Africa makes the objectives of the project outdated and consequently difficult to foresee any financial assistance for its implementation

Therefore, in their last meeting held in Lusaka 23 June 1994, the Energy Ministers Committee approved the withdrawal of the project

**Project SWA 1.1: Strategic Storage Facilities in Swaziland**

The objective of this study is to design a project, including costings, and establish in Swaziland, a Strategic Storage Facility for Fuel for at least four months' consumption Phase I which started in March, 1990 is completed, and the final report has been approved by the Swaziland Government The T O R's for Phase II (feasibility study) have been reformulated jointly by the Swaziland government representatives and TAU, and has subsequently been approved

This project has been in the Energy Sector's Project Portfolio more than two consecutive years without attracting any funding interest neither from inside nor outside SADC

In addition, the new environment created in the Southern Africa Region with the establishment of a democratic Government in South Africa makes the objectives of the project outdated and consequently difficult to foresee any financial assistance for its implementation

Therefore, in their last meeting held in Lusaka 23 June 1994, the Committee of Energy Ministers approved the withdrawal of the project

**Project TAN.1.1: Rehabilitation of the TAZAMA Pipeline Phase III**

The objective of the project is to rehabilitate the entire pipeline system and improve/repair supporting facilities such as corrosion protection, mechanical, electrical, telecommunication and the tank farm

Phase I and II were completed in 1988 and 1990 respectively. Phase III involves pipeline replacement including pipeline spares and equipment, cathodic protection works, telecommunication rehabilitation. A loan of US\$15.75 million was secured from the ADB in January, 1991, and the project is under implementation. Completion is expected in 1994.

**Project TAN.1.3: Biostratigraphic Reference Collection for the SADC Region**

The objective of this project is greater utilization of existing biostratigraphical and geological data from the SADC countries, together with additional studies of geological samples, to achieve a general biozonation and correlation for the entire region. The first phase of the project has been completed. A meeting took place in Dar es Salaam in November, 1990 where geoscientists from the region reviewed the programme and recommended further steps to proceed with the second phase. The SADC/TAU has drafted a service agreement with TPDC to implement the second phase, for which funds have been secured. The draft contract was reviewed and accepted by TPDC during 4th Quarter of 1992. The project is under implementation. A meeting to review the results is planned for later this year.

4.3 **COAL**

**Project AAA.2.3: Manpower Development and Training for the Coal Sub-Sector**

The objective of this project is to carry out a training needs survey to provide a basis for planning a manpower development and training programme for the coal sub-sector.

The cost of the project is estimated at US\$0.11 million. Funding is being sought.

**Project BOT.2.2: Coal Distribution Yard and Coal Information, Botswana**

The main objective of the project is to promote the use of coal by community services and households, and to gain experience in distribution and marketing of coal. It is hoped that the experience gained during implementation, can be applied in other member States.

The project costing US\$0 81 million has been funded bilaterally as part of the German (FRG) Technical Assistance to Botswana and has been completed

**Project ZAM.2.1: Investigation of Coal Briquetting (Zambia)**

The objective of this project is to investigate the technical and economic feasibility of setting up and operating a coal briquetting plant fed with washed fine coal. The coal briquets so produced would be used as an alternative to woodfuel and charcoal. Studies funded by Japan and FRG have been completed. The Pilot project has been completed, but commercial production has not been initiated, due to high costs for rural people.

**Project ZIM.2.1: Coal Stoves for use in Rural and Urban Areas**

The objective of the project is to establish the technical economic and environmental feasibility of introducing coal stoves for low income households and assess the user's acceptance of the stoves and gain experiences

The project is financed by the Zimbabwe Government and is completed

4 4 **ELECTRICITY**

**Project AAA.3.1: Regional Rural Electrification Programme - Phase I**

The objective of Phase I of the project, financed by Canada to the tune of US\$0 18 million, is to identify the institutional and socio-economic setting and framework for Rural Electrification in member States, including energy resources and electricity systems, current technical experiences in rural electrification, training facilities, expert personnel and case studies of specific projects

Phase I has now been completed. In June, 1993 Energy Ministers approved the reformulation of the project which has not been done yet

**Project AAA.3.2: Specialised Training in the Field of Electric Power**

The objective of this project is to identify training needs for electricity utilities' personnel and formulate a training programme taking into account the existing facilities in the region. The objectives of Phase III is to implement the training programme defined during Phase II

Phases I and II were successfully completed, leading to a recommended list of courses to be undertaken, and approved by the Energy Ministers as the FIVE YEAR REGIONAL POWER SECTOR TRAINING PROGRAMME. Phase III was initiated in 1992

through undertaking the necessary steps to implement the recommendations from the Lusaka Workshop held in March 1992, namely to issue a call for proposals to deliver 33 formal training courses, to evaluate the bids and to select the best institution for each course. The Final Report was issued in June, 1993 with the final list of selected institutions.

KGRTC is sponsoring five courses, namely Generation Maintenance Management Systems, Dam Safety Monitoring, Instrumentation and Control, Production Planning and Water Management, and Training of Trainers.

CIDA and ODA were expected to finance four and five courses respectively. The prospect of having South Africa as a new SADC member State has refrained them of funding those courses for the time being. Consequently the remaining 28 courses are still available for funding.

#### **Project AAA.3.4: Regional Hydroelectric Hydrological Assistance Programme**

The objective of the project is to improve availability, accessibility and quality of hydrological data within the SADC region, for hydroelectric, agricultural, fisheries, forestry and environmental development, etc.

Phase I of the project was completed in April 1991, funded by CIDA and ICE (Portugal). Part I of the Phase II started late 1991, but funds have been secured only from CIDA. TAU is making efforts to have Portugal again co-finance this project. The 6th Project Steering Committee took place in May, 1994 in Harare. The extension of Phase II - Part I was approved and its budget is now approximately CND 3 million.

#### **Project AAA.3.5: Plan for Integrated Utilization of the Cunene River Basin**

The objective of the project is to develop a master plan to utilize the Cunene River Basin's water resources fully.

Laboratoria Nacional de Engenharia Civil (Portugal) has been selected as the consultant and Hidroportos as the supervising company. The implementing agency is "Cabinete da Bacia Hidrografica do Rio Cunene" (GABIC). With funds allocated by the governments of Angola and Portugal, two major activities are being carried out:

- To strengthen the institutional capacity of the implementing Agency
- To perform some feasibility studies on the basin

When the project was approved Namibia was not a member State Efforts are now in place in order to amend the MOU and integrate Namibia as a full member of the Project

The first Project Steering Committee was held in Lisbon in May, 1994 The Inception Report was approved A database will be created soon after all the relevant data is gathered

**Project AAA.3.6: Power Systems Control and Operation Technical Support and Training**

The objective of the project is to train personnel who work with computerised control equipment, establish a permanent store of spare parts for quick replacement of faulty equipment, and regular maintenance routines for communication equipment The project has been completed

**Project AAA.3.7: Computer Model for Analysis and Planning of SADC Transmission Systems, Phase II - SADC Power Grid Model**

The objective of this project is to develop models to analyse electricity transmission systems at a regional level, in three separate stages preliminary study, development of a computer model for analysing the grid, and implementation of the model A technical mission, which involved a regional expert, visited five member States to assess the situation in those countries Questionnaires were sent to the other member States not visited Phase I of the project has been completed in late 1990

The PSS/E model was recommended to be used by SADC Power Utilities Financing of Phase II is being considered by NORAD Phase I has been completed in 1990 The PSS/E model was recommended to be used by SADC Power Utilities Financing of Phase II has been reconsidered by NORAD Funding for Phase II is expected to be allocated soon

At a meeting held in Harare in June, 1994 the Terms of Reference of the project were refined as a compromise of having a mixed team composed of external consultants and an active participation of all utilities was agreed A maximum degree of training and provision of hardware and software is envisaged The PSS/E package has been approved to be used by all the SADC power utilities, including SNEL of Zaire The project will be implemented over a period of six months, starting any time in 1994

**Project AAA.3.8: Coordinated Utilisation of Regional Generation and Transmission Capacities - Prefeasibility Study**

The aim of this project is to assess the scope for coordinated utilisation of the total regional power generation capacity, taking into account the need for

reserve capacity, reliability, etc. The study will ascertain current installed capacity against demand into the future, examine power tariff and pricing policies and structures, and their possible impact on regional trade in electricity, and recommend accordingly. Phase I was finalised in 1991.

A PSC meeting in Gaborone in February, 1993 approved the completion of Phase II. The final report clearly states the benefits of regional power cooperation. The study indicates that optimum use of regional resources and installations may provide total savings of approximately US\$ 1.6 billion (current values) compared to a development based on individual transmission and generation expansion plans for each country. A particular 'Drought Scenario' was developed to investigate the possible impacts of a continued negative hydrological trend, and the study suggests that additional thermal support in the region may be necessary in addition to a strengthening of inter-ties with non-SADC countries. The final phase (III) will deal with institutional arrangements for power exchange and pricing policies, and was approved by the Energy Ministers' in June, 1993.

With the constitution of the "Southern African Power Pool" a great deal of Phase III will be considered as completed. The finalisation of the project will in addition involve the preparations for an Implementing Phase, i.e. assessment and identification of necessary actions, investments and funding requirements to make the Power Pool operable, including a comprehensive study of telecommunication requirements, assessment of control equipment and human resources requirements.

#### **Project AAA.3.9: Power Station Maintenance Programme**

The project, which is a follow up to Project AAA.3.3 Maintenance of Mechanical Equipment in the SADC Power Stations (completed), seeks to increase the reliability of power plants in the SADC member States. The project has been suspended for reformulation in 1992.

#### **Project AAA.3.10: Kafue Gorge Regional Training Centre Continued Operation and Expansion**

The objective of the project is to continue providing specialized training for hydropower personnel from the SADC countries.

Funds are secured through ZESCO and NORAD/SIDA for an extension period of three years 1993/95. After 1995 the Centre is expected to be self-sustained. A sub-committee of representatives from SADC member countries was formed at the recent Reference Group meeting, and met in June, 1993 to

- (a) work out modalities of funding KGRTC by the SADC,
- (b) work out a staffing structure for the Centre,
- (c) compile a document on (a) and (b) to send to TAU and member States

The project Monitoring Committee has an expanded role, including NORAD with an observer status. A Budget Meeting composed by TAU, NORAD, ZESCO (Chairman), and the Ministry of Energy and Water Development (Zambia) has been constituted. The Project Manager, KGRTC is the Secretary SIDA and the consultants are observers.

For all basic, advanced, high level and AAA 3 2 courses offered at KGRTC there is general satisfaction with the standards offered. The Budget meeting approved the budget for 1994/95. The sustainability of the Project after the termination of the contract is the issue being discussed now. ZESCO is heavily sponsoring many activities.

#### **Project AAA.3.11: Lightning Research**

The objective of this project is to carry out research related to lightning phenomena, with regards to protection of power equipment, etc. The project was not presented at the 1993 ACC, due to incomplete project documentation.

#### **Project ANG.3.2: Interconnection of the Northern, Central and Southern Grids in Angola and Possible Extension to Namibia**

The aim of the project is to study the technical and economic feasibility of interconnecting the three main electricity grids in Angola, as well as consider possible interconnection with Namibia.

The feasibility study was carried out by THEMAG. A 220 KV line from Gabela to Quileva to link the North and Central systems, and a 150 KV line from Lomaum to Lubango to make the Central to South connection was recommended. The extension to Namibia, involving a 150 KV line from Matala, was included in the Terms of Reference, and the Namibian Power Utility, SWAWEK, plans to investigate the possibility of constructing the high capacity interconnector system.

The project study is completed. However further studies are bound to be carried out, to include a possible extension to Namibia. However, studies cannot be fulfilled due to the present political situation in Angola. The project has therefore been suspended.

### **Project ANG.3.3. Completion of the Gove Hydroelectric Development - Feasibility Study**

Phase I is a study on the generation and transmission facilities in the central system with emphasis on Gove Phase II comprises engineering, tendering and work supervision The study has been completed in 1990

Shawinigan/Lavalin International has just completed the revision and upgrading of THEMAG's report and has recommended a scheme with an installed capability of 40 MW Unfortunately the Gove Dam was damaged during the war Therefore, the Ministers of Energy, at their meeting in June, 1990, approved an emergency Project ANG 3 6. Repair of Gove Dam The project has been suspended, due to the political situation in Angola

### **Project ANG.3.4. Communication and Information System for the Angolan National Power Grid-Phase I**

The project seeks to improve communications in the Angolan power system in order to prepare for possible connection to neighbouring countries

In March, 1990, a team from Norway visited Luanda to discuss the project with TAU and Angolan utilities and authorities The consultants, EB NERA sponsored by NORAD prepared a report which demonstrated the feasibility of the project NORAD agreed to finance the implementation of Phases I and II at the same time, for the northern system at the cost of US\$1 95 million The estimated cost for all the Angolan Systems is US\$5 5 million

The Power Line Carrier, was installed in Luanda, Cambambe, dalatando, and Cacuso and Malanje (Northern System) Studies for Central and Southern Systems were already being carried out However, the war situation has prevented its conclusion

### **Project ANG.3.6: Repair of Gove Dam**

The Gove Dam was sabotaged in February 1990 The objective of this project is to restore the Dam to pre-sabotage level, in order to regulate the flow of the Cunene River, so that downstream hydropower facilities can operate properly To avoid more extensive damage a number of actions have been carried out, being all costs, so far, supported by the Angolan Government The Angolan Government approached NORAD and a team from Norway visited the site in January, 1991 Further in depth investigations will be carried out and NORAD is ready to finance part of the costs However, due to the war situation no work can be carried out on the side The project, is therefore suspended

**Project BOT.3.1: Interconnection of the Botswana and Zimbabwe Grids**

The objective of the project is to promote the rational utilisation of regional electricity resources in order to reduce dependence on imports from outside the region

The tariff on surplus energy was made retroactively effective from 1 November, 1991 while the firm power agreement will be effective from 1 January, 1994. The agreement is however, still conditioned on a proper solution of the parallel operation problem relating to operating the interconnected SADC system in parallel with the ESKOM system of South Africa. CIDA is financing the work.

Deficiencies in the PLC system have been detected very recently by ZESA. Recommendations have been forwarded to the constructors. The operationality of the tie-line control to supervise the power flow on the new interconnector has been discussed taking into account the following courses of action:

1. Determination of the chief deficiencies of the PLC system and their immediate rectifications
2. Finding of an alternative type of data link
3. Abandon tie-line control

Negotiations between the constructors and IOPC members are taking place in order to solve the obstacles. The project is expected to be completed in 1994.

**Project BOT.3.2: Power Supply to Northern Botswana**

The objective of the project is to promote the rational utilization of regional energy resources in order to reduce dependence on imported electricity from outside SADC countries.

The project has been completed and was commissioned in January 1988.

**Project BOT.3.4: Second 220 KV Line from Morupule to Gaborone**

The objective of this project is to reduce Botswana's dependence on power supply from South Africa by improving reliability of supply to the southern part of the country by providing a second line, which in turn will raise the transmission capacity to the expected levels by 1991.

Ministers of Energy, at their meeting in June 1990, decided to defer implementation of this project until the line is required for firm power supply in 1996/97. However, due to new developments, Energy Ministers at their meeting held in Lusaka, in June 1994 approved the reactivation of the project.

**Project LES.3.2: Transmission Network Development in Lesotho Phase III**

The objective of the project is to ensure a reliable power supply of power to the rural areas of Lesotho, and hence contribute towards lessening dependence on fossil fuels, and imports from outside the region.

Phases I and II were completed in late 1987. The project was reformulated in 1991. Funding is secured in phases by BITS (Sweden) and Norad.

**Project LES.3.5: Outing Small Hydropower Project - Lesotho**

The objectives of the project are

- \* Reduce dependency on external power supplies ,
- \* Promote economic development in the southern parts of the country,
- \* Improve the reliability and availability of electricity throughout the country

The T O R's were reformulated in 1991, to include geo-technical investigations. These new terms of reference were presented to the Energy Ministers, in June, 1991 and approved.

The project has been presented at the Annual Consultative Conferences in 1992, 1993 and 1994 without attracting any funding neither inside nor outside SADC. Therefore at their meeting held in Lusaka, June 1994 the Energy Ministers approved the withdrawal of the project from the Sector's portfolio, in accordance with SADC guidelines.

**Project LES.3.6: Muela Hydropower Project - Lesotho**

The objectives of this project are to reduce Lesotho's dependence on external sources for energy, and to improve the reliability and availability of electricity supply.

The project entails the construction of a hydropower complex, with a power output of 72 MW.

This project, which is part of the Lesotho Highlands Water Project (LHWP), will promote general development of the remote Highlands region, by providing electricity, potable water and water for irrigation. Economic analyses have shown that this project can generate the highest internal rate of return among possible electricity generation projects in Lesotho. Funds have been secured, and the project is under implementation.

**Project LES.3.7: Letseng Mines and Mokhotlong Supply (Feasibility Study)**

The objective of the project is to investigate the feasibility of supplying Letseng Mines and Mokhotlong town with electrical energy from a proposed mini-hydro plant.

To secure future power supply to the town of Mokhotlong and to connect the Letseng Mines to the national grid, to substitute the present supply from RSA.

The project has been split into two Phases: Phase I - Letseng Supply and Phase II - Mokhotlong Supply.

An Economic Appraisal was carried out by TAU in November, 1992. The report concludes that the Project is financially and economically viable. Phase I has been recommended for implementation without delay.

However, funding for the implementation phase has not been obtained for two years. Therefore the Energy Ministers at their meeting held in Lusaka, June 1994 approved the withdrawal of the project.

**Project MAL.3.1: Malawi/Mozambique Electricity Supply in the Eastern and Western Border Regions**

The objective of the project is to supply electricity from the Malawi grid to three villages in Mozambique, located near the eastern and western border with Malawi, and far from the national grid in Mozambique.

Phase I which was funded by Norway has been completed. Phase II of the project comprises rehabilitation of Caia substation, 153 km of 66 KV lines, three 66/33 KV substations, 50 distribution sub-stations and 50 km low voltage lines, in western Mozambique. Phase II has been reformulated and now comprises 350 km of 33 KV overhead transmission line, 40 distribution sub-stations, 40 km low voltage network and one 66 KV substation. The cost of Phase II of the project is estimated at US\$8 46 million.

Phase II, reformulated in 1990, has been presented at the Annual Consultative Conference in 1991, 1992 and 1993. The present funding status is still nil and efforts to secure funds, have been not successful. Therefore, the Energy Ministers at their meeting held in Lusaka, June 1994 approved the withdrawal of the project in accordance with SADC guidelines

**Project MAL.3.2: Small Hydropower Plants in Malawi**

The objective of this project is to reduce diesel imports, provide cheaper energy for rural centres and increase local self-sufficiency. Funding has been secured on a bilateral basis

**Project MAL.3.3: Rehabilitation and Expansion of Power Network Communication**

The objective of this project is to improve the power network operation by providing reliable transmission circuits for speech, data collection and control, to enable fast restoration of power supply during disturbed conditions, increase switching capacity of subscriber circuits and isolate faulty lines rapidly to enhance safety for power plants and personnel. This is hoped to improve efficiency on the grid interconnection work between Malawi and Mozambique

Funding (US\$2.28 million) was secured from Norway (50% grant and 50% in soft loan). Project implementation has started, and was completed in June 1992. The remaining line on the network was taken over in mid-June 1993. The project has been completed

**Project MAL.3.4: Limbe Reinforcement**

The objective of the project was to prevent disruption of electricity supplies in the Limbe area by upgrading cables laid in the 1960s to improve voltage stability, providing an extra transmission line and by constructing a second 33/11 KV substation to improve supply security

Funding was secured from the European Investment Bank (EIB), on a bilateral basis, and the project was completed in October 1992.

**Project MAL.3.5: Supply to Chitipa and Karonga in Malawi from Mbeya in Tanzania**

The project seeks to provide a cheaper source of electricity to consumers in Karonga and Chitipa, reduce Malawi foreign exchange drain due to imports of diesel fuel, and provide a more reliable source of electricity

Project activities include the construction of 267 km 33 KV overhead lines, one substation at Ibada, two substations at Chitipa and Karonga and two distribution substations at Kuela and Chilumba. The draft Agreement on cross border power inter-change between TANESCO and ESCOM has been prepared and sent to the Belgium Government for comments. There is no reply up till now. Funding is being sought.

**Project MAL.3.6: Malawi/Zambia Power Cooperation in the Border Region**

The objective of the project is to provide electricity supply as an alternative source of energy to the rural areas on both sides of the Malawi-Zambia border. ZESCO and ESCOM were due to meet in July, 1993 to agree on the tariff before funding can be sought. The project will take 24 months to be implemented. ZESCO and ESCOM are discussing at moment to finalise the Tariff Agreement. The project will take 24 months to be implemented after financing is secured. The African Development Fund (ADF) has shown interest to fund the project.

**Project MOZ.3.1: Mozambique/Zimbabwe Cooperation in Electricity Supply**

This project seeks to increase cooperation in the electricity sector between the Mutare region in Zimbabwe, and Manica province in Mozambique, by up-grading existing transmission lines and substations. Phase I of the project will increase the capacity of the Mutare substation from 15 MW to 40 MW. Funding (US\$0 7 million) for Phase I was secured from Norway. Phase I of this project has been completed.

Phase 2 comprises a feasibility study on a new transmission line (100 MW) between the two countries, which has been completed, and the report issued in April, 1987. A revised summary of the final report on project MOZ 3 1/MOZ 3.8 was issued in December, 1990. An agreement on tariffs already exists. This project is now entitled Xigadora-Orange Grave 220 KV Interconnector. However, the funding for the project has not been successful for some time. Hence the Energy Ministers at their meeting held in June 1994, in Lusaka, Zambia, approved the withdrawal of the project in accordance with SADC guidelines.

**Project MOZ.3.2: Master Plan for the Electricity Supply for Swaziland and Mozambique**

The objectives of the project is to develop a master plan for the power supply to Swaziland and Southern Mozambique.

The project was suspended until the DC link providing Mozambique with power from Cahora Bassa (through RSA) is restored. However, as a result of the new political situation in Mozambique, the Energy Ministers at their meeting held in Lusaka, in June 1994 approved the reactivation of the project.

#### **Project MOZ.3.3: Corumana Hydropower Scheme**

The project's objective is to reduce the dependence of the southern part of Mozambique on South Africa for electricity supply. In addition, the reserve generation capacity will improve the system's security.

Construction works are proceeding well, in spite of some security problems. The project, which is funded by Norway (US\$7.4 million) and Sweden (US\$13.09 million) has been completed. However, the final report is still being awaited.

#### **Project MOZ.3.5: Mozambique - Malawi Interconnection of Electricity Supplies**

This project consists of a study of the feasibility of constructing a transmission line which would carry power generated at Cahora Bassa to Malawi, and to the northern part of Mozambique.

The feasibility report was issued in 1987, and has been evaluated by the two countries. Meanwhile the project has been suspended for reformulation, due to incomplete tariff negotiations. No reformulation has been received so far. However, following improvements in the security situation in Mozambique, the parties involved (EDM and ESCOM), have established a Project Steering Committee and discussions on tariff issues are going on with the aim to finish it shortly in order to be taken for consideration by potential funding institutions.

Equipment for installation of 132/110 KV transformer and 110 KV feeder bay is on site.

In view of the findings of project AAA 3.8, Mozambique and Malawi have agreed to conduct another study to compare the use of a higher voltage of 220 kV and 132 kV (interconnecting Songo in Mozambique to Blantyre West or Kapichira in Malawi) which was proposed for the project. The study will also consider supplying the north-western part of Mozambique in addition to Malawi. Mozambique has approached the Government of Australia to finance the study and subsequent project.

Mozambique have approached the Australian Government to finance the study and subsequent project. ESCOM has expressed interest in the study.

**Project MOZ.3.7: Reconstruction of Mavuzi Hydropower Station - Implementation**

This project involves the reconstruction and rehabilitation of the Mavuzi Power Station which was damaged during the Zimbabwe liberation struggle. The power station is an important energy source for projects in the Beira Corridor, including the port of Beira itself. The project also offers an opportunity for increased cooperation in the power sector, between Mozambique and Zimbabwe.

Caisse Centrale and Indo-Suez Bank (France), and Banco de Mozambique agreed to finance the project, and construction started at the beginning of 1989. The project is estimated to cost US\$8 million of which US\$6 million is from France, and US\$2 million from Mozambique. The implementation of the project was delayed due to the security situation in Mozambique, but was reactivated in 1992 and is now in progress.

**Project MOZ.3.10: Power Cooperation in Mozambique/Zimbabwe Border Areas**

The objectives are to supply the border region areas with electricity, Cashel in Zimbabwe, and Catandica in Mozambique. Both areas are at present depending on expensive diesel electricity generation.

The project involves the construction of 42 km of 35 KV overhead line from Mavita to Cashel, and the local distribution network, and 76 km of 33 KV overhead line from Ruwangwe to Catandica and local distribution network development. The project has been suspended until EDM and ZEZA prepare a reformulated project description. No reformulations has been recovered so far. Funding of the project is pending completion of tariff agreements between ZESA and EDM.

Energy Ministers at their meeting held in Lusaka, in June 1994, approved the withdrawal of the project in accordance with SADC guidelines.

**Project MOZ.3.11: Mozambique Central Region Transmission and Distribution Network Study**

The objective of the project is to prepare an investment programme for rehabilitation of the existing distribution network in the Beira Corridor, as well as further expansion beyond the Corridor, new connections to consumers, training of EDM's staff, and technical assistance. The project is about to be implemented with assistance from France, as part of the integrated power development in the Beira Corridor Region.

Funding for this project is being sought for four years without any success. The Energy Ministers at their meeting held in Lusaka, June 1994, approved the withdrawal of the project in accordance with SADC guidelines.

**Project MOZ.3.12: Cahora Bassa Power for SADC - Phase II**

The objective of this project is to investigate the feasibility of interconnecting the Cahora Bassa power station to the main transmission grid in Zimbabwe, thus allowing export to Botswana, Zambia and Zimbabwe.

The pre-feasibility and feasibility studies were completed at a cost of US\$0.25 million.

Funding for Phase III (implementation) is secured. The tendering process has been initiated.

**Project MOZ.3.13: Control Centre for the Supply of the Beira Corridor and Mozambique-Zimbabwe tie-line.**

The objective of the project is to up-grade the power control centre in the EDM central Region to take account of planned national and regional power system improvement in the provinces of Manica and Sofala, and adjacent areas in Zimbabwe.

Funding has been secured.

**Project NAM.3.1: Power Supply Cooperation in Border Regions Between Angola and Namibia**

The objective of the project is to provide supply of electricity to the border areas of Namibia and Angola.

Funding at the Namibian side has been secured through bilateral arrangements, and this part of the project is completed. At the Angolan side, however, the last years' war actions have damaged vital parts of the infrastructure at the area of interest. In addition, the security situation prevents any proceeding of the construction works. On this basis, the Ministers of Energy had suspended the project until the situation within Angola allows reconsideration of the project.

**Project SWA.3.1: DREDGING of Mkinkomo Reservoir**

The objective of the project is to reduce dependence of Swaziland on South Africa electricity supply, by dredging the Mkinkomo reservoir which will increase the power production in Swaziland. The Netherlands Government has offered to soft finance the project, based on an estimated volume of dredging at alternatively 1.5 or 2.6 million cubic metres. Swaziland has, however, decided to finance as maintenance from own resources, a reduced scale of dredging at 0.3 million cubic metres per year.

The project commenced in March 1993 and is going on very well. About 300,000 cubic meters of slimes have already been dredged and about E1 8 million has been spent so far. Estimated cost of the project is E5 million. The project will take 3 years to complete and is being fully financed by Swaziland Electricity Board (SEB).

**Project TAN.3.4: Songwe River Hydropower Development (Reconnaissance Study)**

The project seeks to investigate the potential for hydropower development of the Songwe River, in order to provide the basis for future power systems planning in Malawi and Tanzania.

The Energy Ministers meeting in June 1992 recommended that Tanzania should reformulate the TOR for this project and present it to TAU by December, 1992. A reformulation has been received, but due to incomplete project documentation the project has been suspended for reformulation pending further consultations between Malawi and Tanzania. In November 1993, a summary of a project description was presented by TANESCO who will meet the project's local costs.

**Project TAN.3.5: Power Supply to Tunduma and Mbozi in Tanzania from Nakonde in Zambia**

The objective of the project is to improve power supplies to Tunduma and Mbozi in Southwest Tanzania, by constructing some 45 km 11/33 KV overhead line to transmit power from Nakonde, in Zambia. Funding (US\$1 80 million) has been secured from Norway. The project has been completed.

**Project TAN.3.6: Supply of Sumbawanga in Tanzania**

The project seeks to determine the preferred least cost scheme to supply Sumbawanga in Tanzania, with power.

The first phase is a load flow and cost estimate study, to decide on the best of the following alternatives:

- (a) small hydropower development,
- (b) extension of the Tanzanian grid from Mbeya, and,
- (c) supply from the Zambian grid in Mbala.

Funding (US\$0 14 million) has been secured from Norway, and the study has been completed in October 1992, and the supply from Zambia was found to be feasible. The implementation was approved in 1993 as Phase II of the project. Funding is being sought.

### **Project ZAM.3.2: Upgrading of Kafue Gorge Power Plant**

The objectives of the project are to maintain the equipment, give key personnel at Kafue Gorge Power Station the opportunity to acquire knowledge and skills relevant to the requirements and problems they face in their jobs, and continue safe delivery of energy to other SADC member States

The work on the ventilation system is completed. The control system is under manufacture and should be completed in the last quarter of 1993. In addition to the phase IV work the other outstanding works are supply and installation of 11 kV and 0.4 kV switchgear, 11/0.4 transformers, control cables, auxiliary power cables and lighting in the shaft. The common electrical works were due for completion in the second quarter of 1992 while the lift is under manufacture and installation should have been completed in the first quarter of 1994. In spite of the draught problems the plant is operating at 100%. The full installed capacity, 900 MW have been exploited.

### **Project ZAM.3.3 Rehabilitation of the National Control Centre (Phase II)**

The project seeks to provide the national power company with modern equipment which will enable more efficient and economic operation of the electric system, and to maintain stable conditions on the 330 KV system in Zambia and consequently assist in maintaining stable conditions in Zimbabwe and Zaire.

The preliminary project design report was completed in February, 1991. Tender from one Swedish company was opened on 5th May, 1993. The Project is scheduled to be completed in 27 months after contract award.

### **Project ZAM.3.5: PLC Communications on the Northern Transmission System**

The objectives of the project is to install a communication system on the north eastern 66 kV network.

The project was suspended in June, 1990. Elements of this project are being implemented under projects TAN 3.5/3.6. The project was reformulated in 1993 and it is desired that the project is carried forward to the envisaged interconnections between Zambia and Tanzania.

### **Project ZAM.3.6: Refurbishment of Victoria Falls Power Station - Phase I and II**

The project originally sought to rehabilitate the station's machines, and improve reliability and security of the local 66 KV feeder. In December, 1990 TAU and ZESCO finalized the detailed and reformulated TOR's, which was presented at

the 1991 ACC, in Windhoek. However there have been delays in awarding the contract. Current position is that the consultancy for the Engineering study is being re-tendered. Fresh tenders were due to be opened on 26th May, 1993. The European Investment Bank will still finance the project. Therefore, funding is secured.

**Project ZAM.3.7: 132 KV Tieline Zambia - Malawi: Feasibility Study**

The objective of the study is to establish the economic and technical feasibility of an electricity supply interconnection between the national grids of the two countries, in order to improve power supplies to Malawi. This project involves load flow and stability analysis, assessment of up-grading the Pensulo-Lusiwasi line, along with basic design and cost estimates, evaluation of various benefits of inter-connection, assessment of impact on operation in both systems, development of principles for agreement and tariffs, and analysis of reserve connection Chama-Mzuzu.

Norway financed the study, which has been completed.

The final report on the feasibility study was issued in May, 1993. The interconnection was found to be feasible, and an agreement between ZESCO and ESCOM should be negotiated followed by an implementation phase of the project.

As soon as the agreement is signed, seek financing for the project and embark on project design.

ZESCO and ESCOM have started tariff negotiations at a meeting in Lusaka on 26th and 27th July 1993 and general tariff principles were agreed. ZESCO is working out the tariff structure for further negotiations.

The feasibility report prepared by Tron Horn Consulting Engineers recommends a 132 kV tie between Pensulo (Zambia) and Lilongwe (Malawi). ESCOM's view is that investigations be carried for a 220 kV or higher voltage tie. Depending on load flow calculations and stability analysis, the line could be energised at 132 kV at the initial stage. However, the inter-connection should be planned and constructed for 220 kV operation, as at 132 kV only about 35 MW could be transmitted to Malawi, with the supply being over 400 km from the load centre. Reliability of supply would therefore be low. ESKOM of South Africa proposed to carry out this study, having suggested a 220 kV corridor within Malawi, between Lilongwe and Blantyre west (or Kafichira).

**Project ZAM.3.8: 330/220 KV Tieline Zambia/Tanzania: Feasibility Study**

The objective of the study is to establish the economic and technical feasibility of an electricity supply interconnection between the national grids of the two countries in order to improve electricity supplies to Tanzania

Norway financed the study which has now been completed. The study recommended that interconnection is feasible. Up to 100 MW can be transmitted from Zambia to Tanzania. The final pre-feasibility report was issued in June 1993. It is recommended to bring the studies up to feasibility level.

#### **Project ZAM.3.9: Power Cooperation Between Zambia and Namibia**

The objective of the project is to provide hydroelectric power to enhance development of the great agricultural potential of Northern Namibia and generally improve the reliability and increase the capacity of power supply to the region which comprises Botswana, Namibia and Zambia.

TAU has executed an evaluation study. Efforts are being made to secure financing from ADB, who has shown interest. No comments on the Appraisal Report have been received so far. Currently SWAWEK is waiting for a Feasibility Study on the Load Potential in Northern Namibia before the financing process of the Project can be started.

#### **Project ZIM.3.13: Upgrading of the ZESA National Control Centre in Harare**

The objective of this project is to enhance the monitoring and control of power exchange in the interconnected grids of Botswana, Mozambique, Zambia and Zimbabwe, by the installation of computer based supervisory, monitoring and control equipment at the National Control Centre in Harare.

Since there was no news from SIDA, the former ICP who pledged interest in the Project, ZESA has managed to secure a loan from BITS. The Project is now progressing well. The expected commissioning date is May, 1994.

ZESA has requested extension of the project to adapt to the new situation related to the Power Pool arrangement. As the issue is related to upgrading of the telecommunication system TAU has proposed that the issue will be dealt with under Phase III of AAA 3 8.

### **4.5 NEW AND RENEWABLE SOURCES OF ENERGY**

#### **Project AAA.4.7: Assessment of Applications and Markets for Photovoltaic Systems in the SADC Region - Phase I**

The objective of this pre-investment study is to develop a framework for identification and market assessment of

viable applications of photovoltaic (PV) technology for the SADC region

The project cost is estimated at US\$0 19 million Funding was provided by CIDA and the project is completed

**Project AAA.4.8: Assessment of Applications and Markets for Wind Energy Systems in the SADC Region**

The main objective of this study is to assess the technical and economic viability of wind energy applications and to determine the potential market size and financing for the most viable wind energy applications in the SADC countries

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC) Therefore, in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project

**Project AAA.4.9: Assessment of Applications and Markets for Industrial Process Solar heat in the SADC Region**

The main objective of this study is to assess the technical and economic viability of industrial process solar heat (IPSH) applications and to determine the potential market size and financing for the most viable IPSH applications for the SADC countries

Funding amounting to US\$0 22 million, is being sought

**Project AAA.4.10 Assessment of Applications and Markets for Solar Water Heating in the SADC Region**

The objectives of the project are to determine the potential market size for Solar Water Heating (SWH), determine the condition which SWH are economically viable to held Governments of SADC member States establish appropriate policies, research priorities for the use of SWH technology, provide a framework for the financial evaluation of SWH applications, so that financial institutions in SADC can better evaluate loans involving SWH applications, suggest institutions and financial arrangements that can promote economically viable SWH applications Funding is being sought

**Project AAA.4.11 SADC Programme for Financing Energy Services for Small Scale Energy (FINESSE)**

The primary objective of the SADC FINESSE Programme is to develop means for using intermediary organisations (development finance institutions, commercial banks, power utilities, private sector companies, NGOs, etc ) to channel multilateral agency and donor funds more effectively for the provision of renewable energy conservation services to small-scale energy end-users

The Royal Netherlands Government approved to finance the total amount of the project through UNFSTD Discussions with the USA, Japan and Norway are ongoing, to secure an expansion of the project to cover the entire region

**Project ANG.4.1: Installation and Rehabilitation of wind Powered water Pumps**

The objectives of this project are

- (a) to supply potable water to people and livestock in remote areas using wind Pumps, and
- (b) to build local capabilities to carry out repairs maintenance and installation of wind pumps by effectively training local technicians and users

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC) Therefore, in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project

**Project LES.4.2: Solar Photovoltaic Power Generation in Rural Areas -Lesotho Pilot Project**

The objective of this feasibility study is to determine the conditions under which supplying photovoltaic generated electric power would be cost effective compared to other alternatives The project will involve two phases Phase I Feasibility Study and Phase II Implementation

Funding amounting to US\$0 08 million is being sought for Phase I The estimated cost for Phase II is US\$0 25 million The implementation of Phase II is subject to the outcome of Phase I AGCD of Belgium indicated in May 1992 that they are interested in funding the project and would initiate their approval procedures by sending a formulation mission to Lesotho The principal output of the mission shall be a project design report for the solar photovoltaic implementation stage

**Project TAN.4.1: Utilisation of Agricultural and Forestry Residues for Energy Production in the SADC region**

The objective of this project is to determine existing potential of agricultural and forestry residues for energy production; determine socio-economic, cultural and technological factors affecting sustainable residues utilisation of energy reproduction in SADC region reduce dependence on imported fuels and improve standards of living for rural population, and reduce pressure on natural forest reserves through woodfuel substitution

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC) Therefore, in their last meeting held in Lusaka - Zambia, 24th June 1994, Ministers approved the withdrawal of this project

**Project TAN.4.2: Accelerated Biogas Technology Diffusion**

The objective of this project is to introduce and disseminate new technology, 'biogas energy production, develop and promote greater use of biogas energy in institutions and households, reduce dependence on imported fuels, improve living standards of rural populations by developing and promoting use of decentralised energy systems for power generation, lighting and cooking, and reduce woodfuel demand pressure on forest reserves through substitution with other appropriate indigenous energy sources

Funding is being sought (US\$1 11 million)

**Project ZIM.4.1: Feasibility Study on the Utilisation of Solar Water Heating for Reducing Power Utility Demand Costs**

The objective of the project is to investigate possibility of using solar water heating systems to reduce the demand for electric heating in industrial, commercial and domestic installations.

Funding is being sought (US\$0 25 million)

4 6 **WOODFUEL AND OTHER TRADITIONAL FUELS**

**Project AAA.5.7: Support to TAU Woodfuel Section**

The objectives of this project are to

- (a) Strengthen TAU planning and coordination capacity on woodfuel issues
- (b) Enable TAU to provide catalytic support to member States on planning' implementation and evaluation of woodfuel projects
- (c) Funding of a regional woodfuel expert post as part of technical support to TAU
- (d) Collection of woodfuel data in the SADC Region using short term consultancy.
- (e) Provision of essential working tools like a micro printing unit, audiovisual aids, etc

The EC has approved funding of the project costing US\$.0 58 million for a period of three years beginning August 1990 - 1993 TAU is intending to seek further extension of the

project for 3 years (August 1993 - July 1995) A funding proposal has been submitted to EC for consideration under Lome IV

**Project AAA.5.8 Development of National Woodfuel Strategies and Plans**

The objectives of the project are to

- \* develop comprehensive woodfuel strategies and implementation plans for each member States,
- \* develop projects for energy production integrated with other sectors dealing with biomass management and rural development,
- \* provide data to assess national capabilities for the implementation of woodfuel programmes, and means of increasing such capabilities through institutional strengthening

The first phase of the project was implemented by a NORAD grant of US\$0 86 million which was used for developing detailed implementation terms of reference for two pilot projects in Lesotho and Tanzania for Phase 2 The estimated total cost for implementing the Lesotho and the Tanzania components is US\$0 545 million for which funding is being negotiated with NORAD

Lesotho has prepared the project proposal for review The agreement between the two countries (Lesotho and Norway) is expected to be signed in August, when all the issues have been taken into account

Tanzania and Norway have discussed the proposal in Dar-es-Salaam and the draft agreement has been submitted to Norway for comments Tanzania is waiting for the comments from Norway

**Project AAA.5.9: Identification and Support of Non-Governmental Organizations and Women's Groups Dealing with Woodfuel**

The objectives of the project are to

- (a) identify active NGOs and women's groups dealing with woodfuel programmes in the region,
- (b) analyse NGOs and women's groups experiences in implementing woodfuel projects, in particular those based on people's participation at grassroots level, and

- (c) explore possibilities of intensifying NGOs and women's groups involvement in woodfuel programmes, by providing them with catalytic support like training, project planning, provision of equipment and funds, etc

Funding is being sought

**Project AAA.5.10: Identification of Suitable Tree Species for Energy Production in the SADC Region**

The objectives of the project are to

- (a) provide comprehensive data on suitable multipurpose tree species for energy production for the different climatic and edaphic zones of the region,
- (b) provide data on how to obtain seeds of the recommended species, and
- (c) facilitate exchange of research findings and knowledge of suitable species for energy production

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC) Therefore, in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project

**Project AAA.5.11: Assessment of Environmental and Socio-Economic Impact of Woodfuel Scarcity**

The objectives of the project are to provide

- (a) comprehensive site-specific data on environmental and socio-economic problems created by woodfuel scarcity in the SADC region,
- (b) information to be used for increase of public awareness of woodfuel aspects, and
- (c) data for planning future woodfuel projects

During the 1991 ACC the Netherlands indicated interest to support the project In 1993 they provided technical assistance to develop implementation terms of reference for the project

At their meeting of February, 1993, the Woodfuel Specialised Sub-Committee officials recommended a further change in the terms of reference to focus on the theme Sustainable Land Use Management which would cover the narrow aspects of the original project formulation To this effect a consultant was hired to reformulate the terms of reference and a report is expected later in the year

**Project AAA.5.12: Household Woodfuel Consumption Survey in the SADC Region**

The objectives of the project are to

- (a) provide site-specific data on household woodfuel consumption rates within the SADC region, and
- (b) analyse factors which influence rates of woodfuel consumption at household level. The cost of the project is estimated to be US\$0 5 million

An initial amount of US\$0 15 million was secured from the World Bank (ESMAP). The money was used to organize a regional workshop on "Household Energy Survey Applications, which was held in Arusha, April 1991. The workshop provided inputs for further developing the Terms of Reference of the project, which has now been done. US\$2 87 million is being sought to implement Phase II of the project. The total cost of the project (Phases I and II) increased from US\$0 50 million to US\$3 07 million, due to emphasis on training and implementation of actual household surveys, instead of small pilot studies.

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC). Therefore in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project.

**Project AAA.5.13: Development of Fuel Switch Opportunities**

The main objectives of the project are to

- (a) examine critically opportunities for fuel switch from woodfuel to other sources of energy by the majority of the population in urban and a few rural areas in the SADC region,
- (b) examine factors which hinder fuel switch, and give recommendations on how to overcome them, on a short- and long-term basis, and
- (c) establish a few pilot projects on fuel switch, to test the validity of hypotheses advocated by the study

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC). Therefore, in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project.

**Project AAA.5.14: Increase of Public Awareness on Woodfuel Issues**

The objectives of the project are to intensify

- \* people's participation in the production of woodfuel, and adoption of improved techniques of utilising woodfuel, and
- \* the awareness of decision-makers on socio-economic and environmental problems created by woodfuel scarcity, and the need to increase resources for the implementation of woodfuel programmes

The EC has indicated interest to support the project. In December 1991 an EC consultant prepared a financing proposal for the project and submitted it to the EC headquarters. The title changed to "Intensification of People's Participation in Tree Growing and Environmental Protection in the SADC Region" because the main goal is to increase awareness which in its turn will lead to intensification of tree growing and environmental protection. Based on the financing proposal submitted to the EC, the estimated ICP contribution for implementing the project increased from US\$1.80 million to US\$5.05 million. The increase is due to emphasis on actual tree growing in addition to mass awareness. Funding is being sought.

**Project AAA.5.15: Improvement of Woodfuel End-use Efficiency in Rural Industries of the SADC Region**

The main objectives of the project are to

- (a) contribute to sustained supply of woodfuel for rural industries by improving their woodfuel use efficiency,
- (b) minimise environmental degradation being caused by deforestation through clearing of trees and forests to supply woodfuel to rural industries,
- (c) increase public awareness of the socio-economic importance of rural industries, and the need to sustain their energy supply through improvement of woodfuel end-use efficiency, and
- (d) produce country reports, indicating the main rural industries using woodfuel, and possibilities of improving their end-use efficiencies

The project which has received financial support from the Royal Netherlands Government was launched in March, 1993 under the direct management of SADC-TAU. Four countries are involved in research activities. These are Angola and Tanzania where research into woodfuel end-use efficiency improvement in fish smoking industries is being conducted, and Mozambique and Zimbabwe who are covering similar

research activities in the brick making industry A workshop to review technical outputs from the first phase of the project was undertaken in Maputo in November, 1993 A regional methodology for field energy efficiency testing has been developed and being disseminated The results of the field research activities were discussed at the workshop held in Harare-Zimbabwe, from 27 June till 1 July 1994

**Project AAA.5.16: Development of Improved Charcoal Production Techniques**

The main objectives of the project are to

- (a) minimise the wasteful use of wood in charcoal production in the region,
- (b) minimise environmental degradation arising from poor charcoal production techniques,
- (c) increase the income of charcoal producers through adoption of improved production techniques which will increase recovery rates, and
- (d) facilitate exchange of experiences in the improvement of charcoal production techniques in the region

This project has been in the Energy Sector portfolio for more than three years without attracting any interest (neither inside nor outside SADC) Therefore, in their last meeting held in Lusaka - Zambia, 23rd June 1994, Ministers approved the withdrawal of this project

**Project AAA.5.17: Rural Energy Planning and Environmental Training Programme**

The objectives of this project are as follows

- To stimulate and contribute significantly to the human resource development efforts in the SADC region for sustainable rural energy development, utilization and environmental management
- To develop training programme that will eventually contribute to the building of professional competency in the region for effective rural energy planning and environmental management
- To conduct rural energy planning and environmental management courses in the SADC region

The project which has received financial support from the Royal Netherlands Government was launched in March, 1994 ESAMI is under contract with SADC-TAU as the Lead executing Agency The Technology Development Group of Twente University in the Netherlands is under contract with the

Royal Netherlands Government to provide back-up advisory services to ESAMI by way of transferring their know-how in training activities. The Energy Ministers Seminar which was held in Lusaka as a part of the 1994 EO/EM Meeting formed the first major activity to be undertaken under the project.

**Project AAA.5.18 Strengthening the Coverage of Woodfuel and Environmental Protection in Relevant SADC Training Institutions**

The main object of the project is strengthening the coverage of woodfuel and environmental protection issues in relevant training institutions of the SADC region, aiming at

- Slowing down the now rampant problem of environmental degradation being experienced in various forms across the SADC region,
- Increasing awareness and knowledge among the general public about how to improve their own management of the environment and utilisation of the natural woodlands on a sustainable basis, and
- Encouraging people, through extension, to growing more trees

The Royal Netherlands Government has expressed interest to finance the project. A proposal was thus submitted to them in July, 1993 for their consideration. Formal response is however being awaited.

**4 7 ENERGY CONSERVATION**

**Project AAA.6.2: Energy Saving in Industry**

This project has been merged with project no ZAM 6 2 into one programme for energy conservation in industry. Its goals are to (1) Establish an energy conservation office in Harare (2) Develop industrial energy audits in selected firms in Zimbabwe, Zambia, Botswana and Malawi and launch some demonstration projects followed by training workshops, (3) Organise general energy conservation seminars for all member States (4) Develop a regional energy conservation strategy.

This project, initiated in 1987, was completed at the end of 1991. Accomplishments include completion of 33 energy audits in Zimbabwe, Malawi, Mozambique, Zambia and Botswana, four industry-specific workshops and one country workshop (for Mozambique), 8 national energy seminars, in all member States except Namibia and Malawi and training of three SADC counterpart staff in both energy auditing-related management and communications activities. In 1990 the project underwent a midterm review by CIDA, with

generally positive results, including a recommendation to finance a successor project which CIDA have now accepted. In order to bridge the gap between the new project and the current project, CIDA sponsored an extension of project AAA 6 2 which will include a strong emphasis on planning and database activity, promotions, and follow-up to audits already completed.

**Project AAA.6.3. Development of Energy Conservation Activities at TAU**

The objective of this project is to identify national consultants in the region to assist in planning and policy formulation and development, strengthen TAU energy conservation department and develop a detailed regional energy conservation plan.

Funding is sought for the period 1994 to 1996, to cover the programmed travels to the region and abroad, supplies, equipment and the functioning the Energy Conservation Subcommittee meetings in 1995, 1996.

**Project AAA.6.5: ENERGY MANAGEMENT IN INDUSTRY**

The objective of this project is (1) to develop energy management expertise in SADC industry through training and technology transfer in order to provide sustainable energy management activities beyond the project, (2) to determine the energy use patterns and potential for savings in selected sub-sectors (Food and Beverages, and Mining and Metals), and to provide special programmes to assist firms to improve energy efficiency in these sub-sectors and also (on a responsive basis) in other sub-sectors, (3) to develop an industry-government network to promote and coordinate energy management in the various industrial sub-sectors, (4) to develop a capability within member State engineering consulting firms to plan and undertake energy management projects.

Inception mission has been initiated in July and project activities are progress as planned.

**Project AAA.6.6 Energy Conservation and Fuel Substitution Opportunities in SADC Transport Sector**

The principal objectives of the study are

- 1 To identify the potential petroleum savings in the transport sector in all SADC member States which could be achieved through (a) conservation measures and (b) fuel substitution
- 2 To evaluate the costs and benefits of different conservation and substitution options

- 3 To identify substitution and conservation projects carried out in the transport sector in the region to date, including ongoing projects
- 4 To make a preliminary assessment of the cost/benefits obtainable from savings in the transport sector, including savings in foreign exchange
- 5 To identify those areas within the region where conservation and substitution measures are feasible and/or require more detailed study

Due to the lack of interest shown by donors in funding this project and to be in compliance with recommendations from 1992 SADC Council of Ministers, the Energy Ministers at their meeting held in Lusaka, June 1994 approved the withdrawal of the project from the Energy Sector's portfolio

#### **Project AAA.6.7. Development of Promotional Activities for Energy Efficiency**

The objective of this project is to (1) assess current state of information on energy conservation/efficiency in the region, in order to pinpoint gaps or inadequacies in current efforts to change end-user behaviour in this area, (2) identify the potential or target markets for future energy conservation/efficiency promotional activities, (3) develop guidelines for future implementation of promotional campaigns, (4) determine which methods and which media will be most effective in delivering the energy conservation message, (5) produce materials to be used as a model for future work of this kind

The project has not attracted any funding There is now agreement that most of the objectives of this project can be included in projects with larger scope Therefore the Energy Ministers at their meeting held in Lusaka, June 1994 approved the withdrawal of the project

#### **Project AAA.6.8: Assessment of Energy Conservation Training Requirements in the SADC Region**

The objective of this project is to (1) assess the current demand for energy conservation training in such key areas/sub-sectors as, professional engineers, industry and government personnel, and post secondary students, (2) review current SADC energy curricula, particularly in the engineering and related technology fields, to determine where and in what form energy conservation concepts and procedures are being taught in the region's training institutions at present, (3) identify gaps or deficiencies in curriculum offerings, and show how new programmes could alleviate these deficiencies, (4) assess the human resource capabilities and infrastructure of various SADC training institutions in the areas of energy engineering in general,

and energy conservation in particular, (5) recommend possible sites or venues for the delivery of future energy conservation programmes, (6) provide preliminary design concepts and outline curriculum plans for a variety of energy conservation training programmes. This project has been withdrawn from the SADC Programme of Action in 1993.

**Project AAA.6.9. Demandside Management Opportunities for SADC Utilities**

The objective of this project is to (1) identify sectors/sub-sectors where there are inefficient or peaking end-uses of electricity, (2) determine the most cost-effective means (from both power utility and energy user viewpoints) to correct these inefficient uses or to reduce peak demand, (3) develop a series of utility demandside management investment programmes (financial assistance, technical assistance and information) to encourage industry, commercial establishments and other consumers to adopt these cost-effective means to improve efficiencies or reduce peaking, (4) bring electricity tariffs in line with the long-run marginal costs of supply (including environmental costs) to encourage wider user investment in efficient technology, to investigate disparities in pricing between different types of end-users (consumer classes), (5) compare the economic, social and environmental benefits of these DSM programmes with costs of investment in new supply, (6) ensure the long-term sustainability of these investments by providing training to both management and operational staff in SADC utilities.

The interim report for the Phase I, is to be issued in August 1994.

**Project AAA 6 11 Energy Efficiency Improvements in SADC Heavy Industry**

This project was developed at the request of the Energy Ministers meeting in Windhoek in June 1992. Following a decision by CIDA and TAU to eliminate mining and other heavy (energy-intensive) industries such as cement and metallurgical industries from Project AAA 6 5, it was recommended that a project dealing with these sub-sectors should be developed. The proposed new project aims to provide a preliminary assessment of energy savings potential in a variety of heavy industry sub-sectors, followed by detailed energy audits of plants designated as having a significant savings potential. Development of demonstration projects for a number of plants is also planned. Funding is sought.

# **Project Descriptions**

**AAA.1.4: MANAGEMENT DEVELOPMENT AND SPECIALISTS TRAINING FOR THE SADC PETROLEUM SECTOR**

-----  
Estimated Cost (US\$ Million) Financing Gap 1 55

Total 1 55  
 Foreign 1 55  
 Local -

Executing Agency TAU/RTC

Funding Secured

Start As soon as funds are secured

Foreign -  
 Local -

Duration 2 years

-----

- Objectives:**
- To produce a core professional staff and management for the SADC Oil Companies and Government Ministries through an integrated Regional Energy Programme
  - To improve regional cooperation and standardization of policy in matters of common interest in the Oil/Gas and petroleum industry
  - To increase standardisation of exploration agreements, safety procedures, oil supply contracts, product handling procedures and product specifications within the region, for the purposes of enhancing international cooperation with non-SADC oil companies and to reduce costs and losses

**Description:** The project will consist of two phases

Phase I Training programme in the SADC countries

Phase II Award of scholarships to select staff overseas for specialized training

The College of Petroleum Studies, Oxford, (CPS), has proposed a partnership with SADC Energy, TAU, to provide a major training programme, to be carried out in the region and abroad. The programme will consist of a range of training modules and workshops covering the management, technology and economics of both the 'upstream' and 'downstream' sectors of the industry, with an additional core of petroleum-related general management modules, covering corporate planning, and project development

**Status:** Funding sought

**AAA 1.5 JOINT SADC PETROLEUM EXPLORATION PROGRAMME**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 80

Total 1 90  
Foreign 1 89  
Local 0 01

Executing Agency SADC/TAU

Funding Secured Start June 1991

Foreign 0 81  
Local 0 01

Duration 2-3 years  
-----

**Objectives:** The projects will improve the geological database and allow the individual SADC countries to evaluate the petroleum potential of their basins. By merging the national projects in a SADC exploration programme, the short-term objectives are

- to promote the contribution from oil companies interested in getting new data to evaluate the prospectivity of the region,
- to save money as a certain crew can execute different projects in the same region

**Description:** The project consists of four phases, (est in US\$ Million)

Phase I - Task Force	1 55
Phase II - Project Steering Committee	0 06
Phase III - Basin Studies	0 29
Phase IV - Exploration Programme	50 00

**Status:** Funding has been secured from NORAD to finance the services of a Petroleum Consultant, for the Project Task Force, who will collect, analyse and present all prospective data for the Joint Programme

Funding has also been secured from NORAD to finance the Project Steering Committee, which met in March 1991 for the first time. Financing of the Basin Studies are under discussions with cooperating partners (US\$0 28 m)

Phase IV, The Exploration Programme is dependant upon the success of the preceding three phases

**AAA.2.3: MANPOWER DEVELOPMENT AND TRAINING FOR THE COAL UTILIZATION SUB-SECTOR**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 11

Total 0 11  
Foreign 0 11  
Local -

Executing Agency SADC/TAU

Funding Secured Start As soon as funding is secured

Foreign -  
Local -

Duration 6 months  
-----

**Objectives:** The overall objectives of the Training Needs Survey are to provide a basis for planning a manpower development and training programme for the coal utilization sub-sector

**Description:** Local consultants in each of the member States will be employed to survey the needs in each country. A Project Coordinator will be appointed to assist the national consultants and to integrate the national reports into a total training needs programme for SADC

**Status:** Funding is being sought. The survey will start as soon as financing is secured

**AAA.3.2: SPECIALIZED TRAINING IN THE FIELD OF ELECTRIC POWER PHASE III. FIVE YEAR REGIONAL POWER SECTOR TRAINING PROGRAMME**

-----  
Estimated Cost (US\$ Million) Financing Gap 23 03

Total 28 43  
Foreign 23 03  
Local: 5 39

Executing Agency

Funding Secured Start January 1992

Foreign -  
Local: 5 39

Duration 5 years  
-----

**Objectives:** The objective of the project is to identify training needs for electricity utilities personnel, and formulate a training programme taking into account the existing facilities in the region

**Description:** Phase III consists of three different cost items: Courses, Database and Programme management

Courses 33 specific courses have been defined, based on the analysis done during phase II of this project, when the needs were identified. The courses will be conducted in cooperation with existing training institutes in the SADC region, identified in the report based on the findings during phase II.

Database The database is meant to contain information on possibilities for attachment training in the various power utilities within the SADC region. The database will also contain names of persons with special skills which could be of use for other utilities.

Programme management The programme has to be coordinated by a full-time Human Resources Development Manager working as part of the TAU team. This position has been advertised within the SADC power utilities. The Five-year Regional Power Training Programme is described in more detail in the presentation to ICPs on 29th January, 1992.

**Status** Funding sought

AAA 3.4\* REGIONAL HYDROELECTRIC HYDROLOGICAL ASSISTANCE PROGRAMME

-----  
Estimated Cost (US\$ Million) Financing Gap 4 00

Total 8 50  
 Foreign 8 50  
 Local -

Executing Agency ZESCO

Funding Secured

Start Phase I February 1989  
 Phase II November 1991

Foreign 4 50  
 Local -

Duration

-----

**Objectives:** Improve availability, accessibility and quality of hydrological data for hydroelectric purposes within the SADC region.

**Description** This project comprises two phases. Phase I was completed in April, 1991. Phase II was approved in Gaborone in June, 1990. Detailed terms of reference have been developed by TAU. This approach permits the programme to continue without interruption. Part I of Phase II started in November 1991, but funds have been secured only from CIDA. Efforts have been made by TAU in order to have Portugal and Canada involved financially in Parts III and II of Phase II.

Phase II will include major investments in an improved hydrometeorological reporting network throughout the Zambezi basin and further work on training and publishing and analysis of data

**Status:** Phase I Completed in April, 1991

Phase II Funding sought (Estimated cost US\$8 50 million) Canada has agreed to continue the assistance

**AAA.3.8: REGIONAL GENERATION AND TRANSMISSION CAPACITIES INCLUDING INTERREGIONAL PRICING POLICIES (Phase III)**

-----			
<u>Estimated Cost</u>	(US\$ Million)	<u>Financing Gap</u>	0 85
Total	0 85		
Foreign	0 85	<u>Executing Agency</u>	World Bank/ESMAP
Local	-		
<u>Funding Secured</u>		<u>Start</u>	-
Foreign	-		
Local	-	<u>Duration</u>	12 months
-----			

**Objectives**

- 1 Formulate a strategy for fostering regional cooperation through power interconnection in the region as a means of providing opportunities for enhanced electricity trade
- 2 Determine the most appropriate pricing principles for pooling operation
- 3 Analyze the institutional, contractual and organisational aspects for establishing a regional power pool, determining the most appropriate organizational structure for possible introduction in the region and its mode of introduction, and considering the potential for coordinated planning and development as well as integrated operations of the regional interconnected system

**Description:** Activity A Regional Rural Electrification Information Programme

The focus of the study is to provide a framework for increased regional cooperation and for progressive - stage-wise integration of regional power supplies based on a realistic assessment on the options that will increase opportunities and

benefits for electricity trade The scope of work will also cover institutional requirements such as regulatory matters, tariff formulation, power pool supervisory arrangements and dependency issue (i.e. essentially the institutional, financial and technical measures necessary to achieve closer regional cooperation in the sector)

**Status:** Funding sought

**AAA.3.11: LIGHTNING RESEARCH**

-----  
Estimated Cost (US\$ Million) Financing gap 1 03

Total 1 03  
 Foreign 1 03  
 Local -

Executing Agency

Funding Secured Start As soon as financing is secured

Foreign -  
 Local -

Duration

-----

**Objectives** • Carry out an effective research and establish the real causes for the severity of the lightning strikes and hence suggests practical means of protection of both people and electrical utilities against lightning strikes

**Description** Installation of lightning counters at selected sites, firstly in Zimbabwe and then to other selected areas of neighbouring countries to collect data which will lead to a lightning frequency and intensify map of the SADC region

**Status** Funding sought

**LES.3.2. POWER NETWORK EXPANSION FOR THE SOUTHERN AND CENTRAL REGIONS OF LESOTHO**

-----  
Estimated Cost (US\$ Million) Financing Gap 43 50

Total 43 50  
 Foreign 43 50  
 Local -

Executing Agency  
 Lesotho Electricity Corporation (LEC)

Funding Secured Start As soon as funding is secured

Foreign -  
 Local -

Duration

**Objectives:** To ensure a reliable power supply to the rural areas of Lesotho, and hence contribute towards lessening dependence on fossil fuels and import from RSA. The project will also assist towards a reliable transmission of the power generated by the Mantsonyane mini hydropower plant.

**Description:** The 33 KV transmission network has been subject to extensive refurbishment after being presented and approved as a SADC project in 1984. Phase II was completed in 1988. The project is a continuation of the completed work on phases I and II and comprises 5 new phases.

33 kV line Mazonod-Roma-Mantsonyane and Mohale's Hoek-Quthing US\$10.6 Million

33 kV line Mantsonyane-Thaba Tseka and Thaba Tseka-Mashaal US\$ 7.7 Million

SINDAC upgrading US\$ 9.8 Million

33 kV reformulation and refurbishment in Mafeteng US\$ 4.5 Million

132 KV transmission extensions  
US\$10.9 Million

Work on phase III and consecutive phases will commence as soon as funding has been secured. Due to the condition of the lines in question, the work needs to start as soon as possible. Top priority is given to Phase III, next to Phase IV, etc.

**Status:** Funding sought

**MAL.3.5: SUPPLY TO CHITIPA AND KARONGA IN MALAWI FROM MBEYA IN TANZANIA**

-----  
Estimated Cost (US\$ Million) Financing Gap 3.05

Total 3.98  
Foreign 3.05  
Local 0.93

Executing Agency ESCOM/TANESCO

Funding Secured:

Start

Foreign -  
Local 0.93

Duration 2 years  
-----

**Objectives:** - Provide a cheaper source of electricity to consumers in Karonga and Chitipa

- Reduce Malawi's foreign exchange drain due to import of diesel fuel
- Provide a more reliable source of electricity

**Description**

Electricity supply to Karonga was established in 1979, while Chitipa was electrified by the end of 1988 by diesel generators under the present Rural Electrification Programme

Reliability of supply in Karonga is poor due to frequent machinery breakdowns

By connecting the two towns in Malawi to the national grid in Tanzania considerable improvements will be achieved. The following is needed

- 267 km 33 kV overhead lines
- 1 substation for voltage regulation at Ibanda
- 2 substations at Chitipa and Karonga
- 2 distribution substations at Kyela and Chilumba

**Status**

Funding sought

**MAL.3 6 MALAWI/ZAMBIA POWER COOPERATION IN THE BORDER REGION**

-----  
Estimated Cost (US\$ Million) Financing Gap 3 63

Total 5 00  
 Foreign 3 63  
 Local 1 38

Executing Agency ESCOM/ZESCO

Funding Secured

Start

Foreign -  
 Local 1 38

Duration 24 months

**Objectives:**

To provide electricity supply as an alternative source of energy to the rural areas on both sides of the Malawi-Zambia border in order to foster national development and improve the living standards of the people in the areas through encouragement of the formation of a locally based agro-industrial economy, reduction of rural-urban migration, reduction of deforestation and improvement in education and health standards of the people in those rural areas. The electrification will also improve the foreign

exchange earning capacity of Malawi, reduce the use of costly diesel fuel at Lundazi surrounding areas in Zambia and replace it with low cost hydro-electric energy from the Malawi system, and avoid installation of diesel-electric generation on the Zambian side by supplying the areas from the Malawian hydro-based grid

**Description** The project includes construction of more than 300 km 33 kV lines, upgrading/construction of two 33/11 kV substations, 27 distribution substations and about 15 km low voltage lines

**Status:** Funding sought

**ZAM.3.9. POWER COOPERATION BETWEEN ZAMBIA AND NAMIBIA**

-----  
Estimated Cost (US\$ Million) Financing Gap 14 55

Total 15 94  
 Foreign 14 55  
 Local 1 39

Executing Agency ZESCO/SWAWEK

Funding Secured

Start As soon as funding is secured

Foreign -  
 Local 1 39

Duration 33 months

-----  
**Objectives:** The objectives of the project is to provide hydroelectric power to enhance development of the great agricultural potential of Northern Namibia and generally improve the reliability and increase the capacity of power supply to the region which comprises Namibia, Zambia and Botswana

**Description:** It is intended to construct a 215 km 132 kV overhead line from Victoria Falls Power Station to Katima Mulilo, construct a 132/66 kV 10 MVA substation at Katima Mulilo and connect it to the existing 66 kV line at Katima Mulilo. A 132 kV line will be constructed from the 132/66 kV substation at Katima Mulilo into Namibia. SWAWEK will determine the length of this line and the location of their step down substation to distribute power in Northern Namibia which has a great agricultural potential, and which is too costly to supply from Namibia's power grid because of the long distance

At Victoria Falls Power Station it will be necessary to construct a 33/132 kV 40 MVA substation

**Status:** Funding sought

**AAA 4.9: ASSESSMENT OF APPLICATIONS AND MARKETS FOR INDUSTRIAL PROCESS SOLAR HEAT IN THE SADC REGION**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 22

Total 0 22

Foreign 0 22

Local -

Executing Agency TAU

Funding Secured  
secured

Foreign -

Local -

Start After funding has been

Duration 8 months

-----  
**Objectives** The principal objective of this study is to assess the technical and economic viability of industrial process solar heat (IPSH) applications and to determine the potential market size and financing for the most viable IPSH applications in the SADC countries

**Description** The principal outputs of the study will be

- development of an analytical framework for the financial and economic evaluation of IPSH systems used in SADC for industrial applications,
- an assessment of the conditions under which IPSH systems are economically viable for each of these applications and in each member state,
- an analysis of the market size for technically and economically viable IPSH applications, and
- an evaluation of whether applications which are economically viable are also financially viable, and what financing arrangements and industry development conditions could encourage widespread use

**Status:** Funding sought

**AAA.4.10: ASSESSMENT OF APPLICATIONS AND MARKETS FOR SOLAR WATER HEATING IN THE SADC REGION**

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<u>Estimated Cost</u> (US\$ Million)	<u>Financing Gap</u>	0 24
Total		0 24
Foreign	<u>Executing Agency</u>	0 24 SADC/TAU
Local		-
<u>Funding Secured</u>	<u>Start</u>	-
Foreign		-
Local	<u>Duration</u>	- 8 months

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- Objectives:** The principal objectives of this project are to
- determine the potential market size for Solar Water Heating (SWH),
  - determine the conditions which SWH are economically viable to help Governments of SADC member States establish appropriate policies, research priorities for the use of SWH technology,
  - provide a framework for the financial evaluation of SWH applications, so that financial institutions in SADC can better evaluate loans involving SWH applications,
  - suggest institutional and financial arrangements that can promote economically viable SWH applications

- Description:** The principal outputs of the study will be
- presents an analytical framework for the financial and economic evaluation of SWH systems used in SADC for domestic water heating to each member State,
  - indicates the conditions under which SWH is economically and financially viable for each of this applications,
  - presents an analysis of the market size for technically and economically viable SWH applications in each member State,
  - identify constraints and needs of local industry in production and distribution of SWH and recommended ways of overcoming them

**Status** Funding sought

**AAA.4.11: SADC PROGRAMME FOR FINANCING ENERGY SERVICES FOR SMALL-SCALE ENERGY USERS (FINESSE)**

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<u>Estimated Cost</u> (US\$ Million)		<u>Financing Gap</u> 1 45
Total	1 58	
Foreign	0 13	<u>Executing Agency</u> SADC/TAU
Local	-	
<u>Funding Secured</u>		<u>Start</u> -
Foreign	-	
Local	-	<u>Duration</u> 2 years

---

**Objectives.** The primary objective of the SADC FINESSE Programme is to develop means for using intermediary organizations (development finance institutions, commercial banks, power utilities, private sector companies, NGOs, etc ) to channel multilateral agency and donor funds more effectively for the provision of renewable energy and energy conservation services to small-scale energy end-users

**Description** The FINESSE approach provides a means by which multilateral development bank and donor agency loans can be made available to small-scale energy users. The first implementation of this approach in the ASEAN region identified over US\$ 800 million of investments in renewable energy and energy conservation projects. Over US\$ 100 million of investments are already in the process of implementation and the World Bank has begun to focus more attention on the potential of alternative energy investments in their energy portfolio.

The current SADC FINESSE initiative will draw on the successful experience in Asia to develop an appropriate programme for the SADC Region. This proposal describes the seven inter-related tasks which will be performed to develop a framework for a SADC FINESSE Programme. The principal output of this work will be an implementation strategy.

**Status:** Funding sought

Therefore in this regard, actions have been initiated to attempt to meet these people's needs, using indigenous energy sources and available regional capacities and facilities.

The project consists of rehabilitation and installation of windpumps in the three SADC countries (Angola, Mozambique and Tanzania) using regional capacities and facilities in order to ensure sustainability of the project.

**Status:** Funding sought

**LES.4.2: SOLAR PHOTOVOLTAIC POWER GENERATION IN RURAL AREAS - LESOTHO PILOT PROJECT**

<u>Estimated Cost</u> (US\$ Million)		<u>Financing Gap</u>	0 33
Total	0 33	<u>Executing Agency</u>	TAU
Foreign	0 33		
Local	-		
<u>Funding Secured</u>		<u>Start</u>	After funding has been secured
Foreign	-		
Local	-	<u>Duration</u>	3 months (Phase I)

**Objectives:** The principal objective of the feasibility study (Phase I) is to determine the conditions under which supplying photo-voltaic generated electric power would be cost effective compared to other alternatives

**Description:** The SADC Power Utilities are mandated with providing electric power in each of the member States Typically, this is done through the national and regionally connected power networks, and in some remote areas by diesel powered generators or by small hydro-electric facilities One potentially cost effective alternative to these distribution systems is to provide power by the installation of solar photovoltaics in remote growth areas, these areas being distant from the established grid and located where grid extension would not be expected for many years

This proposed project will investigate the feasibility of providing solar photovoltaic generated power in remote areas The project will be carried out in two phases Phase I is a feasibility study to document the technical and economic viability of the proposed project, including identification of an appropriate site for a pilot project Phase II will be the implementation of a pilot installation, if the results of the feasibility study warrant such action

The level of effort for the feasibility study is estimated to be 28 person weeks during a 3 month period. The estimated cost is US\$77,000.

Detailed level of effort and costs for Phase II - Implementation will be an output of Phase I - Feasibility Study. The estimated cost of implementation is US\$250,000.

**Status:** Funding sought for Phase I, Feasibility Study. Estimated funding for Phase II, Implementation to be sought subject to recommendations of Phase I.

**TAN.4.2: ACCELERATED BIOGAS TECHNOLOGY DIFFUSION**

<u>Estimated Cost</u> (US\$ Million)		<u>Financing gap</u> 1 11
Total.	1 11	
Foreign	1 11	
Local	-	
		<u>Executing Agency</u> Renewable Energy Development Project Unit (REDPU), Tanzania
<u>Funding Secured</u>		<u>Start</u> As soon as financing is secured
Foreign	-	
Local	-	<u>Duration</u> 3 years

- Objectives**
- (1) Introduction and dissemination of a new technology, 'biogas energy production'
  - (2) To develop and promote greater use of biogas energy in institutions and households
  - (3) To reduce dependence on imported fuels
  - (4) To improve the living standards of rural populations by developing and promoting the use of decentralized energy systems for power generation, lighting and cooking
  - (5) To reduce the present woodfuel demand pressure on forest reserves through substitution with other appropriate indigenous energy sources

**Description** This project shows the needs of dissemination of biogas energy production and utilization technology in SADC Region in order to promote greater use of indigenous renewable energy.

**Status** Funding sought

**ZIM.4.1: FEASIBILITY STUDY ON THE UTILISATION OF SOLAR WATER HEATING FOR REDUCING POWER UTILITY DEMAND COSTS**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 25

Total 0 25  
 Foreign 0 25  
 Local -

Executing Agency

Funding Secured

Start As soon as funding is secured

Foreign -  
 Local -

Duration 3 months, Phase I only

-----

**Objectives** Through pilot project to investigate the possibility of using solar water heating systems to reduce the demand for electric heating in industrial, commercial and domestic installations Budget for feasibility study (Phase I) US\$0 080 m, while for implementation (Phase II) US\$0 170 m

**Description** A viable option exists in solar energy for the conservation and/or substitution of electrical energy from the grid, thereby allowing for increased access to hot water by the general population and the release of grid power for uses where it is most essential Specific outputs of Phase I Financial and economic analysis of technically viable systems, assessment of financing mechanisms, including evaluation of access to capital and recommended power and energy rate structures, recommended organisational arrangements for construction, maintenance and operation of solar water heating systems, recommendations for replication of pilot project, if viable, in other SADC member States, particularly addressing issues related to institutional aspects, exchange of technical information and intra-regional trade of equipment

**Status** Funding sought

**AAA.5.7: SUPPORT TO TAU WOODFUEL SECTION - EXTENSION**

-----  
Estimated Cost. (US\$ Million) Financing Gap: 0.68

Total: 0.78  
Foreign 0.68  
Local: 0.11

Executing Agency SADC/TAU

Funding Secured

Start -

Foreign: -  
Local 0 11

Duration 3 years

-----  
**Objectives:** The main objectives of the project are to

- strengthen TAU planning and coordination capacity on traditional fuels and environmental protection issues,
- enable TAU to provide catalytic support to member States on planning, implementation and evaluation of woodfuel projects,
- enable TAU to sustain its current woodfuel programmes and projects

**Description:** The following activities will be undertaken

- funding of the SADC Energy Sector Biomass Fuels Technical Advisor Post;
- provision of funds for technical missions to member States to collect data, monitor and evaluate project and share grass roots experiences with local actors on how to develop and implement traditional fuels programmes successfully in particular through peoples participation,
- sponsoring of TAU officials, to attend some International and Regional Woodfuel workshops and seminars of high relevancy to the SADC region

**Status:** Funding sought

**AAA.5.8: DEVELOPMENT OF NATIONAL WOODFUEL STRATEGIES AND PLANS**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 47

Total 1 98  
Foreign 1 98  
Local. 0 10

Executing Agency TAU

Funding Secured

Foreign 0.86  
Local 0 10 (SADC)

Start As soon as funding is secured

Duration 3 years  
-----

**Objectives:** The main objectives of the project are to

- develop comprehensive woodfuel strategies and implementation plans for each member State,
- intensify development of projects for energy production, integrated with other sectors dealing with biomass management and rural development, and
- provide data to assess national capabilities for the implementation of woodfuel programmes, and means of increasing such capabilities through institutional strengthening

**Description:** The following activities will be undertaken

- review of experiences, and formulation of detailed strategies and plans for implementing the project,
- strategies and plans will be compiled to form a regional woodfuel strategy and implementation plans which will be published for distribution in the member States

**Status:** Funding sought Norway has indicated interest to support the project

**AAA.5.9: IDENTIFICATION AND SUPPORT OF NON-GOVERNMENTAL ORGANISATIONS AND WOMEN'S GROUPS DEALING WITH WOODFUEL**

-----  
Estimated Cost (US\$ Million) Financing Gap 0 40

Total 0 46  
Foreign 0 40  
Local 0 06

Executing Agency TAU

Funding Secured

Start. Implementation can commence once funding is secured.

Foreign -  
Local. 0.06 (SADC)

Duration: 3 years

-----  
**Objectives:** The main objectives of the project are to

- identify active NGOs and women's groups dealing with woodfuel programmes in the region,
- analyse NGO's and women's groups experiences in implementing woodfuel projects, in particular those based on people's participation at grassroots level,
- explore possibilities for intensifying NGO's and women's groups involvement in woodfuel programmes, by providing them with catalytic support like training, project planning, provision of equipment and funds, etc

**Description:** The following activities will be undertaken in order to achieve the above objectives

- compilation of a comprehensive list of active NGOs and women's groups dealing with woodfuel in each member State will be made
- formulation of strategies and projects to support NGOs and women's groups on short-and long-term basis

**Status:** Funding sought (Canada has indicated interest to support the project)

**AAA.5.11: ASSESSMENT OF ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACT OF WOODFUEL SCARCITY**

-----  
Estimated Cost (US\$ Million) Financing Gap 2 30

Total· 2.53

Foreign 2.30

Local. 0 23

Executing Agency TAU

Funding Secured

Start Implementation can commence once funding is secured.

Foreign -

Local· 0 23 (SADC)

Duration: 3 years

-----  
**Objectives:** The main objectives of the project are to provide

- comprehensive site-specific data on environmental and socio-economic problems created by woodfuel scarcity in the SADC region,
- information to be used for increase of public awareness of woodfuel aspects; and
- data for planning future woodfuel projects

**Description:** - A steering committee of environmental experts will be formed, to provide a detailed plan on how to implement the project

- Review of experiences in member States will be undertaken by short-term consultants
- Priority areas to be studied in the main project will be defined, based on the seriousness of the problem in member States
- Obtained data will be analysed and a final report prepared. Demonstration materials like photographs, slides, video cassettes and films will be included as part of the study

**Status:** Funding sought (The Netherlands Government has indicated interest to support the project)

**AAA.5.14: INTENSIFICATION OF PEOPLE'S PARTICIPATION IN TREE GROWING AND ENVIRONMENT PROTECTION IN THE SADC REGION**

---

Estimated Cost (US\$ Million) Financing Gap 5 05

Total: 5 35

Foreign: 5.05

Local: 0.30

Executing Agency TAU

Funding Secured  
secured

Foreign: -

Local: 0.30 (SADC)

Start As soon as funding is

Duration 5 years

- 
- Objectives :**
- 1 To enhance sustainable land use management, energy development and environmental protection in SADC region through participatory efforts,
  - 2 To enhance sustainable coordination and integration in planning and implementing rural development programmes

**Description** The project addresses problem on broad scale through integrated approach with other regional sectors, national institutions and local grass roots actors as pre-requisite for sustainability. The project will be divided into two phases (1) formulation of effective ways of increasing awareness and (2) implementation of mass awareness programmes and tree growing activities. Ten country reports will be produced, indicating existing ways of raising mass awareness of woodfuel and environmental issues, propagate tree growing activities and their effectiveness with regard to specific areas and target groups. An overview of regional woody biomass extension services and people's participation shall be produced.

**Status** Funding sought

**AAA.5.17: RURAL ENERGY PLANNING AND ENVIRONMENTAL MANAGEMENT TRAINING PROGRAMME**

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<u>Estimated Cost:</u>	(US\$ Million)	<u>Financing gap:</u>	3 09
Total	3 35		
Foreign	3 09		
Local	0 26	<u>Executing Agency</u>	SADC Energy Sector (TAU)
<u>Funding Secured</u>		<u>Start</u>	As soon as financing is secured. (Phase 1)
Foreign:	-	<u>Duration</u>	3 years
Local	0 26		

---

- Objectives**
- To stimulate and contribute significantly to the human resource development efforts in the SADC region for sustainable rural energy development, utilization and environmental management
  - To develop training programme that will eventually contribute to the building of professional competency in the region for effective rural energy planning and environment management.
  - To conduct rural energy planning and environment management courses in the SADC region on a sustained basis
- Description**
- Design and conduct policy Makers seminar on Rural Energy Planning and Environment Management
  - Design and conduct specialist courses on subject matters related to Rural Energy Applications Project Planning, Communication Planning, Biomass and Other Energy Technologies, etc
  - Identify candidates to be developed as trainers, and to prepare them for a Training of Trainers course to be conducted in the present project phase
  - Strengthen the base for sustainability of courses after the completion of the project
- Status**
- Funding sought The Netherlands has indicated interest to support the project.

**AAA.5.18: STRENGTHENING THE COVERAGE OF WOODFUEL AND ENVIRONMENTAL PROTECTION IN RELEVANT SADC TRAINING INSTITUTIONS**

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<u>Estimated Cost.</u> (US\$ Million)		<u>Financing Gap</u>	7 40
Total	7 40		
Foreign	6 73	<u>Executing Agency</u>	SADC/TAU
Local:	-		
<u>Funding Secured</u>		<u>Start</u>	-
Foreign	-		
Local	-	<u>Duration</u>	5 years - 3 Phases

---

**Objectives:** The main objective of the project is strengthening the coverage of woodfuel and environmental protection issues in relevant training institutions of the SADC region, aiming at

- 1) slowing down the now rampant problem of environmental degradation being experienced in various forms across the SADC region,
- 11) increasing awareness and knowledge among the general public about how to improve their own management of the environment and utilisation of natural woodlands on a sustainable basis, and
- 111) encouraging people, through extension, to growing more trees

**Description:** The project will focus on the following priority activities

- 1) curriculum development, based on prior assessment, improving and expanding existing curricula and where required develop new ones,
- 11) development and distribution of teaching materials and visual aids on environmental and woodfuel subjects,
- 111) developing local institutions capacity to mass produce and effectively distribute (11) at regional and national levels, and
- 1v) human resource development through formal and informal education sectors

Through this extensive outreach programme over 10,000 teachers and extension staff will be trained during the life of the project and well over 6 million primary and secondary school pupils and their parents will be reached each year

**Status:** Funding sought

**AAA.6.3: CONTINUING DEVELOPMENT OF ENERGY CONSERVATION ACTIVITIES AT TAU**

-----  
Estimated Cost (US\$ Million) Financing Gap: 0 22

Total 0 60  
 Foreign: 0 56  
 Local 0 03

Executing Agency

Funding Secured

Start As soon as funding is secured

Foreign 0 36  
 Local 0 03

Duration 24 months  
 -----

**Objectives .** The main objectives of the project are

- to continue planning and project development work undertaken under Project AAA 6.2/ZAM 6 2,
- to identify national consultants from the region to assist in planning and policy development,
- to strengthen the Energy Conservation Department at TAU,
- to develop a detailed Regional Energy Conservation Plan

**Description:**

- Recruit a two-person team to take over management of the Energy Conservation Department (currently managed by the Electricity Department) at the TAU
- Visit SADC energy contacts and assess the level of energy conservation expertise in each country, both in the public and private sectors

- Prepare a Training Plan for the Energy Conservation sector, taking into account the availability of facilities and trained teaching personnel, as well as providing estimates of the demand which exists or could exist for these skills
- Appoint ten local consultants who will carry out the basic background studies for the project and attend a strategy workshop for presentation of their papers and produce a preliminary regional energy conservation plan
- Prepare a report outlining a programme of background research for each country, and establishing an overall terms of reference and style/content guide for the individual country papers
- Prepare an Energy Conservation Plan for the TAU, outlining future sectoral activities and presenting guidelines for the future functioning of this department within TAU

**Status:** Funding sought (Negotiations with Canada who have agreed in principle to sponsor the project)

**AAA.6.9 DEMANDSIDE MANAGEMENT OPPORTUNITIES FOR SADC UTILITIES**

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<u>Estimated Cost</u>	(US\$ Million)	<u>Financing gap</u>	0 99
Total	0 99		
Foreign	0 99		
Local	-	<u>Executing Agency</u>	
<u>Funding Secured</u>		<u>Start</u>	As soon as financing is secured
Foreign	-		
Local	-	<u>Duration</u>	12 months

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**Objectives** Identify sectors/subsectors where there are inefficient or peaking end-uses of electricity, determine the most cost-effective means (from both power utility and energy user viewpoints) to correct these, develop a series of utility demandside management investment programmes to enable consumers to adopt means to improve efficiencies or reduce peaking, bring electricity tariffs in line with the long-run marginal cost of supply (including environmental costs) to encourage wider user investment in efficient

technology, compare the economic, social and environmental benefits of these DSM programmes with investment in increased supply; ensure the long-term sustainability of these investments by providing training to both management and operational staff in SADC utilities.

**Description .** This project has been developed in response to the critical energy supply situation in many SADC countries arising from (1) the effect on hydro resources of the drought and (11) the delay in development of new supply sources and a regional supply grid. The opportunities for reducing demand in SADC utilities through direct investment in consumer efficiency appears to be very great, but before initiating such a programme it will be necessary to identify specific programmes and strategies, to identify the costs of these, and to undertake a pilot project in one SADC utility to demonstrate the benefits to others.

**Status** Funding sought

**AAA.6.11 ENERGY EFFICIENCY IMPROVEMENTS IN SADC HEAVY INDUSTRY**

-----  
Estimated Cost (US\$ Million) Financing Gap 1 98

Total.	1 98	
Foreign	Phase I 0 40	<u>Executing Agency</u> SADC/TAU
	Phase II 1 58	
Local.	-	

Funding Secured Start -

Foreign	-	
Local	-	<u>Duration</u> 5 years

-----

- Objectives:**
- (a) to determine the energy use patterns and potential for savings in the most energy intensive industries of the SADC region,
  - (b) to assess the amount and type of technical and financial assistance in these industries which would be required to achieve significant energy savings,
  - (c) to provide special programmes to assist firms to improve energy efficiency in these same sub-sectors, including but not limited to energy audit programme, training programmes, and information transfer programmes,

- (d) to develop an industry-wide network in the region to promote and coordinate energy management among energy-intensive industries

**Description:** Visits to all member States to assess current status of energy-intensive industries and feasibility of continuing work Undertake an assessment of the aggregate demand for energy from industry in general and heavy industry (including mining in particular), using national energy statistics, an inventory of energy - intensive industries for each member States, including information on current capacity and utilisation of energy by type, production levels, employment levels, future expansion plans etc Assessment of current and planned rehabilitation/retrofit programmes which might include energy-intensive industries, including those which are sponsored by ICPs or multilateral banks

Evaluate technical capabilities of these industries, including availability of engineering and process specialists in the private consulting sector as well as within the industries themselves

Phase I - Assessment/Feasibility  
Phase II - Audit Programme/Demonstration Projects  
Phase III - Demonstration Projects/Retrofit Programme

**Status:** Funding is being sought for Phase I

# **Annex I**

## **Criteria for the selection of Regional Projects**

## 1. CRITERIA FOR SADC ENERGY PROJECTS

### 1 1 REGIONAL CRITERIA

Various types of regional projects exist.

- (a) Projects of overall regional benefit which result from the coordination of the investment programmes of two or more member States, with a view to avoiding unproductive duplication and taking advantage of economies of scale, including a larger market,
- (b) Pilot and research projects whose results can be repeated in other member States, especially those projects promoting the utilization of indigenous raw materials,
- (c) Studies and training programmes of importance to all or several of the SADC member States, and
- (d) Projects with an indirect regional impact, located in more geographically remote member States

Accordingly, SADC Energy Sector projects need to satisfy the following regional criteria/groups of criteria, in descending order of importance, (the last criterion being applicable only to member States not bordering other member States, or with complicated border conditions of a semi-permanent nature)

- directly involve two or more member States in ownership, investment finance, production or in the sharing of benefits from energy projects,
- indirectly benefit one member State in a significant manner, in addition to benefitting the member State where the project is located, and
- directly benefit one member State, through increasing the number and flexibility of its energy supply options

### 1 2 TECHNICAL CRITERIA

SADC projects must be

- be technically feasible,
- use technology appropriate to the SADC region in general and the applicable member States in particular. As far as possible this includes use of regional standards and codes of practice,

including safety standards, which are frequently based on international standards modified as necessary to meet the needs of the SADC environment,

- make provision for acceptable long term operational conditions (maintenance agreements, provision of spare parts, technical training of local personnel, etc ), and
- include technology transfer, both between non SADC experts and their SADC counterparts, and also from more experienced SADC experts to the less experienced

### 1 3 SOCIO-ECONOMIC CRITERIA

These criteria include economic and social aspects The project must

- be economically viable, i e satisfy normal socio-economic project evaluation criteria based on calculations of Economic Internal Rate of Return (IRR) and Net Present Value (NPV),
- be clearly preferable to any alternative or competing project, i e when alternative solutions exist, the project should represent the least cost solution (including investment, training, operation and maintenance costs), and
- be socially justifiable in the sense that the social impact of the project is positive The impact on the rural and peri-urban poor populations of the region is of particular importance

### 1 4 FINANCIAL CRITERIA

Development efforts in the SADC region experience severe financial constraints Therefore all regional projects must satisfy the following financial criteria

- the capital resources required to implement and maintain the project must be available Particularly important is an assessment of the project's required amount of equity capital and the availability of such capital, and
- the cashflow of the project must be sufficient to sustain recurrent operation and maintenance expenses

In addition, for capital investment projects, the following criteria should be met

- the cashflow of the project, both related to the investment and operation and maintenance phases should be sufficient to sustain repayment of loans, interest payments and recurrent operation and maintenance expenses; and
- the project's financial viability must be verified, i.e. to make certain that the project has a satisfactory Financial Rate of Return based on the proposed financial arrangements

## 1 5 ENVIRONMENTAL CRITERIA

Environmental issues are attracting increasing attention in all the SADC member States, as well as in all major international financing institutions. All projects should therefore

- comply with generally accepted environmental requirements of the SADC region, e.g. regarding emissions to air and water, and
- contribute to minimising environmental damage in the SADC member States, particularly with regard to deforestation and soil erosion

Capital investment projects should undergo an environmental impact assessment in order to be approved in the SADC Programme of Action

## 2 SPECIFICATIONS FOR PROJECT DESCRIPTION

Energy Sector project descriptions must comply with the following specifications in order to expedite evaluation, presentation and project promotion

### 2 1 SUMMARY

The proposal must contain a brief of one page information summary in a standardized format

- Estimated project costs (both foreign and local currency),
- Funding secured (both foreign and local currency),
- Financing gap,
- SADC Executing agency(ies) for the project,
- Expected start date and duration of the project,
- Objectives,
- Short project description incl. regional aspects of the project and social and economic benefits, and
- Present project status (incl. date of status given)

## 2 2 BACKGROUND

This section should include, but not be limited to, the history of the project and should describe the project's relation to the energy situation in the actual area to be covered by the project. The regional significance of the project must be elaborated.

## 2 3 OBJECTIVES

The objectives of the project need to be clear. It is important to demonstrate that the project's objectives comply with SADC regional energy strategies and policy objectives and the national development plans for the energy sector in the member State(s) involved in the project.

## 2 4 TECHNICAL DESCRIPTION

This section should include information on expected outputs of the project, the scope of work (tasks to be undertaken), the methodology to be applied for the project and the conduct of work (description of actions to be taken).

## 2 5 ECONOMIC BENEFITS AND JUSTIFICATION

The socio-economic benefits expected from the project must be addressed.

Certain aspects of the project may impose substantive costs or generate benefits outside the project itself. Examples of such aspects are training, transfer of know-how and environmental effects. In case such costs or benefits exist they should as far as possible be described and analyzed (both qualitatively and quantitatively).

## 2 6 ENVIRONMENTAL IMPACT ASSESSMENT

For all major capital investment projects an environmental impact assessment would be required. This assessment shall demonstrate the project's contribution to the sustainable environmental development of the SADC region.

## 2 7 IMPLEMENTATION (ORGANIZATION AND MANAGEMENT)

The planned project organization, including responsibilities and reporting procedures/frequencies, shall be included in the project proposal.

## 2 8 TIME SCHEDULE

An implementation schedule for the project is required. This shall include major milestones to be reached and specification of important project meetings and reports to be delivered during the implementation period. Details of human resource allocation shall be included.

## 2 9 RESOURCES AND COSTS (LOCAL AND FOREIGN)

A detailed resource and budget plan for the project must be specified. This includes investment capital, working capital requirements, human resources, raw materials, natural resources and necessary equipment. Both local and foreign components must be detailed.

## 2 10 PROPOSED FINANCING (LOCAL AND FOREIGN)

Proposed sources of financing shall be included. This applies to financing of both the local and foreign cost components. For the local cost components it is important that these are matched with budgetary allocations in the member State(s) involved in the project. Letters of intent indicating financial commitments may be annexed to the project documents.

## 3 PROJECT APPRAISAL AND APPROVAL PROCEDURES

### 3 1 THE ENERGY SECTOR'S PROJECT APPRAISAL PROCESS

One major concern is that all scarce resources - including capital, skilled labour, enterprise and know-how - should be used to their best advantage. Consequently, there is a clear need to have parameters which can help in the choice of the "best projects" and guide resource allocation.

Project appraisal is the process whereby it is determined whether a project meets technical, economic and social criteria and objectives established in the SADC Energy Sector and the countries involved in the actual project, and whether it meets these objectives efficiently. Appraisal provides a comprehensive review of all aspects of the project and lays the foundation for its implementation after it has been approved, and for its evaluation after it has been completed. The project appraisal process applied in the Energy Sector is shown schematically as enclosed.

### 3 2 URGENT PROPOSALS

Only in exceptional circumstances, as in the case of emergency projects, should consideration be given to project proposals presented directly to the Energy Officials meeting. The Energy Officials will decide whether such a proposal will be forwarded to the Energy Ministers for consideration.

### 3 3 FORMAL APPROVAL OF MAJOR PROJECTS

The decision as to whether a project may be adopted as a SADC project can only be made by the Energy Ministers. New projects must be considered at their annual meeting, usually in mid-June, before presentation to the next Annual Consultative Conference in late January.

If approved by the Energy Ministers, the Chairman of the Energy Ministers' Committee presents the project proposals formally to the Council of Ministers (usually in August) for consideration and approval. Once approved, the project enters the SADC Programme of Action for implementation.

The procedure described above is the way new projects usually receive formal approval. This applies to all major projects, e.g. all projects characterized by a large magnitude of investments, considerable working capital etc. There may be situations where a more simple procedure could apply. Accordingly, the Energy Sector in some cases applies simplified procedures (relating to small projects, minor extensions to existing projects, and emergency projects).

#### 4 **PROMOTION STRATEGY**

When a project has been formally approved, certain promotional activities would be undertaken in order to facilitate a timely and successful implementation of the project.

##### 4 1 PROMOTION ACTIVITIES AFTER SADC APPROVAL

Project promotion is a joint responsibility of both the member State(s) involved in the project and the TAU.

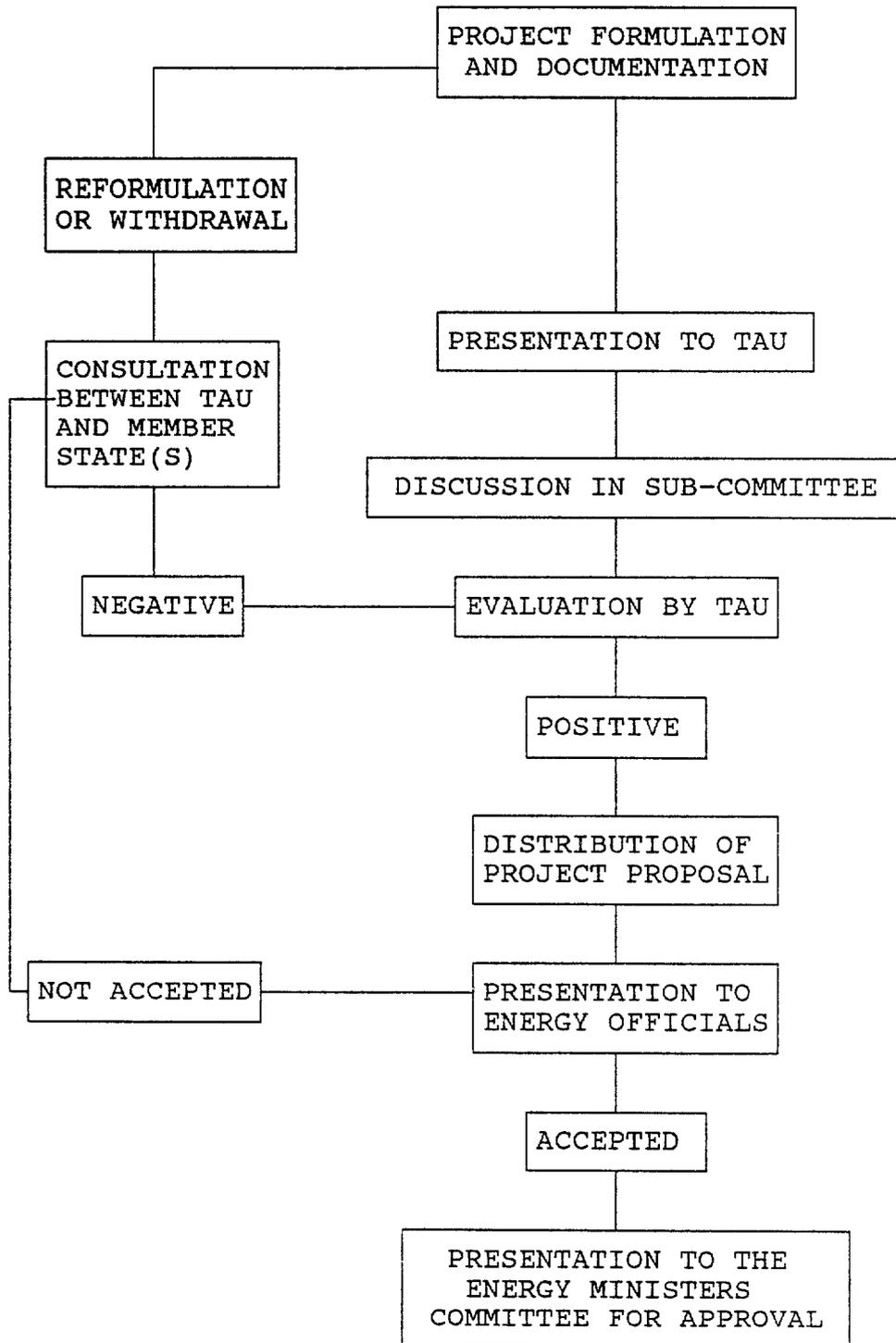
Following approval by the Energy Ministers, TAU will internally allocate responsibility for promotion and follow-up of the new project.

Promotion includes circulation of project documentation to the Energy Sector's International Cooperating Partners (ICPs). This is followed-up by personal contacts between TAU and the ICPs, and between TAU and member States.

##### 4 2 CONSULTATIVE CONFERENCE/ENERGY SECTOR WORKING GROUP

During the SADC Annual Consultative Conference (ACC) held annually in late January, sectoral working groups are held. In the Energy Sector Working Group (ESWG), TAU and member State representatives meet with ICPs to discuss issues related to financing of projects in the Energy Sector portfolio. On this occasion bilateral discussions are also held regarding financing of specific projects. The contacts made in the ESWG are followed up throughout the year.

THE ENERGY SECTOR'S PROJECT APPRAISAL PROCESS



## ENERGY

Project Title	Total	Estimated Cost		Funding Secured		Funding	Financing	COMMENTS/STATUS
		Foreign	Local	Amount	Source	Under Negotiation	Gap	
<b>US \$ Million</b>								
<b>OVERALL COORDINATION</b>								
AAA.0 3	General Support to the Energy Sector TAU	28.08	22.02	6.06	6.06 (ANG) 19.54 (NOR) 2.48 (BEL,BRA, CAN EC,FRA POR,UK,NOR, SWE)	0.00	0.00	Under implementation.
AAA.0 4	Energy Bulletin	0.89	0.26	0.63	0.63 (ANG) 0.26 (CAN EC POR,NOR)	0.00	0.00	Under implementation.
AAA.0 7	Documentation Centre for Energy	0.31	0.31	0.00	0.31 (NOR)	0.00	0.00	Under implementation
AAA.0 8	Establishment of a Regional Energy Planning Network in SADC	2.50	2.50	0.00	2.50 (BEL)	0.00	0.00	Funding secured. Awaiting selection of the Executive Consultant
AAA.0 10	TAU Office Facilities	2.67	2.00	0.67	0.67 (ANG) 2.00 (NOR)	0.00	0.00	Under implementation
<b>Sub-total</b>		<b>34.45</b>	<b>27.09</b>	<b>7.36</b>	<b>34.45</b>	<b>0.00</b>	<b>0.00</b>	
<b>PETROLEUM</b>								
AAA.1 2	Regional Petroleum Training Centre							
	Phase I	0.00	0.00	0.00	0.00	0.00	0.00	Completed.
	Phase II Intermediate Planning	0.22	0.22	0.00	0.22 (UNIDO)	0.00	0.00	Under implementation.
AAA.1 4	Management Development and Specialist Training for the SADC Petroleum Sector	1.55	1.55	0.00	0.00	0.00	1.55	Funding sought
AAA.1 5	Joint Petroleum Exploration Programme							
	Phase I Task Force	0.00	0.00	0.00	0.00	0.00	0.00	Completed
	Phase II Project Steering Committee	0.00	0.00	0.00	0.00	0.00	0.00	Completed
	Phase III Basin Studies	0.29	0.28	0.01	0.01 (SADC)	0.00	0.28	Funding sought
	Phase IV Joint Petroleum Exploration Programme	50.00	50.00	0.00	32.70 (ADB & Others)	0.00	17.30	Funding sought
ANG.1 1	Oil Supply from Lobito to the SADC Region	0.00	0.00	0.00	0.00	0.00	0.00	Suspended
LES.1 1	Strategic Fuel Storage in Lesotho							
	Phase I Prefeasibility Study	0.00	0.00	0.00	0.00	0.00	0.00	Completed.
	Phase II Engineering Design	0.00	0.00	0.00	0.00	0.00	0.00	Withdrawn
MOZ.1	CNG Pilot Project Study and large scale vehicle conversion study	0.00	0.00	0.00	0.00	0.00	0.00	Completed
NAM.1 1	Oil Terminal in the Form of an Off Shore Buoy at Swakopmund in Namibia							
	Phase I Feasibility Study	0.00	0.00	0.00	0.00	0.00	0.00	Withdrawn
NAM.1 2	Pre Feasibility Study for Strategic Petroleum Storage Facilities in Namibia	0.00	0.00	0.00	0.00	0.00	0.00	Withdrawn
SWA.1 1	Strategic Storage Facilities for							

## ENERGY

Project Title	Total	Estimated Cost		Funding Secured		Funding	Financing	COMMENTS/STATUS
		Foreign	Local	Amount	Source	Under Negotiation	Gap	
<i>US \$ Million</i>								
<b>Petroleum Products in Swaziland</b>								
Phase I Prefeasibility study	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Phase II Feasibility study	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
<b>TAN 1 1 Rehabilitation of TAZAMA Pipeline</b>								
Phase I	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase III	15 75	15 75	0 00	15 75	(ADB)	0 00	0 00	Under implementation.
<b>TAN 1 3 Biostratigraphic Reference Collection</b>								
	0 10	0 10	0 00	0 10	(NOR)	0 00	0 00	Under implementation.
<b>Sub-total</b>	<b>67.91</b>	<b>67.90</b>	<b>0.01</b>	<b>48.78</b>		<b>0.00</b>	<b>19.13</b>	
<b>COAL</b>								
<b>AAA.2 3 Manpower Development and Training for the Sub-sector</b>								
	0 11	0 11	0 00	0 00		0 00	0 11	Funding sought
<b>BOT 2 2 Coal Distribution Yard and Coal Information, Botswana</b>								
	0 00	0 00	0 00	0 00		0 00	0 00	Completed
<b>ZAM.2 1 Investigation of Coal Briquetting</b>								
	0 00	0 00	0 00	0 00		0 00	0 00	Pilot project completed. Commercial production has not been initiated
<b>ZIM.2 1 Coal Stoves for Use in Rural and Urban Areas</b>								
	0 00	0 00	0 00	0 00		0 00	0 00	Completed
<b>Sub-total</b>	<b>0.11</b>	<b>0.11</b>	<b>0.00</b>	<b>0.00</b>		<b>0.00</b>	<b>0.11</b>	
<b>ELECTRICITY</b>								
<b>AAA.3 1 Regional Rural Electrification Programme</b>								
Phase I National Surveys	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II	0 00	0 00	0 00	0 00		0 00	0 00	To be reformulated
<b>AAA. 2 Specialised Training in the Field of Electric Power</b>								
Phase I Prefeasibility study	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II The Sector Training Needs	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase III Five Year Regional Power Sector Training Programme	28 43	23 03	5 40	5 39	(SADC)	0 00	23 04	Funding sought.
<b>AAA.3 4 Regional Hydroelectric Hydrological Assistance Programme</b>								
Phase I Zambezi Basin	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II Zambezi and Other Basins								
Part I Upper and Middle Zambezi and Kafue Sub-Basins	4 50	4 50	0 00	4 50	(CAN)	0 00	0 00	Funding secured. Local contribution from SADC not yet budgeted.
Part II Lower Zambezi and Malawi Sub-Basins	4 00	4 00	0 00	0 00		0 00	4 00	Funding sought.
Part III Outside Zambezi Basin	0 00	0 00	0 00	0 00		0 00	0 00	
<b>AAA.3 5 Plan for Integrated Utilization of the Cunene River Basin</b>								
	0 62	0 60	0 02	0 02	(ANG)	0 00	0 00	Funding secured.
			0 00	0 60	(POR. BRA)			Partially implemented
<b>AAA.3 6 Power System Control and Operation Technical Support and Training</b>								
	0 00	0 00	0 00	0 00		0 00	0 00	Completed
<b>AAA.3 7 Computer Model for Analysis and Planning of SADC Transmission</b>								

## ENERGY

Project Title	Estimated Cost			Funding Secured		Funding	Financing	COMMENTS/STATUS
	Total	Foreign	Local	Amount	Source	Under Negotiation	Gap	
<i>US \$ Million</i>								
Systems								
Phase I Preliminary Study	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II SADC Power Grid Model	0 40	0 40	0 00	0 40	(NOR)	0 00	0 00	Under implementation
AAA.3 8 Coordinated Utilisation of Regional Generation and Transmission Capacities								
Phase I Inception	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II Intermediate	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase III Institutional	0 85	0 85	0 00	0 00		0 00	0 85	Funding sought
AAA.3 9 Power Station Maintenance Programme Phases I and II	0 00	0 00	0 00	0 00		0 00	0 00	Project under suspension.
AAA.3 10 Kafue Gorge Regional Training Centre	7 35	6 77	0 58	0 58	(SADC)	0 00	0 00	Under implementation
			0 00	6 77	(NOR/SWE)			
AAA.3 11 Lightning Research	1 03	1 03	0 00	0 00		0 00	1 03	Funding sought
ANG 3 2 Interconnection of Angola Grid to Namibia	0 00	0 00	0 00	0 00		0 00	0 00	Study completed. Project suspended
ANG 3 3 Completion of Gove Dam	0 00	0 00	0 00	0 00		0 00	0 00	Suspended
ANG 3 4 Provision of a communication and information system on the Angolan National Power Grid								
Phase I Evaluation study	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II Implementation	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Part I Northern System	1 95	1 80	0 15	1 80	(NOR)	0 00	0 00	Under implementation.
				0 15	(SADC)			
Part II Central & Southern Systems	0 00	0 00	0 00	0 00		0 00	0 00	Under suspension
ANG 3 6 Repair of Gove Dam	0 00	0 00	0 00	0 00		0 00	0 00	Suspended
BOT 1 Interconnection of the Botswana and Zimbabwe Grids	0 00	0 00	0 00	0 00		0 00	0 00	Expected to be completed in 1994
BOT 2 Power supply to Northern Botswana	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
BOT 4 Second 220KV Line from Moropule to Gaborone	0 00	0 00	0 00	0 00		0 00	0 00	Reactivated
LES 3 2 Transmission Network Development in Lesotho								
Phase III	10 60	10 60	0 00	0 00		0 00	10 60	Funding sought.
Phase IV	7 70	7 70	0 00	0 00		0 00	7 70	Funding sought.
Phase V	9 80	9 80	0 00	0 00		0 00	9 80	Funding sought.
Phase VI	4 50	4 50	0 00	0 00		0 00	4 50	Funding sought.
Phase VII	10 90	10 90	0 00	0 00		0 00	10 90	Funding sought.
LES 3 5 Quthing Hydropower Project	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
LES 3 6 Muela Hydropower Project	220 60	220 60	0 00	220 60	(EC ADB/ADF EIB CDC)	0 00	0 00	Under implementation
LES 3 7 Letseng Mines and Mokhotlong Supply								
Feasibility Study	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Phase I	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
Phase II	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn

## ENERGY

Project Title	Total	Estimated Cost		Funding Secured		Funding	Financing	COMMENTS/STATUS
		Foreign	Local	Amount	Source	Under Negotiation	Gap	
<i>US \$ Million</i>								
MAL 3 1								
Malawi Mozambique Electricity Supply in the Eastern and Western Border Regions								
Phase I	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Phase II	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
MAL 3 2	0 00	0 00	0 00	0 00		0 00	0 00	Funding secured bilaterally
MAL 3 5	3 98	3 05	0 93	0 93	(MAL,TAN)	0 00	3 05	Funding sought.
MAL 3 6	5 00	3 63	1 37	1 37	(MAL ZAM)	0 00	3 63	Funding sought.
MOZ 3 1								
Mozambique/Zimbabwe Cooperation in Electricity Supply (Xigadora Orange Grove 220 kV Interconnector)								
Phase I Study	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase II Tender documents and construction	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
MOZ 3 2	0 00	0 00	0 00	0 00		0 00	0 00	Reactivated
MOZ 3 5	0 00	0 00	0 00	0 00		0 00	0 00	Study to be initiated soon
MOZ 3 7	8 00	6 00	2 00	2 00	(MOZ)	0 00	0 00	Under implementation.
				6 00	(FRA)			
MOZ 3 10	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
MOZ 3 12								
Cahora Bassa Power for SADC Phases I and II Feasibility Study	0 00	0 00	0 00	0 00		0 00	0 00	Completed.
Phase III Engineering Services and Implementation	241 60	241 60	0 00	241 60	(SWE)	0 00	0 00	Funding secured
MOZ 3 13	0 12	0 12	0 00	0 12		0 00	0 00	Funding secured
Control Centre for the Supply of the Beira Corridor and Mozambique Zimbabwe Tie Line Phase I Feasibility Study								
NAM 3 1	0 00	0 00	0 00	0 00		0 00	0 00	Suspended
Power Supply Cooperation in Border Regions Between Angola and Namibia								
SWA 3 1	5 00	5 00	0 00	5 00	(SWA)	0 00	0 00	Financed by Swaziland.
TAN 3 4	0 00	0 00	0 00	0 00		0 00	0 00	Reformulated
Songwe River Hydropower Development								
TAN 3 5	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Power Supply to Tunduma and Mbozi in Tanzania from Nakonde in Zambia								
TAN 3 6								
Supply of Sumbawanga in Tanzania Phase I (Study)	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Phase II (Extension)	8 00	8 00	0 00	0 00		0 00	8 00	Funding sought
ZAM 3 2								
Upgrading of Kafue Gorge power Plant Phase II Extension (Training Centre)	0 00	0 00	0 00	0 00		0 00	0 00	Phase I and II completed

## ENERGY

Project Title	Total	Estimated Cost		Funding Secured		Funding	Financing	COMMENTS/STATUS
		Foreign	Local	Amount	Source	Under Negotiation	Gap	
<i>US \$ Million</i>								
Phase III Provision of spare parts	0 00	0 00	0 00	0 00		0 00	0 00	Funding secured
Phase IV Resoration after Fire Accident	54 70	50 22	4 48	50 22	(NOR)	0 00	0 00	Due for completion in the first quarter of 1994
				4 48	(SADC)			
ZAM 3 3 Rehabilitation of the National Control Centre								
Phase I	0 00	0 00	0 00	0 00		0 00	0 00	Completed
Phase II	8 50	8 50	0 00	8 50	(SWE)	0 00	0 00	Funding secured
			0 00					
ZAM 3 5 Power Line Carrier Communications on Northern Transmission System	0 00	0 00	0 00	0 00		0 00	0 00	Project reformulated. But no costing yet
ZAM 3 6 Rehabilitation of Victoria Falls Power Station								
Phase I Feasibility Study	0 26	0 25	0 01	0 25	(EIB)	0 00	0 00	Funding secured
				0 01	(ZAM)			
Phase II Implementation	10 00	10 00	0 00	10 00		0 00	0 00	Funding secured
ZAM 3 7 132 KV Tieline Zambia Malawi Feasibility Study	0 00	0 00	0 00	0 00		0 00	0 00	Completed and another study is being commissioned
ZAM 3 9 Power Cooperation Between Namibia and Zambia	15 94	14 55	1 39	1 39	(ZAM,NAM)	0 00	14 55	Funding sought.
ZIM 13 Upgrading of ZESA National Control Centre Installation, Commissioning and Training	5 20	3 50	1 70	1 70	(ZIM)	0 00	0 00	Funding secured. To be completed in 1994
				3 50	(SWE)			
<b>Sub-total</b>	<b>679.53</b>	<b>661.50</b>	<b>18.03</b>	<b>577.88</b>		<b>0 00</b>	<b>101.65</b>	
<b>NEW AND RENEWABLE SOURCE OF ENERGY</b>								
AAA 4 8 Assessment of Applications and Markets for wind energy in the SADC Region	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
AAA 4 9 Assessment of Applications and Markets for Industrial Process Solar Heat in the SADC Region	0 22	0 22	0 00	0 00		0 00	0 22	Funding sought
AAA 4 10 Assessment of Applications and Markets for Solar Power Heating in the SADC region	0 24	0 24	0 00	0 00		0 00	0 24	Funding sought
AAA 4 11 SADC Programme for Financing Energy Services for small scale Energy users (FINESSE)	0 44	0 42	0 02	0 02	(ANG,MOZ TAN)	0 00	0 42	Funding sought.
ANG 4 1 Installation and Rehabilitation of Wind Powered Water Pumps	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
LES 4 2 Solar Photovoltaic Power Generation in Rural Areas Lesotho Pilot Project								
Phase I Feasibility study	0 08	0 08	0 00	0 00		0 00	0 08	Funding sought
Phase II Implementation	0 25	0 25	0 00	0 00		0 00	0 25	Funding sought
TAN 4 1 Agricultural and Forestry Residue Utilisation for Energy Production	0 00	0 00	0 00	0 00		0 00	0 00	Withdrawn
TAN 4 2 Accelerated Biogas Diffusion Project	1 11	1 11	0 00	0 00		0 00	1 11	Funding sought.

## ENERGY

		Estimated Cost		Funding Secured		Funding	Financing	COMMENTS/STATUS	
Project Title		Total	Foreign	Local	Amount	Source	Under Negotiation		Gap
<b>US \$ Million</b>									
ZIM.4 1	Feasibility Study on the Utilisation of Solar Water Heating for Reducing Power Utility Demand Costs	0.25	0.25	0.00	0.00		0.00	0.25	Funding sought
<b>Sub-total</b>		<b>2.59</b>	<b>2.57</b>	<b>0.02</b>	<b>0.02</b>		<b>0.00</b>	<b>2.57</b>	
<b>WOODFUEL</b>									
AAA. 7	Support to TAU Woodfuel Section								
	Phase I	0.64	0.58	0.06	0.64	(EC/SADC)	0.00	0.00	Under implementation
	Phase II	0.78	0.68	0.10	0.10	SADC	0.00	0.68	Funding sought
AAA.5 8	Development of National Woodfuel Strategies and Plans								
	Phase I Development of TORs for LES/TAN	0.00	0.00	0.00	0.00		0.00	0.00	Completed
	Phase II Pilot Study	0.55	0.55	0.00	0.00		0.55	0.00	Negotiations underway with Norway
	Phase III Implementation	0.57	0.47	0.10	0.10	(SADC)	0.00	0.47	Funding sought.
AAA. 9	Identification & Support to NGO and Women's Groups Dealing with Wood fuel & Environmental Protection	0.46	0.40	0.06	0.06	(SADC)	0.00	0.40	Funding sought
AAA. 10	Identification of Suitable Tree Species for Energy Production in the SADC region	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA.5 11	Assessment of Environmental and Socio-Economic Impacts of Woodfuel Scarcity	2.53	2.30	0.23	0.23	(SADC)	0.00	2.30	Funding sought.
AAA.5 2	Household Woodfuel Consumption Survey in the SADCC Region. Phase I Feasibility Study	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA.5 13	Development of Fuelswitch Opportunities	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA.5 14	Increase of Public Awareness on Woodfuel and Environmental Issues	5.35	5.05	0.30	0.30	(SADC)	0.00	5.05	Funding sought.
AAA.5 15	Improvement of Woodfuel End use Efficiency in Rural Industries of the SADC Region	0.79	0.67	0.12	0.12	(SADC)	0.00	0.00	Under implementation
					0.67	(NET)			
AAA. 16	Development of Improved Charcoal Production Techniques	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA. 17	Rural Energy Planning and Environmental Training Programme	3.35	3.09	0.26	0.26	(SADC)	0.00	0.09	Funding sought.
AAA.5 18	Strengthening the Coverage of Wood-fuel and Environment Protection in relevant SADC Training Institutions	7.40	6.77	0.67	0.00		0.00	7.40	Funding sought.
<b>Sub-total</b>		<b>22.42</b>	<b>20.52</b>	<b>1.90</b>	<b>2.48</b>		<b>0.55</b>	<b>19.39</b>	
<b>ENERGY CONSERVATION</b>									
AAA.6 3	Continuing Development of Energy Conservation Activities at TAL								
	Phase I	0.00	0.00	0.00	0.00		0.00	0.00	Completed
	Phase II	0.24	0.22	0.02	0.02	(ANG)	0.00	0.22	Funding sought

## ENERGY

Project Title	Estimated Cost			Funding Secured		Funding	Financing	COMMENTS/STATUS
	Total	Foreign	Local	Amount	Source	Under Negotiation	Gap	
<i>US \$ Million</i>								
AAA.65 Energy Management in Industry	10.00	10.00	0.00	10.00	(SWE)	0.00	0.00	Funding secured
AAA.66 Energy Conservation and Fuel Substitution Opportunities in the SADC Transport Sector	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA.67 Development of Promotional Activities for Energy Efficiency	0.00	0.00	0.00	0.00		0.00	0.00	Withdrawn
AAA.69 Demandside Management Opportunities for SADC Utilities	0.99	0.99	0.00	0.00		0.00	0.99	Funding sought
AAA.61 Energy Efficiency Improvements in the SADC Heavy Industries								
Phase I Feasibility Study	0.40	0.40	0.00	0.00		0.00	0.40	Funding sought
Phase II Implementation	1.58	1.58	0.00	0.00		0.00	1.58	Funding sought
<b>Sub-total</b>	<b>13.21</b>	<b>13.19</b>	<b>0.02</b>	<b>10.02</b>		<b>0.00</b>	<b>3.19</b>	
<b>GRAND TOTAL</b>	<b>820.22</b>	<b>792.88</b>	<b>27.34</b>	<b>673.63</b>		<b>0.55</b>	<b>146.04</b>	