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XD9700195

48 p.
tables

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**Elaborated concept for a CASE in Southern Africa
(Centre/s for the Application of Solar Energy)**

prepared for

United Nations Industrial Development Organization

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November 1996

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Summary

This paper was commissioned by UNIDO, building on an Expert Group Meeting (EGM) held in Cape Town, December 1995, to discuss the prospects for a "CASE" in Southern Africa. The central objective of the global CASE concept is to support the efforts of developing countries to harness solar energy for their economic development. The aim of this paper is to elaborate possible functions and structure for a Southern African CASE, taking further the EGM discussions. The concept presented is intended for communication and comment among stakeholders in the region and internationally.

Quite dramatic expansions and high potential of solar energy applications in the region (SADC and neighbouring countries), plus limited support capacity both in the private and public sectors, provide new motivation for a Southern African CASE – previously judged premature. Southern Africa stands to be a major world market, in particular for solar photovoltaics, in the near to medium term.

The proposed overall objective of establishing a CASE in the region is to *increase the beneficial utilisation of solar energy in the region* and it is argued that (at least initially) bridging the gap between technology supply and the potential market demand will entail considerable public sector support. The initial proposed functions for a CASE are therefore partly oriented towards private-sector industry support but to a greater extent are aligned towards assisting public-interest pre-competitive functions such as

- the development and implementation of technical quality assurance standards
- training and human resource development
- marketing, dissemination, finance and implementation assistance
- information services
- contributions to policy development
- coordination and networking

To serve the regional objectives, while achieving the benefits of critical-mass and a longer-term planning framework, the recommended structure for a Southern African CASE is a combination of one or two "core" institutes, with radial links to affiliated institutions (of varying kinds) in the region and in country provinces. This combination seems advisable in order to achieve objectives which require both centralised (coordinating, critical-mass) activities as well as necessarily decentralised functions.

1. Introduction

For several years, there has been growing interest in establishing a CASE (Centre for Applications of Solar Energy) in Southern Africa. This paper represents a further step in this process.

1.1 Background

A central objective of the global CASE initiative, promoted by UNIDO, is to support the efforts of developing countries to harness solar energy for their economic development. The CASE concept was first implemented in Perth, Western Australia. The Perth CASE is located in a developed country, but is positioned to engage with developing countries particularly in the Pacific, South-East and Southern Asian regions. At the same time that the CASE in Perth was being established, Southern African interest grew: a similar centre (or network of centres) located in Southern Africa could help to support large-scale applications of solar energy in this region.

Initial SADCC approaches to UNIDO took place in the early 1990s, through the SADCC Energy Sector TAU.¹ At the time of this approach, however, establishment of a Southern African CASE was judged premature.

Meanwhile, the size of the existing and potential market for solar energy applications in the SADC region has continued to expand, particularly with South Africa's entry into SADC². Further contacts with CASE (Perth) and with UNIDO representatives took place, and in 1995 the South African government requested a feasibility study for the establishment of a CASE in Southern Africa.

Based on this request, UNIDO convened a consultative Expert Group Meeting (EGM), which was held at the Energy for Development Research Centre in Cape Town, 6 – 8 December 1995.

This EGM was attended by some 35 delegates with expertise in solar energy applications in Southern Africa, representing government departments of energy (from Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland and Zambia), R&D institutes, educational institutions, industry and business, NGOs, consultants and a few international agencies. A number of invited delegates, in particular from Zimbabwe, Mozambique and the SADC Energy Sector TAU in Angola, were unfortunately unable to attend at rather short notice.

The broad purpose of this meeting was to discuss the needs and opportunities for a CASE in Southern Africa. Current solar energy activities, programmes and plans in the region were summarised by delegates, to establish the scale of opportunities and the spread of existing institutional involvements in this field. More detailed discussions then focused on the key functions which could be served by a CASE, and the appropriate form and structure of a CASE (or preferably CASE network) in Southern Africa.

The status of this meeting was preliminary and consultative. It was not considered fully representative, nor intended to make decisions about a Southern African CASE, but

¹ SADCC (Southern African Development Coordination Conference) at that time represented the regional interests of member countries Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe. The Energy Sector TAU (Technical and Administrative Unit) has operated an active NRSE (New and Renewable Sources of Energy) division.

² SADC (the renamed Southern African Development Community) now includes Namibia, Mauritius and South Africa as further member states.

rather to provide a better-informed basis for further steps. A synopsis of main points from the EGM is provided in Annex A.

Arising from the EGM, UNIDO requested the development of an “elaborated concept” for a CASE in Southern Africa,³ and commissioned this report.

1.2 Aims of this report

The Terms of Reference for this report were as follows:

Based on the guidelines of framework for a Centre for Applications of Solar Energy (CASE) for Southern Africa, and as discussed at the EGM on a CASE Centre for Southern Africa, prepare an elaborated concept paper for Southern Africa CASE including the structure and scope of the Centre.

The objective is therefore to provide a document which will incorporate the main information and expert opinions expressed at the EGM, with additional elaboration on the suggested functions and scope of a Southern African CASE/network, and elaboration of a possible structure.

The document is intended to serve two main purposes,

- communication of the concepts to stakeholders (national, regional, international) for their information, comment and participation
- provide a basis to help formulate Terms of Reference for a possible feasibility study for CASE/s in Southern Africa

1.3 Scope

Two particular questions of scope were noted, in the EGM discussions, and apply in the present concept paper.

1. “Southern Africa” is usually equated with the member countries of SADC. However, other neighbouring countries such as Kenya have highly valuable experience and common needs in the field of solar energy applications. EGM delegates felt that rigid boundaries were unnecessary, and that CASE participation should be open amongst countries in the broader region.
2. In SADC countries, there are usually overlaps between solar energy, renewable energy, rural energy needs and broader development and environmental concerns. Although nearly all renewable energy applications in the region are derivatives of solar energy (wind, hydro, biomass, etc.), and the most widespread RE technologies are solar (particularly photovoltaics), it is not clear that “solar energy” is the best way of identifying the scope which could be served by a CASE/network in Southern Africa. This question was left open in the EGM, and remains open in this paper. The term solar energy will be used in its broad sense.

Further, there is no pre-supposition that a CASE should be a single centre. Instead, as stressed at the EGM, a regional network of participating institutions could constitute a preferred structure for CASE (see section 4.5). The use of the abbreviation CASE is therefore meant to include this option, throughout the document.

³ Three EGM delegates (from EDRC, CSIR and the University of Zimbabwe) were asked to collaborate in producing this document. Subsequently, UNIDO contracted EDRC but was not able to finalise contracts with the other nominees (Dr D Krueger of CSIR, and Dr E Naumann, UZ/Borda) by the end of 1995. Dieter Krueger nonetheless contributed valuable advice in the initial planning of this document, which is gratefully acknowledged.

2. Motivation for a CASE in Southern Africa

2.1 Brief statement of proposed CASE functions

In order to motivate for a CASE in Southern Africa, it is useful first to indicate the main functions which a CASE could serve.⁴ These functions will be discussed in section 3, and are merely listed in summary here:

- Technical support functions for solar energy applications, with a focus on technology assessment and quality assurance measures
- Training and human resource development
- Assistance with marketing strategies, dissemination programme design, finance and implementation
- Information functions
- Contributions to renewable energy policy development
- Coordination activities and fostering a regional network

2.2 Solar energy prospects and activities in the region

Biomass:

The majority of the population in Southern Africa live in rural areas, and 80-95% of rural households (in the different countries) rely on biomass for basic energy needs – cooking and heating. This is therefore the most socially significant use of renewable energy in the region, although largely non-commercial.

This widespread dependence on biomass is expected to continue for the foreseeable future, even if the access to alternative fuels and electricity is improved, due to lower monetary costs of biofuels in wooded areas. However, the environmental costs of over-exploitation, health hazards from indoor smoke, and the loss of productivity when families spend long hours collecting wood, are matters of general concern. Given the expectable continued dependency, and the fact that energy for cooking/heating is a priority concern⁵ in Southern Africa, most countries in the region have biomass-energy programmes. There is still enormous potential for improved utilisation of biomass (e.g. stoves and other efficiency measures) as well as finding acceptable widely-affordable alternatives – which in time may include solar-assisted cooking. It is suggested that such topics *should* be within the technology scope of a Southern African CASE, in view of their major importance.

The other side of the biomass equation, namely improved fuelwood supply and security through agro-forestry, woodlots, etc., entails a rather different set of organisational and development issues more strongly related to agricultural and forestry extension services, and it is suggested that these issues *should not* be systematically targeted by a CASE.

Biomass conversion technologies for producing higher-quality (cleaner, more versatile) fuels have strong potential both in the immediate and longer term, in those areas where feedstock is sufficiently plentiful. They include traditional biogas plants (at various scales) and gasification for decentralised power generation. International environmental incentives are likely to increase the rate of international R&D and local adoption of such technologies.

⁴ Substantial agreement was found, at the EGM, on the important functions which a CASE should serve in Southern Africa (although different groups at the EGM came up with slightly different prioritisations of these desired functions).

⁵ Emphasised at the EGM, and by rural communities.

Photovoltaics:

PV electrification has the highest profile in solar energy programmes in Southern Africa. As is well known, stand-alone PV systems are already cost-competitive for small-scale electricity requirements in remote/scattered areas where grid supply is not available or reticulation too expensive. These conditions are typical in much of Southern Africa. However (as is also well known) the dissemination of PV systems to rural households in developing countries presents many barriers and complex challenges. Most SADC and neighbouring countries have programmes, at varying scales, to address these challenges; and *the contribution which a CASE could make towards the success, efficiency and sustainable expansion of these programmes* (involving the private sector as well as public agencies) is considered the most obvious prime focus for a CASE in Southern Africa. It should be noted, however, that the balance of attention between PV and other solar or solar-related energy techniques varies in different countries. This would preferably be reflected in CASE activities. In the event of a regional network of affiliated CASE institutions, it would be expected to be reflected in different country specialisations.

A SADCC evaluation⁶ (excluding South Africa) indicated a total potential market for PV in the order of some 70 MWp, or more than 240 MWp in the event of systematic village electrification. The actual market will clearly depend on penetration levels achieved. For 5% penetration, the study estimated annual sales of more than 13 MWp/year, which is large and probably over-optimistic. Nonetheless, significant expanding PV programmes are under way in Zimbabwe and most other countries. In the broader region, Kenya is frequently cited as a paradigm for free-market PV electrification. Tens of thousands of solar home systems (SHSs) have been installed by private sector companies⁷ – outstripping rural grid electrification.

Estimated sales of SHSs in South Africa slightly exceed Kenya (perhaps 60 000), again supplied (in the past) by the unassisted private sector, but thus far only reaching more affluent rural and peri-urban households.

Present South African programmes include the PV-electrification of about 1000 rural clinics and 16 000 schools over the next five years, representing about 10-15 MWp at a programme cost of some USD 250 million. It is not certain if the total schools target will be achieved, but to date the annual numerical targets have been fully accomplished.

The unassisted private sector market for SHSs in South Africa has effectively collapsed, due to (i) widespread expectations of grid-electrification, which is highly subsidised, (ii) lack of clarity about grid electrification plans and economic criteria, and (iii) the relative dominance of other PV programmes implemented by institutional clients (e.g. schools, clinics, tele-communications) versus domestic sales. However, recognising the gaps and discrepancies, the SA government has established REFSA (“Renewable Energy for South Africa”) to act as a finance and implementation agency for renewable energy in general, and SHSs in particular. Policy attention is also being given to a unification of rural electrification strategies and subsidy finance (grid and solar). REFSA is in its infancy (one staff member, \$3-4 million start-up funding) and will face many hurdles. In its initial piloting phase, a few thousand SHSs are planned under REFSA, while the ongoing mid-range targets are about 500 000 SHSs over 10-15 years (about 25 MWp) at a value of about USD 300 million.

⁶ SADCC (1992) *Assessment of applications and markets for solar photovoltaic systems in the SADCC region*. SADCC Energy Sector TAU, Luanda.

⁷ However, both Zimbabwe’s UNDP/GEF-supported programme and Kenya’s private-sector market have so far only reached more affluent households, and have not yet developed dissemination strategies which reach the potential mass market of lower-income off-grid households.

PV water pumping (PVP) has special application in the region, as better water supply is a high priority in many areas. Several countries have demonstration/test programmes. South Africa has more than 3000 PVP installations (mainly on commercial farms) but has not yet systematically explored PVP for community water supply. Since the economic attractions of PVP are almost directly proportional to international reductions in PV module prices, benefiting from expanded world markets, it can be expected that PV water pumping will stand out as an increasingly important application of solar energy in Southern Africa.

In summary, significant PV programmes are under way; there are many common challenges in the region; and Southern Africa can constitute a major world market for PV in the near- to medium-term. However, in the Southern African region there are probably greater barriers for PV dissemination than in higher-income developing country regions, especially regarding (1) affordability levels, and (2) human resource capacity for distribution/delivery.

Grid-connected solar generation:

In the longer term, it is likely that PV (and/or other solar power conversion processes) will take over an increasing proportion of grid-connected central electricity generation. The transformation to renewable power generation is a global concern, and it is expected that the R&D for this will be concentrated in industrialised countries, while the comparative advantages of a Southern African CASE would be best allocated towards participation in demonstration and feasibility projects for central solar power generation (Southern Africa includes the best solar resources in the world, often correlated with low land-use value, but at the same time has low coal-fired and hydro electricity generating costs, and therefore lacks a strong motivation for investment in future alternatives). Namibia and South Africa are currently exploring the feasibility of grid-connected solar-thermal electricity generation, in a tentative way.

Low-temperature solar thermal:

This includes solar water heating, drying, process heat and energy management in buildings. Solar cooking has not yet been resolved, as low-temperature non-storage devices have not really stimulated end-user demand.

The solar water heating (SWH) market in Southern Africa is, to date, not much different from other developed/developing countries, with private customers concentrated in the higher-income groups, and with a range of institutional applications (mainly residential facilities). Solar water heating is not yet perceived as a cost-efficient priority for the majority of households, nor required as a policy measure for energy conservation.

Reliable information about SWH costs and benefits, and implementation of standards, can increase customer confidence. Development of durable low-cost devices could increase market penetration. Policy studies are needed to quantify effects (e.g. on displaced peak generation capacity) of higher SWH levels. It is likely that SWH would be the main solar energy target for urban households, and could have the greatest near-term impact on reduced greenhouse gas emissions, displacing mainly coal-fired electricity consumption.

Many other thermal applications in the region can benefit from solar energy or solar-related energy conservation measures. Agricultural drying is significant. Solar process heat in selected industries is under-developed in the region. And passive-solar building design is of major importance, as expressed in traditional architecture but often ignored in modern low-cost housing – and with strong prospects for energy-saving in the commercial built-environment.

Hydro:

Only some parts of Southern Africa have exploitable small-scale hydro resources, while large-scale hydro potential (on a few major rivers) is considered outside the scope of a CASE. Where resources exist for mini- or micro-hydro installations, the economics for decentralised power generation are usually better than any other alternative. However, as the opportunities for this are few, and the engineering is well known, it is doubtful whether small-scale hydro power should be prioritised in the technology scope of a CASE. (It should be a CASE function to review this question, however).

Wind energy:

Inland regions in Southern Africa have rather poor wind resources (usually less than 3.5 ms⁻¹ mean windspeed), while selected coastal regions receive moderate to fair windspeeds (e.g. 5 - 6 ms⁻¹), marginally suitable for power generation. In general, the inland wind resources are only favourable for water pumping, and not for electricity generation (except possibly in hybrid energy systems, in favourable locations). Grid-connected wind power is so far considered uneconomical, as long as coal-fired and hydro generation remain so cheap, but this could be explored for proof. Water pumping applications are widespread, with hundreds of thousands of wind-pumps installed using conventional technology.

Energy efficiency and conservation:

Environmental awareness is helping to promote renewable energy use, avoid unnecessary consumption of fossil fuels and encourage a more holistic treatment of human enterprise in relation to natural resources. As in most developing-country regions, there are conflicts between economic growth and conservation of resources, and between previous low-energy practices and more energy-intensive lifestyles and production. Huge potential exists for engaging people's attention to these issues.

Solar-related energy efficiency and conservation measures in the region focus on (1) building design, (2) solar water heating, (3) sustainable biomass use, and in general (4) improvement of energy-wasting practices.

Environmental awareness is a necessary and probable long-term dynamic for sustainable development. Applications for solar energy in Southern Africa are a key exemplar.

2.3 Existing institutional support for solar energy applications

This section briefly discusses existing institutional activities which support solar energy applications in the region. At the same time, related aspects of the solar industry are noted. The purpose is to outline unmet needs – where a CASE could assist.

Annex C provides a summary of the wide range of solar energy involvements reported by regional delegates at the Cape Town EGM. The list of activities is not complete for the region, of course, but provides a good indication of the types of agencies involved and the nature of main support activities in the region.

Testing and standards:

Most countries are engaged in solar standards activities, usually based in Departments of Energy (DoE's), and usually rather specific (related to projects/programmes) rather than systematic. In some, these activities are supported by renewable energy advisors from overseas aid and development agencies, and/or by local R&D groups. There is some communication but surprisingly little coordination between the testing and standards activities in different countries. The standards are mainly at a formative stage.

There have also been sporadic PV industry initiatives, e.g. in Zimbabwe and South Africa, to promote self-regulation, but there have often been conflicts within the industry and between industry players and national agencies/programmes in this respect. Self-regulation has generally not been judged effectual.

Ad hoc equipment testing and demonstration is widespread, both by DoE's and institutions such as universities, colleges, NGOs, renewable energy centres, etc. However, systematic R&D testing programmes have only been conducted at a few centres in the region.

Training, education and human resource development:

The widest spread of solar-support activities are reported in this field, with many institutions offering courses, mainly of a fairly general educational nature, at tertiary level. In addition, several countries provide practical training courses, e.g. for PV installation and maintenance technicians (in some case with a further business component). In general, there is very little effective coordination between and even within different countries.

There have been a few industry initiatives to seek funding for collective training which would be organised by industry, but in general industry training is in-house for own staff. In South Africa there is a growing tendency in large PV programmes to require established companies to train and mentor new contractors (to help create local employment and build capacity for expanded operations).

Marketing and dissemination:

Institutional assistance with marketing and dissemination varies with the nature of the technology, target group and scale of dissemination. Small-scale projects usually take a demonstration character, with intensive agency involvement but limited coverage (e.g. biogas, small PV projects, etc.). Larger projects and programmes usually run information/publicity campaigns, e.g. by DoE's, utilities or NGOs, which support private sector co-marketing in the case of dissemination by sales. In the case of grant-funded projects and programmes, "marketing" has less application, although consultations with recipients take a similar function. Rural consultations and marketing are frequently under-resourced. NGOs sometimes fill gaps in this rural interface, where public-sector extension staff lack the spread or capacity.

Industry marketing shows gaps in some important respects. For example, in the case of PV, company coverage is often restricted geographically; and there is an apparent tendency for larger companies to focus their attention on grant-funded or large institutional clients. The failure of improved-woodstove marketing in rural areas of South Africa is an illustration of similar difficulties. SWH suppliers in some cases have spoiled the collective market through irresponsible claims. And in general (particularly with PV) a combination of misleading claims and poor reliability have dogged the unregulated private-sector market in some localities. In the case of passive-solar building design, companies may lack a commercial motive and large programmes would require extensive information campaigns to home-owners, collaboration with the building industry, incentives and demonstration.

Policy development:

Most countries report policy-related and planning activities which have a bearing on solar energy applications. These activities are located in DoE's, often supported by international advisors or regional consultants, and with involvement of utilities and energy industry stakeholders. More general measures (e.g. energy masterplans, energy-use databases, etc.) predominate, while specific renewable energy activities are more often at a project/programme level and may not be fully integrated within wider energy policy frameworks – an important task which lies ahead.

Solar industries have generally lacked sufficiently strong industry organisations to influence government policies in a systematic way, and while there are usually strong operating contacts between policy-makers/planners and companies (reflecting DoE engagement in practical implementations) there is probably a gap at the policy-making level – and sometimes a measure of cynicism from industry’s side.

Finance:

Finance facilities for solar energy applications are certainly gaining increased attention in the region, often with international support. In particular, several countries have established revolving credit funds, etc., for assisting customer purchase of solar home systems. The establishment of REFSA in South Africa is a recent example; several others are listed in Annex C. Typically, solar energy finance can entail three main aspects, (1) small-scale “retail” loan finance for customers (locally accessible facilities for this are developed to very variable extents in the region); (2) development and operating finance for manufacturers/distributors (rather poorly developed, beyond the normal commercial finance mechanisms); and (3) larger-scale “wholesale” finance for on-lending through retail finance intermediaries (the latter being a topic of intense international attention for solar energy market development, and, for example, the main thrust of the recently-started SADC FINESSE programme).

Coordination:

SADC Energy Sector structures provide a framework for regional aspects of co-ordination. Renewable energy is a sub-sector, and this section of the TAU (based in Luanda) has made valuable contributions to regional renewable energy projects and policy development. Some observers consider that SADC structures may presently be in a transitional phase.

Coordination at a more operational level appears to be weak, both nationally and among countries in the region. The coordination function often rests with DoE’s, which may be under-staffed and stretched in capacity. Inadequate coordination has been noted in the following areas: R&D, training courses, project activities, standards, policy, and within the supply industry.

International agencies and internationally-assisted projects sometimes add capacity for improved coordination. Examples are the FINESSE initiative; the activities of REFAD (Renewable Energy for African Development) in project facilitation, finance and training; regional workshops sponsored by the Commonwealth Science Council; and EC-sponsored projects for information networking in the region (under the Synergy programme) and for renewable energy finance identification in the region – which are at a feasibility stage. Conversely, international initiatives are often highly fragmented and duplicate each other. This further stretches the local capacity for coordination.

The World Solar Summit in Harare, convened by UNESCO, was strongly attended by regional delegates and provided a good opportunity for expression of a coordinated *sense of purpose* at a political level. The task of operationalisation still lies ahead.

2.4 Present and future needs

Present needs, identified by regional participants, reflected a number of the “gaps” indicated above. A list of needs identified by EGM delegates is included in Annex C. The following were emphasised:

- **Technical needs:** further development and coordination of standards (with international collaboration); also, wider transfer of specialised expertise.

- **Human resource development and capacity-building** at various levels, including energy agency staff, intermediary structures (for finance, marketing, project implementation, etc.), rural entrepreneurs, technicians, suppliers and end-users.
- **Market development**, including programme design and evaluation, establishment of finance mechanisms, better assessments of energy needs and demand, and promotional activities.
- **Information and database activities**: collating information on energy needs, resources, and project/programme activities in the region.
- **Coordination**, as a theme running through all the above.

In addition, (i) some delegates (mainly from South Africa) stressed the need for more integrated energy and development policies, including attention to energy subsidies and finance and (ii) strong links with the industrial sector were emphasised throughout.

Future needs are difficult to predict with certainty. With increasing market maturity (referring to currently existing technologies) it is likely that the need for extensive public support roles would diminish and the role of private sector industries in the market would predominate. However, this may happen at different rates in different countries, and with different technologies. Further, the underlying economic conditions of low income-levels and limited access to regular markets in many parts of the region may change only slowly. Straightforward commercialisation cannot be expected.

The rate of technological development in the solar energy field is quite rapid, so it seems important to build up *flexible capacity* and train people to encounter future technical/application needs and opportunities. This implies accelerated high-quality scientific training (primarily a university function, but assisted by training and research opportunities in specialist solar energy centres, locally and internationally). At present, the market attractions in Southern Africa are very favourable for establishing international scientific links, and if this opportunity is harnessed now it will help lay a basis for future flexible response capacity, access to up-to-date knowledge and timely judgement of the emerging local R&D priorities.

The proposed functions for a Southern African CASE, presented in the next section, are mainly concerned with addressing near- and medium-term needs. At this stage, many of the challenges are to do with scaling up, consolidation, coordination and expanding the human resource base for market expansion. In these activities there appears to be plenty to do, within a 5–10 year planning horizon.

3. Proposed functions for a Southern African CASE

3.1 Overall objectives

The proposed overall primary objective of a Southern African CASE is to *increase the beneficial utilisation of solar energy in the region*.

This objective stresses end-use, rather than supply, but of course these are linked. From an industrial perspective, it implies bridging the gap between technology manufacturers and suppliers, and the potential markets in the region. This is unlikely to happen on a significant scale without initial support and intervention measures which, at least in part, are pre-competitive public investment activities. Such measures include *promotion and information dissemination, training and human resource development, technical assistance and quality assurance, and assistance with marketing and dissemination strategies (including finance identification)*. Such measures are therefore sub-objectives of a CASE.

It can be assumed in Southern Africa that such measures require public-interest support (national, regional and international), and to gain this support a further important sub-

objective is to *influence the policy environment*, through good information, analysis, publicity and demonstration of solar energy applications.

Finally, end-user groups (for many of the decentralised solar energy applications which are suitable for rural areas in Southern Africa) often lack access to information, resources and local implementation/organisational capacity. There is therefore a need to provide *support at local level* – informational, organisational, assistance with identifying needs and best options, and helping to build capacity for project implementation and maintenance. The objectives here take on a more development-oriented multi-disciplinary character, in which technology is only one aspect.

The recommended functions for a Southern African CASE should be in line with these objectives, but should focus on those functions which a CASE can perform *efficiently, competitively* (vis-à-vis other agencies) and *within resources*.

3.2 Technical functions

It is proposed that the technical functions of a Southern African CASE should emphasise technology assessment, testing and implementation of quality standards rather than basic research or the development of new products – although the technical capacity of staff, associates and trainees can be enhanced by some levels of involvement in innovative R&D.

The priorities are therefore seen as follows:

- ***Promotion and development of high quality specifications and standards suitable for solar energy applications in the region.*** This will entail extensive liaison with industry, an understanding of user needs, monitoring of installed products, good contacts with energy agencies in the region, and ongoing communication with international standards groups. The work should be coordinated with standards organisations in the region.
- ***Inspection, evaluation and testing of prototypes and new products.*** This service would be directed primarily at manufacturers, with the main aim of assisting product development and modifications for local applications. Such work, for particular clients, must be carefully separated from impartial standards activities, evaluations of tenders, etc.
- ***Testing components and systems for certification purposes,*** in accordance with adopted standard specifications and acceptance tests. Where such tests can be conducted by established standards organisations in the region or (where appropriate – e.g. PV module certification) internationally, the facilities need not be duplicated.
- ***Laboratory accreditation for solar product testing.*** The CASE itself would need to gain accreditation in terms of international or agreed national quality control standards. For decentralised product testing by different institutions, accreditation procedures would have to be extended and quality control measures monitored – possibly a joint CASE/SABS⁸ (South African Bureau of Standards) function.
- ***Authority to develop, monitor and adapt appropriate Codes of Practice.*** As with other standards, Codes of Practice (e.g. for PV system installation) require adaptations over time as well as impartial adjudication of contested deviations. A CASE could be authorised to perform such functions.

⁸ Alternatively, other national standards organisations, or as developed within current international laboratory accreditation initiatives.

- **Technical evaluation of tenders.** On request, the CASE could provide this service, which may include system/component acceptance tests for uncertified products.
- **Technical training.** The CASE should be able to provide technical training (at a research and standards/testing level) for personnel from other organisations, e.g. as interns and through courses (see 3.3).
- **Durability and field trials,** to establish long-term durability and reliability of products.
- **Technical (plus "social") system design capacity.** CASE staff and associates are likely to be called upon for these professional services, and should also produce or adapt system design guides and software tools (including energy resource databases) for the region. Special attention is required to gender issues, as women are main users and controllers of household energy.
- **Act as a node for international technology transfer** – primarily an information function (see 3.5) but also entailing technology scanning, evaluation and providing opportunities for local demonstration.

3.3 Human resource development

This is seen as a major challenge for expansion of solar energy applications in the region, and a CASE should be well placed to make targeted contributions, both through *direct training* as well as assisting the production of *materials for decentralised training and education*.

- **Short professional courses for industry, energy agency staff, consultants, etc.** in technical design and economics of solar energy systems.
- **Course structures and materials for decentralised training** (e.g. for maintenance and installation staff, end-user groups and for capacity building of local-level agencies and NGOs involved in implementation).
- **Coordination and quality monitoring for decentralised training courses.** It has been proposed that a CASE could perform a standardisation and subsequently accreditation function for training courses in the region.
- **Participation and training opportunities for new consultants.** One of the bottlenecks in the region is availability of consultants (preferably localised) for project design, project management, evaluation of user needs, etc. The CASE should provide training and opportunities for new consultants to take part in such activities together with CASE staff.
- **Orientation and policy-related courses for planners and officials,** directed towards national and local-level policies, planning and implementation.
- **Technical, marketing and business training for new entrepreneurs,** focusing on rural small and medium enterprises engaged in solar energy supply, installation and maintenance (in collaboration with other training institutes).
- **On-site training through internship and secondments,** in various CASE functions including technical, both centrally and in the field.

In addition, but depending to some extent on the location of the CASE institution/s, a range of broader educational functions should include:

- **Post-graduate courses and supervision of research**
- **Intern opportunities for students from developed countries**
- **Educational materials for school pupils**
- **Course materials for technical colleges**

3.4 Marketing and implementation assistance

This category covers a wide range of related activities, designed to increase sustainable growth in solar energy applications. It is based on a proposition (which tends to be supported by international developing-country experience) that “marketing” of solar energy technologies requires a combination of private sector enterprise and public sector assistance, in view of market barriers and difficult circumstances associated in particular with the rural energy market. Similarly, it is supposed that large-scale implementation typically involves a mix of private sector operations and public support (even “programmes”). The emphasis in the following is on support for small-scale decentralised solar technologies, such as PV.

- *Studies of energy needs, demand and market potential*, both as a public (pre-competitive) service and also, optionally, on contract for private clients.
- *Assistance in formulating marketing strategies or dissemination programme design*, based on cumulative experience in the region and internationally, and in collaboration with industry.
- *Monitoring, evaluation and documentation of solar energy projects and programmes*, for feedback to implementors, input into policy/strategy analysis, and production of documentary materials (print, video, etc.) which can assist further dissemination.
- *Promoting regional exchange of project/programme experience*, through collaboration of cross-country teams, regional workshops and information pooling. This can be extended internationally.
- *Highlight and help address barriers*, such as critical policy issues, human resource needs, and innovative finance and delivery methods.
- *Monitor end-user behaviour, satisfaction and benefits*, for guiding strategy adjustments, producing marketing and promotional information, and for analysing cost-benefits and the justifications for resource allocations (such as subsidies).
- *Assist/conduct demonstrations*, for end-user groups, planners and also for training purposes.
- *Assistance with proposals and project development* (both private and public sector) including community-level business plans and project proposals; business plans for small and medium enterprises; and assistance with plans and finance identification for institutions affiliated in a CASE network. Staff are likely to be called on to help develop programme proposals for national and international grant and loan funders, and may also be contracted for proposal evaluations.
- *Financing methods for solar energy provision*. Study and assist end-user finance mechanisms. Assist bundling of small-scale projects through national/ regional intermediaries to qualify for bulk finance, and maintain expertise on innovative bulk finance packaging (national, regional, international).
- *Project management services*. CASE staff and associates should be able to offer project management and other implementation services, on contract.

3.5 Information functions

Proposed information functions are linked closely with the other functions for a CASE, but the important information production, information management, publishing and dissemination activities are re-emphasised here. Information media would include print, electronic network, video and database forms.

- **Maintain databases and directories**, to include directories of products and suppliers, energy resource databases, and directories of energy-use, demographic and marketing databases (some will be public and others private domain).
- **Updated information about projects and programmes**, on a regional basis, preferably through subscriptions and contributions to a Web site, backed up by newsletters.
- **Production of technical briefs** on particular aspects, for dissemination to industry and other implementors.
- **Policy briefs** – short targeted papers to inform and influence policy-makers on solar energy experiences and strategies, and to make pro-active recommendations.
- **Production of training materials and design guides** (as outlined in section 3.3). Training materials should probably include videos as well as print forms.
- **Public awareness articles, videos and radio programmes** aimed at a general audience as well as potential end-users/customers.
- **Educational and public awareness materials for schools.**
- **Non-competitive promotion materials**, e.g. providing appealing but accurate public-interest information to potential users.
- **Library and information management services** – maintaining CASE information resources, search and acquisition methods (linking to regional and international information databases) and efficient distribution capabilities.

3.6 Policy development

It is not a CASE function to make government policies, but CASE staff should be well placed to make strategic contributions to policy development, through consultancy services (on request) as well as proactively. Hence the following functions are recommended in this area of activity:

- **Proactive policy recommendations**, based on accumulated local experience and keeping abreast of international developments, designed to reinforce a supportive policy environment for solar energy applications and the removal of barriers.
- **Renewable energy planning and policy advice services**, available to national and provincial government agencies in the region.
- **More detailed strategy analysis for implementing agencies**, based on monitoring and evaluation of projects and programmes, and pooled experience in the region. Given the often-important role in Southern Africa of public agencies in solar energy projects and programmes, such strategy analysis will accordingly often be policy-related.
- **Integration actions**, aimed at fostering integrated policies and strategies for resource allocation and service delivery, e.g. integration between (a) grid and off-grid electrification, (b) renewable and other energy provisions, (c) energy provision versus other services, and (d) between energy provision and broader developmental and income-generating activities. The latter is considered particularly important in Southern Africa (with distinctive characteristics in different localities).

3.7 Coordination and network development

Coordination among national and regional participants is a cross-cutting function which applies across most other proposed activities. However, since coordination is frequently under-resourced, it should be identified as a distinct goal in itself, and it is recommended (in section 4) that resources and dedicated person-power should be allocated for this purpose.

Active development of a proposed CASE network in the region (see section 4.5.1) can take several complementary forms, including

- 1) the *information networking* activities described in 3.5
- 2) *exchange of personnel* between participating institutions (for collaborative activities, secondments, etc.)
- 3) *assistance with proposals and business plans* of participating institutions, to help access resources
- 4) *organisation of conferences and workshops*

Face-to-face coordination is complicated by the large distances in Southern Africa. One proposal from the EGM was that a certain period in the year could be set aside for regional seminars and training courses. This could rationalise travel costs. Participants could assemble at a different centre in the region each year. At the same time, that centre's resources for ongoing training and R&D should be strengthened, thus contributing to the development of the CASE network.

4. Possible structure

Three main questions are addressed in this section, (1) the "external" structure of a CASE in Southern Africa (should it be a single centre, a network, etc.), (2) the internal or operating structure of the proposed CASE institution/s, and (3) related funding and finance issues.

4.1 Simplest structure – a single Centre

Although Southern Africa is a large region, there would be a number of advantages in establishing CASE as a single centre. Some of these are discussed below. There would also be disadvantages. The balance of opinion at the EGM in Cape Town was that a single-centre CASE would be less welcome than some form of network of affiliated institutions. That view is also reflected in the recommendations which follow (section 4.4). Nonetheless, these can be difficult decisions, coloured by many considerations and interests, so it is worthwhile to compare the advantages and disadvantages of a single centre.

4.2 Advantages and disadvantages

Potential advantages of a single centre include:

- better prospects for achieving critical mass
- greater synergy in taking on multiple functions
- easier to achieve a distinctive profile (in the region, and internationally) which can be beneficial for CASE promotion and fund-raising; for serving as a well-known information and services source; and for influence
- centralisation and larger scope can provide more justification for investment in the Centre's infrastructure (communications, technical equipment, accommodation) and administration
- benefits for training capacity, through bringing together a wider range of expertise and practical involvements
- better prospects for providing a one-stop information node for international enquiries, and a more efficient information serving-and-collection node for the region

- scarce management expertise can be superior (selectively recruited) and more efficiently employed
- simpler administration and auditing of funds
- the diversity and larger scale of operations should make it easier to attract a diversified (more sustainable) portfolio of funds and clients
- a more direct commitment is likely from the national host government
- these are favourable for a longer-term planning framework

Potential disadvantages of a single centre:

- there are no clear ideal candidate institutions in the region
- if the Centre turns out to be inefficient or ineffective, it could instead act as a bottleneck
- it would have less direct accessibility
- lack of close contact with local communities, industry, planners, and programmes in different countries
- regional interests are less likely to be served in an equitable way (technologies and needs of different countries may be unequally addressed)
- more likely to focus on host-country needs, since these needs alone may exceed the available resources
- CASE resources could be unfairly concentrated in one country, reduce job opportunities in others and even attract skilled staff away from their home countries
- it would not encourage the development of competitive advantages and specialisations among institutes in the region
- probably less incorporation of the diversity of regional experience
- probably less utilisation of dispersed skills and organisational capacity (among countries, at national, provincial and local levels)
- regional utilisation of centrally-provided services could be disempowering, encouraging a “taking” rather than “giving” orientation (particularly if a single centre gets preferential access to aid-funding)

Suggested principles in weighing up such advantages and disadvantages are

1. identify CASE functions which are best served by a central institute, a network of decentralised institutes, or a combination
2. maximise the “giving” opportunities for regional participants, as this is doubly reinforcing (capacity and participation building) and works against dependency

4.3 Alternative structures

A few delegates at the Cape Town EGM suggested that a CASE should be a “virtual” centre, i.e. a notional coordinating structure which draws together the functions performed separately by a number of existing institutions. However, on balance, this is not recommended. The arguments against this approach have stressed (1) the existing weaknesses in capacity for coordination, evident in the region, (2) the opinion that CASE staff must be involved in “doing” – in order to maintain a high level of practical knowledge and involvement, which would benefit CASE activities, training and influence, and (3) a concern that the existing institutions would lack critical mass and a long-term planning framework.

The majority of delegates therefore supported the following structure: an active hub (at least one, possibly two core institutions) connected radially to several other affiliated institutes in the region. It was proposed that such a combination could meet the objectives of achieving critical-mass benefits and a longer-term planning framework, while encouraging participation and increasing accessibility at local levels. The affiliated institutions could have national or provincial scope, and would ideally cater for decentralised functions (with support from the core institution/s).

4.4 Centralised and decentralised functions: discussion

It is clear that some functions discussed in section 3 could be performed effectively by one or more centralised institutions, while others need to be decentralised for best effect. Most often, a combination would be the best option. The following table attempts to summarise these points, as they apply to the various recommended functions.

The points in italics are implied functions (and definite needs) which seem to *require* decentralised institutional involvements.

COMPARISON OF CENTRALISED AND DECENTRALISED FUNCTIONS

Value of the function if –	Centralised	Decentralised	Combination of both	Collaboration essential?
■ Technical functions				
Developing quality standards	Good	Fair	Best	Yes
<i>Local adaptations</i>	Poor	Good	Good	Yes
Evaluation of new products	Good	Fair	Good	
Certification tests	Good	Fair	Good	Yes
Laboratory accreditation	Good			Yes
Authority for Codes of Practice	Fair	Fair		Yes
<i>Local standards monitoring</i>	Poor	Good	Good	
Evaluation of tenders	Fair	Fair	Good	
Technical training	Good	Fair	Best	
Durability and field trials	Good	Good	Good	
Technical/"social" system design	Good	Fair	Best	Yes
International technology transfer	Good	Fair	Best	Yes
■ Human resource development				
Short professional courses	Good	Fair	Best	
Materials for decentralised training	Good	Good	Best	
Coordinate decentralised training	Fair	Poor	Fair	Yes
<i>Carry out decentralised training</i>	Poor	Best		
Training for new consultants	Good	Good	Best	
Policy-oriented courses	Fair	Fair	Good	
Training for new entrepreneurs	Fair	Fair	Good	Yes
Internships and secondments	Good	Fair	Good	
Post-graduate courses	Good	Good	Best	
Students from developed countries	Good	Good	Good	
Educational materials for schools	Good	Good	Best	Yes
Course materials for colleges	Good	Fair	Good	Yes
■ Marketing & implementation				
Study energy needs and markets	Fair	Fair	Good	Yes
Marketing/dissemination strategies	Good	Good	Best	Yes
Monitoring, evaluation, documentation	Good	Good	Best	Yes
Exchange regional project experience			Best	
Highlight and help address barriers	Good	Good	Best	Yes
Monitor end-user satisfaction	Fair	Good	Best	Yes
Assist/conduct demonstrations	Good	Good	Good	
Proposals & project development	Good	Good	Best	Yes
Finance methods for solar energy	Good	Fair	Good	Yes
Project management services	Good	Fair	Best	
■ Information functions				
Maintain databases and directories	Good	Poor	Better	Yes
Updated information about projects	Good	Poor	Best	
Production of technical briefs	Good	Fair	Good	Yes
Policy briefs	Good	Fair	Better	Yes
Training materials & design guides	Good	Fair	Best	Yes
Public awareness media	Good	Fair	Best	
Education/awareness for schools	Good	Good	Best	Yes
Promotion materials	Good	Fair	Good	Yes
Library & information management	Good	Fair	Best	
■ Policy development				
Proactive policy recommendations	Good	Fair	Best	Yes
Planning/policy advice	Good	Fair	Better	Yes
Strategy analysis for implementors	Good	Fair	Better	Yes
Integration actions	Fair	Fair	Better	Yes
■ Coordination				
	Fair	Poor	Better	Yes

4.5 Proposal for the organisational structure of a CASE/network

4.5.1 "External" structure

The key features proposed are as follows:

(a) *One or two "core" institutions*

- Preference would be given to strengthening and adapting existing institutions rather than trying to establish a new centre.
- A single core institution is favoured, if a strongly suitable candidate can be found in the region, otherwise the combined capacity of two suitable complementary institutions may be preferred.
- In the latter case, an advantage for regional cooperation would be for the two institutions to be located in different countries (not suggested as an essential requirement, but to be weighed against other factors).
- In case of two core institutions, it is likely they would divide up functions. However, *one* institution should incorporate the following, to provide a clear coordinating point and help develop regional participation:
 - a dedicated regional coordination and assistance function
 - a regional (and international) information hub

(b) *Regional and provincial affiliates:*

Some variety is anticipated in institutions which may become regional/provincial affiliates in a CASE network, e.g.

- national/provincial centres which act as local network coordinators and share some similar characteristics to the "core" institutions – expanding, over time (with CASE support)
- smaller groups, possibly with particular specialisations or disciplinary strengths
- training and educational centres
- rural centres which may be closely engaged in local implementation, demonstration, training (it is recommended that core institution/s should have strong direct links with such rural-based centre/s)

A regionally-representative committee (e.g. within the SADC TAU structure) could oversee affiliations to the CASE and set out guideline criteria for affiliation.

(c) *CASE associates*

It is envisaged that CASE activities will often entail contracting out, and a system of CASE associates (individual consultants, groups, etc.) is proposed – see 4.5.2 below. Such associates may be based in various countries, and thereby contribute to the CASE/network regional structure.

(d) *International linkages*

- The core institution/s should act as the primary node for relationships with CASEs in other regions of the world, and help to coordinate N-S and S-S international linkages with R&D, business, financial and development agencies.
- Particular links and MoU's between international agencies (e.g. R&D, bilateral donors which have a country focus, etc.) with particular CASE affiliates in the region should be fostered individually, according to the nature of shared interests.

4.5.2 Internal operating structure, constitution and governance

There should be flexibility in proposals for the operating structure of the core institution/s, since this should be tailored to the institutions' existing structures and should also reflect the funding mix (in terms of lines of accountability, etc.). Some recommendations follow. Suggested aims are that the institution/s give priority to

- (1) a reliable, sustainable and transparent base, but
- (2) with built-in flexibility to respond to future needs and opportunities.

Professional management: High quality management is considered important, in view of the rather complex spread of activities proposed. Professional management, bringing superior *management skills* rather than subject-related expertise, is recommended. In this event, however, the professional management should be *accountable to core production staff* comprising a management committee plus director.

A "champion": It is common that successful institutions of this nature depend on the vision and capabilities of a "champion" – recommended for appointment as the director.

Independent Board: An independent Board should appoint initial senior staff and oversee the institution's policies and performance.⁹

Governance: The centre/s should have a constitution. The director and management committee (proposed) would be accountable to the Board on matters concerning policy setting and the centre's performance, with explicit review mechanisms, and all operations would be subject to the management, administrative and contracting procedures of the host institution. Normal contractual accountability to clients and funders would apply. In addition, it is proposed that "sponsors" (see below) have the right to give guidance at an annual meeting, and that the Board is charged to take account of sponsors' views.

"Sponsors": Three categories of sponsors are suggested, who would have forms of CASE subscriber membership: (i) donors and contract-clients, (ii) industry and institutional subscribers, who pay full subscription fees in return for a set of CASE services, and (iii) limited subscribers (presumed mainly from industry and other interested organisations), who would pay a modest membership fee in return for being on the CASE information network. It is proposed that for maximum participation all sponsors should be invited to attend an annual meeting (to include presentation of recent CASE achievements).

Relation to host government: The EGM recommended that the local host government should contribute *funding* to and take a key part in the *initiation* of a CASE centre (in liaison with SADC structures), but that the centre's operations should be autonomous of government, other than through the governance structures outlined above (government representation on the Board, as a sponsor, and through contractual relationships associated with government project funding). However a close and productive working relationship with government (national and local) is considered vital.

Core staff: The number of core full-time professional staff should depend on the functions taken on, and associated funding. The number should be sufficient to provide continuity of services and training, and to achieve a measure of "critical mass" (together with associates). The necessary number for this will also depend on the host institution environment (e.g. the number of non-CASE staff engaged in closely-related activities, and capacity to provide staff inputs to the CASE centre on a matrix basis); however, it is

⁹ Specific recommendations at the EGM for Board membership were: representatives of funding institutions (2), industry (1-3), affiliates (2), non-regional experts (2), host institution (1), host government (1).

considered essential to have a core of staff *dedicated* to the centre. Cross-disciplinary expertise is considered important.

Associates: A recommended staffing structure, for flexibility to respond to varying needs and for greater geographic flexibility, is a combination of core staff and part-time associates. The latter (e.g. consultants, independent development workers, etc.) would operate on sub-contracts, or may allocate an agreed proportion of their time to centre activities on a regular basis.

4.5.3 Facilities

Recommended facilities for the core institution/s should include the following. (In the event of division of functions between more than one institution, the facilities needed would reflect this accordingly.)

- **Technical facilities:** These should be sufficient for technology testing (adaptive R&D, technology assessment, durability tests and qualifications tests for implementing standards), subject to avoiding unnecessary duplication where suitable testing facilities and expertise are available elsewhere in the region (e.g. solar water heater testing by the SA Bureau of Standards) or internationally (e.g. facilities for full PV module qualifications tests, which may be too expensive to justify in Southern Africa). Highly specialised equipment should be avoided where possible and the initial focus should be on equipment which serves the large-demand areas. The technical facilities should also be suitable for training purposes.
- **Information technology:** Excellent basic communications (phone, fax, email, etc.) are prerequisites for efficiency. Full internet capabilities are required, and for communication with rural projects, NGOs, etc., satellite links should be considered. Computer hardware and software needs to include suitable cataloguing/enquiry, database and geographic information systems. Strong and efficient capability for publishing, documentation and promotional materials (electronic, print and video) should preferably be available in-house, or be readily accessible.
- **Physical facilities:** Depending on functions, the following may be required:
 - adequate laboratory and workshop facilities
 - outdoors testing facilities (these may need a separate location, for climatic or rural-testing purposes)
 - offices for administration, core professional staff and management, with additional flexible office space for accommodating team-workers (associates, other team consultants, international visitors, etc.)
 - working accommodation for trainees, interns, seconded personnel, students (preferably with flexible *expansion potential* rather than excessive fixed allocations)
 - venues for group training, workshops and at least convenient/cheap access to venues for larger conferences
 - access to suitable living accommodation for short-term trainees and other visitors (e.g. hotels, residences, etc.)
- **Transport/access:**
 - convenient airport access
 - reliable freight and courier services

4.5.4 Funding

Many other factors will flow from the potential funding of CASE centre/s and affiliates. Functions and structures will need to be planned in relation to this. The following broad principles are proposed.

1. The CASE centre/s should obtain core funding for at least the first three to five years, to cover their set-up costs, non-project management and administration, and permit secure medium-term planning.
2. Such core funding should be sought from a combination of national government and multilateral/bilateral donor agencies. In addition, contributory core funding commitments may be sought from large solar energy programme agencies, expected to be important beneficiaries of a CASE.
3. Core funding should be distinct from programme/project funding. The latter would be sought from public and private sector clients (national, regional and international) for specific programmes and projects, and be augmented by income from short-term consultancy.
4. Distinction should be made, in planning and budget development, between public sector and private sector income. It is proposed that in early years public sector funding is likely to predominate, due to the stage of solar energy market development in the region. Public sector funding will probably remain appropriate and necessary for some CASE functions, such as public-interest training and implementation of quality assurance measures, but there should be an explicit strategy to increase private sector income over time, as the markets become larger and more profitable.¹⁰
5. The centre/s should have a distinct budget component for regional facilitation and networking. This would be appropriately sought as grant-funding from multilateral/bilateral donor agencies, and possibly local institutions with a regional interest (e.g. Development Bank of Southern Africa).
6. It is not proposed that the CASE centre/s should act as a channel or source of core-funding for regional affiliates. This might lead to excessive powers and to allocative decisions of a political nature for which the centre/s would not have a suitable mandate. Instead, it is proposed that the centre/s should assist regional affiliates to prepare proposals and business plans to obtain their own core funding.
7. The CASE centre/s should, however, aim to channel projects and consultancy to regional affiliates and associates, where possible, in line with regional support objectives. This aim could be in the centre's constitution and be a monitored performance indicator.
8. Donors and clients with a regional interest should encourage/require joint ventures with regional affiliates, where appropriate.

5. Recommendations

5.1 Priority functions

The CASE functions proposed in section 3 are rather extensive. In addition, they may not include further desired functions which others may suggest. A full list of desirable functions can amount to a wish list, no doubt reflecting real needs and interests, but not practicable within the resources and expertise that can be assembled.

¹⁰ This implies an increasing responsiveness to private sector industry, and a growing similarity, for example, to the CASE in Perth.

It is therefore recommended that

- *the functions of particular institution/s in a CASE should realistically reflect capacity and resources.*
- *CASE institution/s should build upon established strengths and specialisations in taking on particular sets of functions.*
- *if resources are scarce, attention should focus on functions which particularly benefit from the networking concept of establishing a CASE, for example*
 - a proactive coordinating role in developing regional quality assurance standards
 - a coordination and accreditation role in training (plus active involvement, without which experience the coordination could be misguided)
 - promotion of regional exchange of project/programme experience (plus acting as an international information node)
 - maintaining information databases

But assuming it is possible to achieve genuine synergy and critical mass in a CASE/network, it is recommended that *quite a full range of the suggested functions should be planned.*

5.2 Consultation processes

The EGM held in Cape Town was one step in the regional consultation process about establishing a CASE in Southern Africa, but (as noted) it was not presumed to be either fully representative or to have any official status.

Several EGM delegates observed that CASE discussions should be closely coordinated with the SADC Energy Sector TAU. This view was reinforced at a subsequent SADC Energy Sector meeting, where it was also observed that many of the proposed CASE activities are also concerns within the SADC FINESSE programme¹¹ and should not be pursued independently of FINESSE. The views expressed on this occasion,¹² that FINESSE can integrate renewable energy activities in the region, may be over-optimistic however; and it is recommended that

- *further CASE consultations should be coordinated with SADC TAU and with the FINESSE (and other) initiatives, but*
- *it is likely that concrete developments towards a CASE will require distinct initiatives, and*
- *the commitment and enthusiasm of particular national governments, institutions and international backers should therefore be harnessed.*

It is recommended that if UNIDO wishes to proceed towards a feasibility study for a Southern African CASE, the plans and concepts for this should be distributed for comment to national representatives who attended the Cape Town EGM (who undertook to communicate such material to any other key stakeholders in their countries) plus Departments of Energy in countries which were not represented at the EGM; to the SADC FINESSE programme manager, and to the SADC Energy Sector TAU.

¹¹ Within the SADC FINESSE programme, country studies for South Africa, Lesotho and Zimbabwe have just started.

¹² According to minutes from the meeting.

Industry was under-represented at the EGM. It is recommended that

— *the national contact-persons should be asked to distribute the information to local industry organisations or relevant companies, who in turn should notify their wish to be part of subsequent consultations (e.g. during a feasibility enquiry).*

It is recommended that initial consultations with potential multilateral donor/ lending agencies, bilateral agencies, and international solar energy programme facilitation agencies (including UNESCO, the World Bank and UNDP) should take place, and similarly with potential funders and programme agencies in the region.

5.3 Identification of institutions

The identification of suitable institution/s for a Southern African CASE should be a (consultative) task for a feasibility study. The following *recommended criteria* for core institution/s are conveyed from the EGM:

- international and regional credibility
- management capability
- human resources: expertise and experience
- excellent infrastructure for communications, hardware, etc.
- accessibility
- potential to attract funding
- ability to network with SADC
- political and economic stability
- strong links with industry and public-sector organisations

5.4 Conclusion

The CASE concept proposed in this report is rather different from CASE guideline features described elsewhere.¹³ The differences reflect judgements about the needs in Southern Africa. Some of the differences are:

1. The original CASE concept seemed to emphasise a supply-driven dynamic from industrial manufacturers (backed by R&D achievements), and a core CASE function was to act as a broker between industrial manufacturers and developing-country markets – i.e. to help identify and realise the developing-country market potential. In Southern Africa, it is suggested that the very real demand and need for renewable energy solutions does not yet amount to a viable large-scale commercial market, and that public-sector agencies are likely to play a larger role in large-scale renewable energy programmes. Hence, the proposed CASE functions for Southern Africa are weighted towards support measures which can assist public agencies in their implementation programmes and their liaison with industry.
2. Barriers to large-scale adoption of renewable energy technologies, predominantly in rural areas of Southern Africa, are seen to lie “close to the ground” (e.g. local-level rural organisation, finance facilities, marketing, project facilitation, quality assurance, etc.) and therefore greater emphasis is given to CASE functions which can help to build up such capacities at local levels.
3. In general, a greater emphasis is given to human resource development. In a Southern African context, it is suggested that the development and spread of

¹³ e.g. in H Sharan (1993) *A global network of Centres for the Application of Solar Energy (CASE) within UNIDO/COSERA Framework*, UNIDO, Vienna.

appropriate skills and knowledge for renewable energy implementation is a precondition for sustainable growth in this field and an immediate bottleneck.

4. Original concepts for CASEs were flexible, regarding regional scope and the way that a CASE might serve a region, focus within a single country, etc.; but the regional outreach idea was undoubtedly important, and seemed to emphasise (i) a single Centre with superior capacity and critical mass which could then serve a wider region of developing countries, and (ii) a proposed network formed between several such international Centres. This report, however, proposes that greater weight should be given to networking of co-operating centres *within* the region served. Main motivations for this are in points 1–3 above: each of these points indicates a need for important CASE functions to be *localised* where possible (close liaison with national programme agencies; local rural development involvements; and a necessary combination of centralised and decentralised human resource development).

These differences of emphasis are recommended as suitable modifications and additions to the concept of a CASE/network for Southern Africa.

Annex A:

**Synopsis of Expert Group Meeting,
Cape Town 6–8 December 1995**

UNIDO EXPERT GROUP MEETING ON A "CASE" FOR SOUTHERN AFRICA

6—8 December 1995 at University of Cape Town

Provisional summary of some main points discussed

compiled by Bill Cowan, EDRC, 11.12.95

Please note:— This summary has not been confirmed by other delegates, and is for provisional information only. A report of the meeting will be issued by UNIDO in January.

1. Description of meeting

- Purpose: to discuss the needs and opportunities for a "CASE" for Southern Africa. CASE stands for Centre for Applications of Solar Energy.
- 3 day meeting at EDRC, University of Cape Town, sponsored by UNIDO.
- About 40 delegates from South Africa, Botswana, Namibia, Zambia, Swaziland, Malawi, Lesotho, Zimbabwe and USA.
- Status: preliminary, consultative, not decision-making, not fully representative nor official.

1.1 Sessions

- Day 1: (plenary) Introductions. Round-up of solar energy activities, programmes, etc., known to delegates in the region. Initial discussion of need for a CASE (a centre, or a network) and functions it should serve.
- Day 2: (smaller working groups, with plenary report-backs) Detailed discussions of key functions and recommended structure for a Southern African CASE/network.
- Day 3: (plenary with reduced group) Summary of conclusions of discussions and of the process forwards.

2. Summary of main areas of discussion

2.1 Round-up of solar energy-related activities, programmes, etc.

(all delegates)

- Extensive activities in the region (several hours of reporting).
- Commonalities in many areas (e.g. renewable energy training; technical standards development; establishment of revolving credit funds).
- Considerable duplication of activities and not much coordination.
- However some activities need to be duplicated, in different countries/provinces (e.g. decentralised training and capacity building).
- A step-change in the size of South African planned implementation programmes (mainly PV) with large investment and market interest.
- PV dominated discussions, but other renewable energy applications discussed to a lesser extent; regional variations of emphasis noted; thermal (especially cooking) needs noted.

2.2 A need for improved integration and coordination of activities

- A broad theme, relevant to the need for and functions of a CASE/network.
- Applicable to most of the categories below.
- Existing coordination bodies stretched in capacity.

- Existing coordination bodies could be strengthened, or elements of the coordination could be built into a CASE function.
- Should the coordination stand by itself (a “virtual” CASE, drawing on existing separate institutions) or be centred around active involvements/capacity?

2.3 Regional issues

(debated)

- Should a CASE start off being a national institution, and expand to a regional scope; or should it have a regional character but with a national core/location?
- Non-South African SADC country delegates and most South African delegates emphasised a regional scope.
- “With more funds flowing to South Africa, other countries will lose out if there is not a CASE”.
- Affiliation to (recognition by) SADC Energy Sector seen as important.
- However, in-country rather than regional initiation seen as more practical at this stage.

2.4 Possible structure

(this discussion, mainly by working groups, was interrelated with “functions and objectives” but is presented separately)

- A single Centre not preferred.
- However, a need for a core “lead” institution (or institutions), with a critical mass (size dependent on functions taken on).
- Strengthening of existing institution/s preferred, rather than trying to establish a new centre.
- Dynamic networking favoured, joining other key institutions as affiliates (e.g. in different countries/provinces). These could be strengthened and/or take on specialist contributing functions over time.
- A preference for combining coordination role with active role, rather than a virtual coordinating structure.
- Some divisions of specialisation (e.g. technical facilities, training and education facilities) between different lead institutions could be beneficial.
- Some activities should in any case be repeated throughout the region.

2.5 Possible constitution, governance and finance

(debated)

- Independent Board of Directors preferred.
- Non-government status preferred.
- Active industry linkages desirable.
- Constitution should make regional scope explicit.
- A mix of national and international funding preferred, with possibility of regional/international funding for regionally-oriented activities and exchange.
- Commercial contributions to the financing important.
- Board of Directors could comprise representatives of: funding agencies, host government, industry, regional affiliates, international experts and host institution.
- Initiation by host government suggested, in communication with regional structures and stakeholders.
- Board of Directors would appoint manager; further appointments and operational management relatively autonomous; appointments based on expertise and record of excellence.
- Income generating activities (consultancy, expert services, etc.) desirable for financial sustainability.

2.6 Functions and objectives

A large range of functions were discussed, with some differences of overall orientation, such as

- the idea that a CASE should be “programme driven” — i.e. mainly provide technical and review support for implementation projects/programmes under way (hence questions about who the main clients should be)
- the idea of a “virtual CASE”, being a coordination of existing activities
- an emphasis on training, education and capacity-building functions
- minority objections that a CASE would monopolise attention and funds, and would have a negative effect on industry

The foremost functions were identified in broad categories as follows:

- Technical quality standards, quality assurance measures, certification and testing
- Training and education (various levels)
- Evaluation of energy needs and market demand for solar applications
- Collection, management and dissemination/networking of information (ranging from coordination of activities and experience through to resource databases — nationally, regionally and also as an “international node”)
- Consultancy and expert services
- Finance identification (for the CASE network itself, and finance measures for projects, commercialisation of R&D, etc.)
- Promotion of CASE activities

Others included

- Acting as a channel for educating policy-makers, industry and institutions about requirements expressed by rural communities
- A channel for international technology transfer
- Inputs into national/regional policy development
- Monitoring and evaluation of implementation programmes

There was a tendency to regard fundamental research as not a primary function for a Southern African CASE/network — more attention to applications, adaptation, facilitating implementation programmes, and human resource development.

It was noted that the central objectives identified were similar to key concerns in the SADC “FINESSE” programme.

2.6.1 Training, education and human resource development

Some specific discussions in this area included:

- Recognition that many countries/institutions in the region are active in education and training, particularly at the tertiary (university/college) level, perhaps less so at the applied technical/installation/rural-entrepreneur level.
- Concern to coordinate with and be better informed about other regional training initiatives, in particular the subject of the forthcoming meeting in Malawi.
- Concern that resources were being wasted in duplication, and that some coordination of curriculum development and training materials would be beneficial.
- The idea that a CASE/network could be responsible for “certification” of curricula developed and applied at decentralised institutions and oversee standards/content.
- The idea of a “rotating centre” for training — a regional training/education team could assemble at a different centre each year to give courses. At the same time, that centre’s resources for ongoing training and R&D/demonstration should be strengthened.
- Multi-disciplinary capacity is important.

2.7 Location criteria for a CASE

Accepting the majority view in favour of a regional developing CASE network, centred around a core institution in one country (or more than one), some of the points regarding location of the lead centre/s included:

- South Africa is a probable location, but a number of institutions in other SADC countries could be considered. This should be a topic for evaluation in a subsequent feasibility study.
- A number of criteria were suggested by the working groups, to guide identification of suitable location/s:
 - political stability
 - economic stability
 - good SADC networking links
 - accessibility
 - excellent infrastructure (communications, hardware, etc.)
 - management capability
 - expertise and experience
 - ability to attract funds
 - credibility (regional and international)

3. Process forwards

The meeting was informal and consultative, and the process objectives were described by Mr Anthony Bromley, UNIDO, as

- presentation of information about the CASE concept
- discussion and gathering of opinions about Southern African requirements
- obtaining a provisional set of issues and recommendations which can be used to inform the next steps

The next steps may include:

1. Short report on the meeting, prepared by Mr Bromley for draft distribution to delegates, thereafter to be distributed to a wider more-representative network of Southern African stakeholders (target: end January).
2. Preparation of a concept document, based on the meeting, which can be distributed to regional and international interested parties, and which could be used as an input for setting terms of reference for a feasibility study. CSIR and EDRC (South Africa) and Dr. E Naumann (University of Zimbabwe) were requested to do this (target : by February).
3. A feasibility study, including consultation with potential donors and governments and other stakeholders (target: start around April, for 3 - 6 months).
4. The results of the feasibility study should include a proposal for establishment of a CASE/network — if found appropriate. This would be the decision point.
5. Actions for establishment.

However, it was recognised that allied initiatives parallel to this process may occur, in order to seek solutions for the urgent needs discussed at the meeting. In view of this, a particular need is for interim coordination.

Annex B:

**List of delegates at Expert Group Meeting,
Cape Town 6-8 December 1995**

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Cape Town, South Africa
6-8 December 1995*

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Annex C:

**Summary of present and future activities, and needs,
reported at the Expert Group Meeting**

Abbreviations

APHABEI	Advisory Project for Household & Building Energy Issues (GTZ supported), Lesotho
ARC - IAE	Agriculture Research Council / Institute of Agricultural Engineering, South Africa
Decon	Deutsche Energie-Consult Ingenieurgesellschaft, Germany
DMEA	Department of Mineral & Energy Affairs, South Africa
DOE	Department of Energy, Lesotho
EDG	Energy & Development Group, South Africa
GEF	Global Environmental Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit, Germany
IDT	Independent Development Trust, South Africa
MEM	Ministry of Energy and Mining, Malawi
MEW	Ministry of Energy & Water, Zambia
MME	Ministry of Mines & Energy, Namibia
MMRWA	Ministry of Mineral Resources & Water Affairs, Botswana
MNRE	Ministry of Natural Resources & Energy, Swaziland
PE Tech	Port Elizabeth Technikon / School of Electrical Engineering, South Africa
PenTech	Peninsula Technikon, South Africa
RDP	Reconstruction & Development Programme, a government development initiative, South Africa
REFAD	Renewable Energy for African Development, USA
REFSA	Renewable Energy for South Africa
SABS	South African Bureau of Standards, South Africa
U Zambia	University of Zambia
U Zimbabwe	University of Zimbabwe / Renewable Energy Programme
U Namibia	University of Namibia / Science & Technology Division
UCT - EDRC	University of Cape Town / Energy & Development Research Centre, South Africa
UCT - Elec Eng	University of Cape Town / Department of Electrical Engineering, South Africa
UPE - Dept Phys	University of Port Elizabeth / Department of Physics, South Africa
UWC - Dept Phys	University of the Western Cape / Department of Physics, South Africa
WWF	World Wildlife Fund

A. Current and Recent Activities Reported at the EGM

Organisation	Category		Activity	Notes
Botswana / MMRWA	application		establishment of a solar home system project (52 lighting systems)	implemented 3 years ago
Botswana / MMRWA	training		training of maintenance technicians	
Botswana / MMRWA	finance		determining mechanisms for financing photovoltaic systems	
Botswana / MMRWA	policy	coordination	integration of solar into the rural electrification programme	
Botswana / MMRWA	policy		energy policy formulation	in conjunction with UCT - EDRC
Botswana / MMRWA	standards		testing, and development of photovoltaic system standards and codes of practice	lacks legal backing for effective enforcement
Botswana / MMRWA	promotion		promotion of photovoltaic and solar thermal technologies (for example, through a demonstration solar village)	
Lesotho / DOE	coordination	industry	facilitating the formation of a solar energy industry association	
Lesotho / DOE	policy	database	formulation and review of a national energy masterplan and development of an associated database	
Lesotho / DOE	policy		formulation of a new electricity masterplan	
Lesotho / DOE	database		initiating a GIS on energy usage	
Lesotho / DOE	programme		solar home system / solar lantern dissemination programme	APHABEI project, implemented in conjunction with Decon
Lesotho / DOE	database		APHABEI solar database	
Lesotho / DOE	finance		establishment of a photovoltaic system loan facility through AGRIC Bank	
Lesotho / DOE	standards		testing of the in-field performance of solar systems	
Lesotho / DOE	standards		formulation of a code of practice for photovoltaic system installations	
Lesotho / DOE	training		photovoltaic technology training at technical school level	
Lesotho / DOE	promotion		marketing of photovoltaic systems via radio, theatre, leaflets, etc.	

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Malawi / MEM	coordination		overall coordination	
Malawi / MEM	promotion		implementation of demonstration projects / promotion	in conjunction with the Department of Works
Malawi / MEM	promotion		symposium on potential solar applications	problem with inadequate funding for implementation
Malawi / MEM	policy		formulation of national energy plans / policies	
Namibia / MME	programme	promotion	programme for the promotion of renewable energy (including the dissemination of solar home systems)	
Namibia / MME	training		training of installers	
Namibia / MME	policy		formulation of national energy policy (through the establishment of the National Energy Management Committee)	with representation from government, industry, NGOs
Namibia / MME	R&D	database	establishment of records of wind energy measurements	
Namibia / MME	application		photovoltaic water pumping projects	in conjunction with the Department of Water Affairs
Namibia / MME	promotion		photovoltaic system demonstration (at government facilities such as clinics, schools, etc. prior to dissemination programmes)	
Namibia / MME	database		utilisation of the LEAP database to inform on future needs	in conjunction with U Namibia
Namibia / MME	application		establishment of wind farm to feed into the national grid	
Namibia / U Namibia	R&D		research into renewable energy applications	
Namibia / U Namibia	promotion		photovoltaic demonstration projects (on campus and in rural environments)	
Namibia / U Namibia	consultancy		consultancy services	
Namibia / U Namibia	training		provision of training and education on renewable energy, and energy and the environment	
South Africa / ARC - IAE	R&D	consultancy	R&D, and consultancy in biogas, solar stills, solar vegetable driers	focusing on applications for agriculture in rural areas
South Africa / CSIR	R&D		R&D : photovoltaic water pumping, wind, solar thermal, social forestry, thermally efficient housing	
South Africa / CSIR	database		establishment of GIS facilities	
South Africa / CSIR	consultancy	application	engineering services and project management	

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South Africa / CSIR	promotion	application	community development projects, incorporating renewable energy technologies	
South Africa / DMEA	coordination		assessment of needs	
South Africa / DMEA	coordination	programme	coordination and facilitation of programmes / projects	
South Africa / DMEA	coordination	programme	channel of RDP funds for Eskom rural school electrification programme	
South Africa / DMEA	database		maintaining a database of renewable energy projects	
South Africa / DMEA	coordination	database	projections related to renewable energy requirements	
South Africa / DMEA	policy		policy development	
South Africa / DMEA	programme	finance	establishment of REFSA (to focus initially on solar household electrification in off-grid areas)	
South Africa / DMEA	R&D		R&D : photovoltaic systems, solar water heaters (and their applications), solar passive design, solar ovens, fuelwood	
South Africa / EDG	consultancy	application	engineering / project management (including a rural clinic electrification programme)	
South Africa / Eskom	database		database of information necessary for rural electrification planning	
South Africa / Eskom	programme	R&D	solar electrification of rural schools (including an evaluation of this programme)	
South Africa / Eskom	R&D		R&D: hybrid RAPS systems, renewable energy technologies	
South Africa / IDT	coordination		coordination of infrastructure projects with provincial governments	
South Africa / IDT	policy		micro-policy formulation	
South Africa / IDT	programme		photovoltaic / wind water pumping programme (focusing on water supply for clinics)	
South Africa / IDT	programme		rural clinic electrification programme	
South Africa / IDT	standards		funding of specific testing programmes	
South Africa / IDT	training	programme	training of field-workers for involvement in rural energy programmes (to form a national facilitation support team)	

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South Africa / IDT	promotion		demonstration of photovoltaic and other pumping systems (at conferences, workshops, exhibitions, etc.)	
South Africa / PE Tech	R&D		R&D : wind and hybrid systems; development of wind-electric water pumping technologies	with involvement of students in projects
South Africa / PE Tech	standards		establishment of test centre	
South Africa / PE Tech	training		establishment of a training centre, with a programme for RAPS (aimed at users, entrepreneurs, installation staff)	
South Africa / PenTech	R&D		case study of a photovoltaic water pumping project (involving long-term monitoring and evaluation)	
South Africa / PenTech	training	R&D	incorporation of renewable energy into the teaching curriculum and research projects	constrained by the availability of resources (staff, etc.)
South Africa / PenTech	training		held REFAD training course, with coordination of the on-going renewable energy tertiary education programme	
South Africa / Renaissance Management	industry		support for the establishment of a solar module assembly plant	
South Africa / Renaissance Management	training	programme	initiation of a rural solar store programme (incorporating small business development within a franchise concept) for the installation of systems, and support for the associated maintenance and finance arrangements	
South Africa / SABS	standards		test facilities for solar water heaters	
South Africa / Solar Electric Light Fund	application	promotion	solar home system dissemination project	in conjunction with the DMEA
South Africa / UCT - EDRC	database		establishment of a database on household energy surveys	
South Africa / UCT - EDRC	policy	R&D	support for the formulation of rural electrification strategies (including techno-economic studies assessing different technologies, cost-benefits, etc.)	
South Africa / UCT - EDRC	coordination		informal coordination role	
South Africa / UCT - EDRC	R&D		R&D : RAPS design guides (including software and manuals, and incorporating the testing and modelling of batteries, regulators, inverters, modules and overall systems - photovoltaic and hybrid)	

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South Africa / UCT - EDRC	R&D	policy	support for the establishment of the solar home system dissemination programme (policy and pilot project implementation)	in conjunction with Decon
South Africa / UCT - EDRC	R&D		design and support services for industry	
South Africa / UCT - EDRC	training		post-graduate training programme	currently by research only
South Africa / UCT - EDRC	standards		development of a code of practice and specifications for system installations	
South Africa / UCT - EDRC	standards		Development of standards for solar water heaters	
South Africa / UCT - Elec Eng	R&D		R&D (undergraduate and postgraduate levels) : inverter development, diesel / solar systems	
South Africa / UPE - Dept Phys	consultancy		provision of support to industry (for renewable energy applications)	
South Africa / UPE - Dept Phys	application		coordination of photovoltaic project in a rural village	in conjunction with Eskom
South Africa / UPE - Dept Phys	R&D		R&D : crystalline silicon cell processing	
South Africa / UPE - Dept Phys	standards		testing of photovoltaic modules (utilising a solar simulator)	donated solar simulator from Siemens (the only independent simulator in the country)
South Africa / UPE - Dept Phys	training		renewable energy education and training at a Masters and Doctorate level	
South Africa / UWC - Dept Phys	R&D		R&D : amorphous silicon development and testing, with international cooperation	
South Africa / UWC - Dept Phys	training		introduction of renewable energy related coursework into 3rd and 4th year curricula	
Southern Africa / ARC - IAE	promotion		renewable energy demonstration centre	requires further staffing for more substantial impact
Southern Africa / EDG	standards		testing (related, for example, to the vaccine cold chain)	
Southern Africa / EDG	R&D	standards	research support on standards, specifications, codes of practice	
Southern Africa / FINESSE	programme	finance	promotion of renewable energy technologies / energy efficiency (incorporating financing schemes, for small users)	active initially in South Africa, Lesotho and Zimbabwe
Southern Africa / REFAD	training		renewable energy training programmes (aimed at renewable energy instructors, and involving a number of technikons), covering photovoltaic, wind and solar thermal technologies, as well as business development	with 2 to 5 year commitment from the US government

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Southern Africa / REFAD	training		support for the establishment of a renewable energy training centre (constituted as a consortium of historically Black institutes)	
Southern Africa / UWC - Dept Phys	training		involvement in the REFAD solar training course	
Swaziland / MNRE	programme		solar electrification of key rural facilities (for example clinics)	
Swaziland / MNRE	programme		solar home system dissemination programme	in conjunction with IVAM
Swaziland / MNRE	application		photovoltaic water pumping schemes	
Swaziland / MNRE	R&D		solar water heating study (of institutes utilising large amounts of heated water)	with support from GTZ
Zambia / MEW	promotion		photovoltaic system demonstration programmes (including electrification of schools and clinics, and the provision of situation lighting)	
Zambia / MEW	coordination		overall coordination	
Zambia / MEW	finance		3% charge levied on electricity accounts for a rural electrification fund (which includes the utilisation of solar technologies)	
Zambia / MEW	policy		policy development	
Zambia / U Zambia	training		course on solar energy	
Zimbabwe / GEF	programme		solar home system dissemination project	
Zimbabwe / GTZ	programme		photovoltaic water pumping programme	

B. Future Activities Reported at EGM

Organisation	Category		Activities
World Bank			Solar Initiative
UNESCO			World Solar Summit process
Botswana & Namibia / REFAD	finance	standards	development of financing mechanism and standards specification for solar home system pilot projects
Botswana / MMRWA	finance		establishment of mechanisms for financing photovoltaic systems
Botswana / MMRWA	database		establishment of a database for the national energy masterplan
Lesotho / DOE	standards		testing / certification (in conjunction with the Solar Energy Industry Association)
Malawi / MEM	finance		establishment of a revolving loan fund (for renewable energy programmes)
Malawi / MEM	promotion		establishment of a demonstration solar village (with the University of Malawi)
Namibia / U Namibia	policy		policy formulation
Namibia / U Namibia	standards		quality assurance (testing and certification)
Namibia / MME	applications		establishment of a solar thermal electric power plant
Namibia / MME	promotion		promote the utilisation of solar water heaters
Namibia / MME	training		introduction of renewable energy curricula into the education system (from primary through to tertiary level)
South Africa / ARC - IAE	R&D		R&D : mechanisms for power generation from redundant wind pumps
South Africa / ARC - IAE	promotion		promotion through mobile demonstration units (displaying renewable energy systems, including solar water heaters, etc.)
South Africa / CSIR	standards		establishment of facilities for standards, testing, remote monitoring, etc.
South Africa / DMEA	coordination	finance	possible channel of funds for the IDT rural clinic electrification programme
South Africa / DMEA	coordination	finance	initiation of appropriate programmes, (and formulation of programme business plans for submission for RDP funding if necessary), and management of the implementation of programmes
South Africa / Department of Water Affairs	applications		utilisation of photovoltaic water pumping systems (on a pilot project basis)
South Africa / National Parks Board	applications		utilisation of photovoltaic water pumping systems (in the national game parks)
South Africa / PenTech	training		development of curricula and training programmes
South Africa / REFAD	finance		management of US government funding provided to Refsa
South Africa / UCT - EDRC	R&D	training	support for RAPS (including hybrid) systems - needs assessment, research, design guide and tool development, training
South Africa / UWC - Dept Phys	coordination	R&D	coordination of organisations working on photovoltaic materials

South Africa / UWC - Dept Phys	coordination	industry	cooperation and involvement with foreign industry
South Africa / UWC - Dept Phys	training		interested in involvement in school-level education
South Africa / EDG	consultancy		project management of solar home system pilot projects
South Africa / Renaissance	promotion		expansion of the solar home system franchise distribution network
Zambia / MEW	finance		establishment of a revolving fund to support renewable energy technologies (for household and institutional applications)
Zambia / MEW	standards		development of a code of practice and standards
South Africa / WWF	promotion		establishment of a Sustainable Development Resource Centre (aimed at businesses, NGO's etc. to promote sustainable development, and focusing on renewable energy and energy efficiency)
Zimbabwe / U Zim	training		introduction of renewable energy into the university curriculum (with links to industry and the University of Germany, and with a component of field research and dissemination)

C. Areas of Need, Identified at the EGM

Organisation	Category		Activity
South Africa / DMEA	standards		further development of appropriate quality assurance measures
South Africa / DMEA	training	industry	support for rural entrepreneurs
South Africa / DMEA	training		additional staff capacity within DMEA
South Africa / EDG	coordination		coordination of energy programmes in the country, within which renewable energy applications can be located
South Africa / EDG	standards		improved quality assurance measures
South Africa / EDG	database		dissemination of information on project and programme activities
South Africa / PenTech	consultancy		technical specialist support
South Africa / ARC - IAE	R&D		identification of on-the-ground needs (to inform national research planning)
South Africa / ARC - IAE	finance		additional funding
South Africa / Renaissance	finance		operating capital for the rural solar stores, and finance for end-users to procure solar home systems
South Africa / UCT - Elec Eng	policy	coordination	minimal bureaucratic involvement
South Africa / UCT - EDRC	coordination	programme	coordination at a national programme level (incorporating the principles of a broader development vision, location within the wider energy and infrastructural provision framework, and the optimal allocation of resources, and involving needs assessments, programme development and management and quality assurance)
South Africa / UCT - EDRC	policy		formulation and review of national policy (this may also include provincial-level policy, as well as subsidy and finance issues)
South Africa / UCT - EDRC	programme	coordination	establishment or support for intermediary structures (for example between the national agencies and local agents or end-users, and dealing with finance, delivery, maintenance, quality assurance, etc.)
South Africa / UCT - EDRC	promotion		'development' of the market for renewable energy technologies (including needs assessment and analysis, clarity on which areas are to be reached through grid-extension, end-user awareness, etc.)
South Africa / UCT - EDRC	R&D		programme evaluation and monitoring (assessing programme accomplishments in terms of the initial objectives, sustainability, socio-economic impacts, effectiveness of the technologies and infrastructures utilised, etc.)
South Africa / UCT - EDRC	database		networking amongst different participants (including the dissemination of information on project activities and experiences, technology transfers, expertise, etc.)
South Africa / UCT - EDRC	applications		development and implementation of appropriate end-use applications (for example productive or income-generation activities, water pumping, etc.)

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Lesotho / Decon	coordination		long-term planning and coordination
Lesotho / DOE	promotion		support solar passive design principles
Lesotho / DOE	R&D		development of efficient low-power appliances for renewable energy systems
Malawi / MEM	finance		additional funding
Malawi / MEM	coordination		overall coordination
Namibia / U Namibia	training		national human resource development
Namibia / U Namibia	training		strengthening of the internal institutional capacity
Namibia / MME	training		human resource development, further expertise
Namibia / MME	finance		establishment of finance mechanisms
Namibia / MME	policy		formulation of concrete policies (for example, dealing with import duties)
Namibia / MME	coordination		more effective coordination (complicated by the long distances involved)
South Africa / industry	standards		adoption of latest international standards and guidelines
South Africa / industry	training		further education of suppliers and end-users
South Africa / industry	training		education on energy efficiency and environmental issues
Southern Africa / UNIDO	coordination	database	overall coordination (incorporating, for example, a database or clearing house), and continuity within programmes
Southern Africa / UNIDO	coordination	database	an institution which can maintain a clear record of needs (made available to member organisations)
Southern Africa / UNIDO	promotion		links to environmental issues (for example, funding related to global warming issues might be attracted)
Southern Africa / UNIDO	industry		links to the industrial sector

Acknowledgement:

This listing was compiled from EGM minutes and workshop notes by Philip Geerds, EDRC.