Sida Evaluation 06/53

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and Economic Cooperation

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The 400 kV Interconnector project, which consists of building a 1100 kms long 400 kV transmission line from Aries in South Africa to Auas in Namibia, including two transformer stations, and the installation of the Sida-financed *Static Volt Ampere Reactor Compensator (SVC)* has been successful on all counts. *Implementation* of all parts was, by the parastatal NamPower, proficiently carried out, largely on time and within budgetary limits. There were some problems of design and of quality along the way, but they were all solved, and none was allowed to delay the project's time schedule, nor lead to cost overruns.

All *output targets* have been achieved to specification, and since commissioning the transmission line along with the two substations, including the SVC equipment, are delivering all the intended services to the full satisfaction of NamPower. A substantial proof of the good functioning of the line is that the experience gained is already applied as standard in new projects.

The Project

The *purpose* of the project was to satisfy the country's growing demand for electricity by enabling larger imports from RSA, as well as to create viable conditions for large scale new industrial investments planned for the future. The Swedish involvement concerned only the concessionary financing – by a 200 MSEK credit with 25% grant element t – of SVC in the Auas transformer station at a total cost of 132 million Rand, accounting for some 15% of the total project cost of 895 million Rand. The SVC are needed in order to improve efficiency by reducing energy losses along the transmission lines. Other donors were EIB, as the lead, AfDB and France.

As a condition for supporting the Interconnector investment, Sida, as well as the other donors, had requested that the grant element of the subsidized loans be placed in a fund to be used for rural electrification programs. Sida's original intention was to support also, with a 50 MSEK soft loan carrying a grant element of 76%, a NamPower *bond* issue. However, this project never got off the ground, because the interest rate level in Namibia rose dramatically in the period after Sida's decision.

The present evaluation is based on a two week visit to Namibia in November 2005.

The Energy Sector

NamPower's role in the electricity supply of Namibia is pervasive, dominating all levels and all components of the energy industry. In recent years about half of the country's consumption of electricity has come from imports. Namibia is today in a vulnerable situation, which can sometimes lead to very high cost of electricity consumption. NamPower today owns and operates three power stations. The 400 kV line was developed as an integral part of the SAPP regional network, and as such it can eventually form part of a regional grid connecting the Congo and Angola with RSA.

Almost all of public investment in rural electrification has so far gone to grid extension, and only about 2% to *Renewable energy sources* such as e.g. solar energy. Such projects have not been found commercially competitive nor technically supply reliable. But this may change in the future with further technological developments and with higher electricity prices. Namibia's preconditions in terms of number of sun hours is one of the very highest – if not the highest – in the world.. Rural development was in Namibia grossly neglected in the past.

Findings

Implementation – Attainment of Output Targets

Overall, implementation of the project went very well, and some components were finished ahead of schedule. Only relatively minor setbacks in the implementation and the commissioning occurred along the way. There were some design problems with the transmission line insulators, initial foundations and reactor earthings. Also some serious shortcomings in the quality of transformers at the manufacturing stage led to a small delay in commissioning. EIB's completion report assigns top score for overall Project Performance, namely "very good".

Static Volt Ampere Reactor Compensator (SVC)

The work of designing, supplying and installing the SVC progressed as planned. Together with the staff of NamPower the supplier ABB (Västerås) undertook several design changes particularly in the control software. The SVC today is, in NamPower's words, functioning beautifully, and everyone seems to agree that the equipment has been able to supply the much needed stability to Namibia's transmission system.

Coordination among Donors

Coordination among donors leaves much to be desired. Before the project there were frequent contacts and dialogue between the donors, but afterwards there has been no contacts at all, and the donors were apparently not aware of what – if any – follow-up or evaluation has been carried out by the others. For this they deserve to be criticized, for the area of evaluation and follow-up is one where donors could save a lot of time and resources by cooperating and pooling their resources.

Functioning of Transmission Line/substations today – Effects of Oroject

The transmission line has since commissioning been functioning very well and today provides all the intended services. The sharp decrease in transmission losses that has taken place is mainly attributed to the project. After the project the total transmission losses went down from about 16 to 10%. Then in 2003–2004 further down to 5%. The SVC has so far functioned very well, and has solved the voltage stability problem. Today, because of the SVC, the resonance problem that had plagued the Namibian grid is a thing of the past. An apparent proof of that the project is fully functional is that there are now plans under way to connect the Kokerboom station to a new 400 kV transmission line for the Skorpion Zinc mine.

Operation and Management

Referring mainly to its handling of the 400 kV Interconnector project, NamPower is today portrayed not only as being strong financially, but also as a company, which is able to undertake and managed large investment projects. In EIB's opinion "NamPower remains one of the most successfully managed utilities of the Southern African region, and consider NamPower staff to be very qualified and experienced at the technical level, something, which was confirmed in the 400 kV Interconnector project.

Financial Feasibility

The project cane out clearly profitable financially. NamPower's financial strength and solvency was high at the time of the investment in 1997–98 and continues to be very good today. In 2001 NamPower had an operating profit margin of 25% on its core activity. If financial investments are included NamPower's profit margin becomes 46%. Debt/asset ratio in 2004 was 14%, and Debt/equity ratio the same year 23%. This is very low in an industry, which depends on large infrastructure investments and very long pay-back periods. NamPower's profitability is impressive, not least because it is attained in spite of the tariffs for electricity in Namibia being lower than the LRMC level, meaning that they do not reflect all of the long run marginal cost involved in producing electricity.

Economic Analysis

As this evaluation has been able to confirm, the building of a 400 kV transmission line from RSA to Windhoek has been a very good proposition for the country's economy, because the line will be needed under all realistic scenarios with respect to the future expansion of the power supply. In 1997, the best (most economic) way for the country to secure its power need was to build the transmission line in order to allow increased imports from RSA. At the same time it is clear that the same transmission line – with the same capacity and the same location – will be needed if and when Namibia decides to develop further domestic generation capacity – irrespective of whether this is done by exploiting the gas fields in the Atlantic Ocean (the Kudu project) or by further exploiting water resources in the north near the border with Angola.

Rural Electrification

The rural electrification program, today implemented mainly by NamPower, seems to be well planned and well implemented. However, there have been long delays in implementation. The financing appears somewhat cumbersome, partly because the three donors – AfDB, EIB and Sida – all maintain their own rules and regulations on how their respective funds are to be used. Each fund has its own conditions. The Sida fund at present has 21,4 million unused balance after 12 million Rand have been spent on 5 groupings of projects, each consisting of 4–5 projects. According to current projections made be NamPower the remaining 21 million of Sida funds will have been all spent by June 2006.

Reporting Requirement

In contrast to its professional and competent implementation of the project itself, NamPower's performance in terms of providing documentation and information can not be given a high mark. For an investment project as big as this, there should be a more substantial completion reports than just a 4 to 5 page narrative, which has been produced.

Evaluative Conclusions

There can be no question that the project has had a positive impact on Namibia's prospects for *economic growth.* As for *poverty alleviation,* in a *direct* sense, the transmission line will have a small beneficial effect because it will enable many poor people to get connected to the electricity grid. Potentially the most important effect of electricity expansion on the poor is, however, *indirectly* through the effect it can have on the general economic development by providing power to new investments in industry and small businesses. An investment in a transmission line cannot really be said to have any bearing on the question of *HIV/AIDS,* at least not in any direct sense. In an *indirect* sense one can imagine that, as more communities (including rural ones) receive their electricity from the grid, it will become easier to fight the Aids epidemic. But this is not an effect, which is certain nor is it measurable. In terms of fighting the HIV/AIDS disease at company level, NamPower is reputed to be in the forefront among parastatals.

There are no major ill-effects on the *environment* from this project. There are potentially beneficial environmental effects of electrification, e.g. that the physical environment in peoples homes will improve, because with access to electricity there will be less need for Namibian households to burn fuels such as wood and paraffin, which is today often done in enclosed spaces with inadequate ventilation. With respect to *gender* there is no direct effect from investing in a transmission line, but again, *indirectly* electrification will improve the welfare of households. Women will not need to walk long distances to collect wood, it will be easier for children to read and do their homework, incubators can be used in maternity wards. Electric water pumps can make life easier for women and children who previously often had to fetch water from far away.

Reforms

Namibia has not yet gotten near to the unbundling stage, only to ring-fencing, which is a modest first step. Overall one may conclude that reforms in the energy sector so far include neither real competition nor any private sector participation. NamPower started its ring-fencing activities two years ago, and in 2004 the company, for the first time produced financial statements for the transmission and generation activities separately. So far ring-fencing has only affected accounting. No separation has taken place in terms of operations, personnel, or the organization of departments.

As part of the restructuring of the electricity supply industry, the government has decided to establish five *Regional Electricity Distributors*. So far only two licensed REDs have been established. Even if the RED system may be seen as step forward, some see a danger that it may be a way to crowd out potential private sector investment, which is what many believe is what happened when a private company, Northern electricity, was forced to leave the scene, apparently as result of pressure from both NamPower, the Ministry and from local authorities.

Additionality

No additionality has taken place with respect to the Swedish funding. NamPower is, and has for several years been a well managed company with plenty of liquidity and it is likely that it would have decided to go ahead with this important investment, and financed the SVC out of their own finds or out of commercial borrowing, had the Swedish soft loan not been available.

Also, the African Development Bank had already decided to finance the SVC before it new that Sida was interested. the investment.

Relevance

The SVCs installed in Auas will be used even if and when Namibia stops importing power from the RSA, for the 400 kV Interconnector will be used under any of the scenarios that are foreseen for the future in the country's generation plan. If and when KUDU comes on line, at least half of the power can be expected to be exported to RSA, and also then the SVC will be needed. The same goes for possible future power coming from Angola, Congo and/or Zambia. Under all conceivable future scenarios with respect to Namibia's energy supply the 400 kV interconnector, including the Sida-financed SVC in Auas, will be needed.

The 400 kV will at the very least be a necessary investment to secure the country's supply of electricity. At best it could in the future stand out as the backbone of an international southern African power pool, which allows the individual countries to trade power to each other on the spot market, thus allowing everyone to attain economies of scale in their domestic power production and to secure the lowest possible cost of electricity for the inhabitants.

Sustainability

Overall prospects for sustainability of the 400 kV Interconnector must be seen as very good.

Technologically, NamPower has shown a high level of proficiency, not least in the way it handled the 400 kV Interconnector investment. The existing electricity infrastructure, although much of it is quite old, seems to be well maintained and looked after. *Financially,* the company is, and has been, doing very well, and the only likelihood that the investment would run into financial problems would seem to be if electricity tariffs are not allowed to rise in a natural manner, or where a future incorrect un-bundling or privatization were to leave unsustainable business units behind. *Environmentally,* there is not much to fear. Except for electricity radiation the transmission line is not a polluter, and besides, it has been built in locations so as to minimize interference with other society functions. Finally, *economically,* the 400 kV transmission line will be a necessary component under any conceivable scenario of future electricity supply. It is therefore hardly conceivable that the line would become unsustainable from an economic point of view in the next few decades.

Lessons Learned

Function of parastatals

A lesson learned could be that also a 100% government owned parastatal can be able – under appropriate circumstances – to independently implement a large and complicated project, and also to efficiently run a large company. This should, however, not be construed as an argument for avoiding or delaying necessary unbundling and eventual privatization, for that is an avenue which must always be considered and tried. But the knowledge that a parastatal is functioning well, will provide the necessary perspective when designing the mode of and the process of various initiatives of unbundling and/ or privatization.

Recommendation

The need to coordinate with other donors – at the very least in such projects, where the scope and objectives of the respective support plans are identical – should be mandated explicitly in Sida's project memoranda, and also included in the formal financing decision. Possibly it can also be included as a paragraph in the project agreement which is signed with the recipient government.

1 Introduction

1.1 The Evaluation of the 400 kV Interconnector Project

The Auas transmission project, or the 400 kV Interconnector project, consists of the construction of 1100 kms of high voltage transmission lines from Aries in South Africa to Kokerboom and onwards to Auas in Namibia. Included in the project are also the erection and installation of transformer stations in Aries (RSA), Kokerboom and in Auas, situated 45 kms south of the capital Windhoek.

The Swedish involvement in this project concerned only the concessionary financing – by a 200 MSEK credit with 25% grant element t – of the *Static Volt Ampere Reactor Compensator (SVC)* in the Auas transformer station at a total cost of 132 million Rand, accounting for some 15% of the total project cost of 895 million Rand.

The project was implemented successfully during 1998–2000 – saving both money and time in relation to what had been planned –. The transmission line from Aries to Kokerboom was commissioned in May 1999, the 790 kms onward to Auas in October 2000, the transformer stations in 31 May 2000 and October 2000, while the SVC in Auas was commissioned in 6 October 2000. After five years of operation it is –as per Sida rules – time to carry out an ex post evaluation.

This evaluation is primarily concerned with the specific investment financed by Sida, namely the Stat Var Compensator. In terms of the project's logical framework analysis matrix, this means that at the implementation, and output levels mainly the Sida-financed part will be discussed. However when it comes to *effects* and *impacts* of the project, they are a function of the whole project, not just the Swedish component, and will therefore be analyzed in relation to the whole project.

1.2 The use of the Grant Element for Rural Electrification

As a formal condition for supporting the Interconnector investment, Sida had requested that the grant element of its concessionary loan (which arises when the government passes on Sida's subsidized credit to Nampower in the form of a commercial loan) be placed in a fund to be used for investments in rural electrification programs.

Even though the objective of supporting rural electrification was important to Sida, this activity was not appraised, nor was it discussed in Sida's project decision memorandum. Instead a reference is made to an evaluation carried out of by Norway of its support to rural electrification, and Sida's decision – to indirectly support this sector through the grant element fund – can be said to have been based on Norway's positive experience.

Being thus merely an indirect side activity, in relation to the 400 kV Interconnector project, the rural electrification program will not be in focus in this evaluation. However, a brief follow-up will be presented on the utilization of the Swedish fund, and also of the general experiences of the country's rural electrification activities.

1.3 The Bond Enhancement Facility

Sida's original intention and formal decision was *twofold:* (1) to support the Interconnector project by financing the Static VAR Compensator in the Auas substation, *and*, (2) to support *an initiative by Nampower to carry out a bond* issue as a means of securing long-term financing for its Interconnector investment from the local capital market. This second project, according to Sida's decision, would be supported through a separate soft loan of 50 MSEK carrying a grant element of 76%, and also the

proceeds from this grant element would be placed in similar fund as the one regarding the Interconnector funds, to be used for rural electrification.

However, the bond enhancement facility never got off the ground, apparently for the simple reason that the interest rate level in Namibia rose dramatically in the period after Sida's decision. With a very high interest level it is usually not a good proposition to raise long-term financing by issuing new bonds. Since the project never materialized there is obviously nothing to evaluate. Nevertheless I will provide some comments regarding the state of affairs in Namibia's bond market, and also briefly comment on the interest for future initiatives in this sector.

1.4 The field Mission

The evaluation is based on a two week visit to Namibia in November 2005, during which time visits were made to sections of the transmission line, to the Auas transformer station, and to the to Van Eck power station. Interview were carried out with over a dozen officers in NamPower, with officials from the Namibia government, and with representatives from the donor community. The field visit was preceded and followed by extensive study of available literature and documentation, as well as with interviews of some of Sida's staff.

2 The Evaluated Intervention

2.1 The Project

The project consists of a single circuit, overhead 400 kV transmission line built both in RSA and Namibia. In Namibia the line is 735 kms long, going from the border with RSA via the existing Kokerboom station to a newly built transformer station Auas, 40 kms south of the capital Windhoek, and in RSA it is 165 kms long, going from the existing transformer station Aries to the border. The existing station in Kokerboom was of 220 kV and the project included extending it to 400 kV capacity by installing 400/220 transformers. The project also includes installation of optical fiber cables for protection and for telecommunication purposes.

The Swedish involvement concerned only the concessionary financing of the *Static Volt Ampere Reactor Compensator (SVC)* in the Auas transformer station at a total cost of 132 million Rand, accounting for some 15% of the total project cost of 895 million Rand. The static VAR Compensators, or SVC for short, are needed in order to improve efficiency by reducing energy losses along the transmission lines. Previous studies had shown that over-voltages could make the system inoperable unless fast, effective and reliable countermeasures were taken. Most SVCs in the world are designed and installed for transfer purposes. But the one in Auas has been installed to mitigate the50 MHz resonance problem.

Table 1 shows the main cost items for the part of the project, which was on Namibian soil. South Africa's portion of the project cost was 18,2 million Rand for the transmission line, and 3,3 million for a substation upgrading. Of the total projected cost of 175,2 at appraisal 151,7 referred to Namibia and 23,5 to RSA.

Table 1: Main cost items in Namibia

	(million Rand)	(million Euro)
Project management	77	8,1
Transmission line	446	71,1
Kokerboom Sub-station	100	
Auas sub-station	140	
Total sub-stations	240	32,5
SVC	132	28,2
IDC		9,3
Total	**895**	**151,7**

The *purpose* of the project was to satisfy the country's growing demand for electricity by enabling larger imports from RSA, as well as to create viable conditions for large scale new industrial investments planned for the future. The two investments relevant at the time were the Ramatex textile mill, which today employs some 800 people in Windhoek, and the Skorpion project comprising a Zinc mine, as well as a refinery based on electricity, in southern Namibia.

With a projected growth of electricity consumption of 3.5% per annum, it was estimated that by the year 2003 either new generation capacity would have to be created or additional transmission capacity must be installed (beside the existing 220 kV line) in order to allow additional import from RSA. NamPower's conclusions in this respect were directly based on a sector study, which Swedepower – financed by Sida – carried out in 1995. The assumption of a 3.5% annual growth did not include additional demand that may come forward from large industrial users. Including these (potential) bigger users, the growth in demand, according to NamPower's estimates, would be up to 6% annually.

Agreements

In the summer of 1998 a Coordination Agreement was signed between Nampower, Sida and the Namibian government (represented by the Ministries of Finance and Mines and Energy). In its contents this agreement looks like a normal project agreement between the parties concerned. Originally the idea was that the two trusts to be constituted under the bond issue project would also be signatories to this agreement. However in order to simplify the agreement it was decided, after Nampower had pointed out that this would risk further delaying the process, to exclude the two trusts. In any case, subsequent developments were that the two trusts were never established. Among many other things this agreement (in Paragraph 4.4.1) specifies the amounts of the grant element which Nampower is required to deposit into the rural electrification trust account and the respective dates for this.

Sida's objectives

Sida's analysis of the project was made in close cooperation with EIB, with EIB acting as lead agency. In Sida's opinion this project fit well with Sweden's intention that its development cooperation with Namibia would transit from today's grant-based aid to a "broader economic cooperation". Sida's overall project goals, as stated in the project memorandum, were that the project would contribute to:

increase the private sector's share of the country's economy,

increase economic growth and employment, and

reduce poverty.

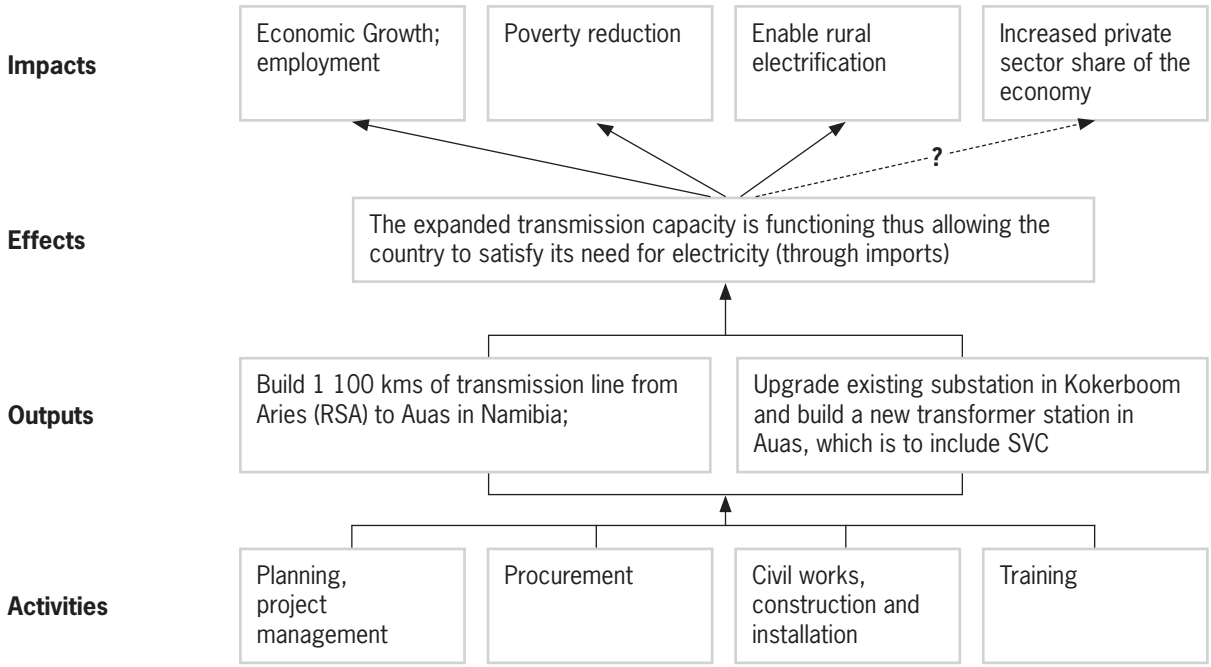
According to Sida's project memorandum these goals would contribute mainly to the overriding Swedish development objectives of *economic growth*, and also, to a certain extent, to economic and political *independence*. The immediate project objectives were to ensure that capacity be installed which during many years can allow import of electricity.

Among the general motives of Sida were that international experience had shown availability of energy to be a precondition for sustainable economic development. Sida's memorandum states that there are no discernible effects on gender and other equality from this project. An important ingredient of Sida's deliberations was that an expansion of the transmission capacity was seen as a precondition for rural electrification. W.r.t. rural electrification, a Norwegian evaluation had shown that such investments were good for development of public services to the poor, and that women could benefit by being exposed to less violence when lighting was present. The Norwegian study also found that financially such investments are not feasible, but that they are good from an economic standpoint

Goal Hierarchy of Means and Ends

Based on the objectives and targets stated in Sida's project document a goal hierarchy of means and ends for the project could look like in the following in Figure 1.

Figure 1: Goal hierarchy of means and ends



All of the above is straight forward, except for the assertion that the enhanced transmission capacity will contribute to increasing the private sector share of the Namibian economy. This is not strictly correct, because it is not the increased transmission capacity which – in itself – will influence this share. The correct chain of causes and effects is at best an indirect one, namely: *if* the share of private sector will increase (for any reason), then an increased transmission capacity will contribute to creating the preconditions for such a development to take place.

Foreign Financing

The two major foreign financiers were EIB and Sida which is shown in table 2.

Table 2: Foreign financing

	Million N $	Terms
Sida	120	7,62%, 15 years
EIB	370	13,95%, 20 years
AfDB	65	JIBAR + 0,5% (11.17%)
AFD (France)	35	JIBAR less 1,14% (9.83%), 20 years maturity of which the first 5 are grace
Total foreign	590	

Sida's Contribution

Sida's contribution was 120 million Rand (about 200 MSEK) loan through AB Svensk Exportkredit, with EKN issuing a guarantee in favor of AB Svensk Exportkredit. The interest rate is 7,62%, the maturity 15 years, and the facility is to be repaid in 30 equal semi-annual installments in June and December every year. The loan effectively contains a grant element of 25%, which is achieved by offering a credit with 7,6% interest given that the Namibian market rate is 14%.

The second loan intended was 50 million Rand (or MSEK 85) for bond market development. This credit had a grant element of 75%. According to the project objective this Swedish support would facilitate a bond issue planned by Nampower of 200 million Rand. The 50 M Rand were to be invested into a fund which would act as guarantee instrument for NamPower's bond emissions. Both the Swedish credits were given to the Namibian state on condition[1] that the on-lending to Nampower be done on commercial terms, and that Nampower must establish a Sida rural electrification Fund, into which NamPower will pay app. 40 million ZAR over a 6 year period to be used for social electrification of rural Namibia within a period of 10 years.

Cost to Sida's Budget

In all, the planned Swedish contribution was 170 million Rand or some 290 MSEK. The cost to Swedish development aid would be 136 million. Of which 51 for the ABB delivery and 85 for the bond market development program. Above this sum Sida decided to use its aid funds to finance a 6% guarantee premium.

Towards the end of 1998 the exchange rate between the SEK and the Rand had gone down from 1.7 to 1.4. Also, at the same time the interest rate level in Namibia had gone up from 13 to about 16 to 18%. Given the comparatively long maturity of the loan, the effect of these changes were substantial on the cost in SEK to Sida of the two projects. In a memorandum dated 17 December 1998 the cost to Sida's budget of the two projects was now estimated to SEK 169,5 million, which is about 35 million more than had been planned in the original project decision.

Sida Debate on Concessionality Level

Sida's original stance was to provide a credit on purely commercial grounds without any concessionality, which it communicated to Nampower in a letter on 5 February 1998. A rather sharp reaction to this followed from Nampower to Sida on 10 February, i.e. just five days later, something which apparently made Sida change its mind. and instead offer a concessionality level of 25%. Sida now considered a 25% grant element to be appropriate, given on the one hand the large size of the investment in relation to the country's economy, and, on the other hand, the project's relatively high profitability and because of the country's relatively strong financial situation. This was communicated to Nampower on February 20. Before that the Sida Project Committee had on February 13 criticized the decision of the Sida infrastructure division to offer concessionality to the "very profitable company Nampower". There were voices within Sida that spoke out against soft credits for energy developments because the government of Namibia was considered rich enough to finance its own energy needs.

[1] In a recent support to the upgrading of Malawi's electricity distribution system, Sida chose a different model for handling the counterpart funds. In this 95 million SEK grant support to the Malawi national electricity utility Eskom, mainly consisting of financing transformers from ABB, Sida did not set conditions with respect to the use of the counterpart funds. The support was given as a grant to the Finance Ministry, which extended it in the form of a loan to Eskom. After Eskom repaid the loan to the ministry these funds can be said to have acted just like untied budget support.

Sida's motive – in this case – of not conditioning the use of the counterpart funds, is stated explicitly in the project memorandum, namely that it is "in accordance with Sida's policy of not doubly tying aid". It is not clear to me why the same principle was not used regarding the grant element of the Namibia project. The fact that the Namibia support was in the form of a 50% grant element as compared to 100% grant in the case of Malawi should not make any difference in application of principles for aid tying.

OECD Rules

Given that this project was expected to be financially rather profitable, OECD rule would not have permitted the Sida loan to be tied to Swedish delivery. Moreover, according to OECD rule, when the grant element is as low as 25% then only untied credits may be offered. In terms of being able to promote Swedish export interests there was no problem for Sida to offer an untied credit, because the Stat var compensators produced by ABB were considered to be of top international standard, and the chances for ABB to win the upcoming tender were – justifiably – considered to be very good.

EIB

This Interconnector line was by the European Investment Bank, EIB, analyzed to be the least-cost solution for Namibia to secure its power supply – in this case by accessing the relatively cheap power surplus offered by RSA. The Bank became the lead donor, contributing a soft loan of 55 million Euro, which was intended mainly for the transmission line itself. The loan conditions were a maturity of 20 years including a grace period of 3 years, with subsequent repayments in 17 semi-annual installments, starting in June 2002. The interest rate was 3%, after a 1,97% subsidy.

Apart from the usual set of financial covenants imposed by the Bank there were two major conditions attached to EIB's loan. Firstly, the Namibian side undertook to continuously reform its electricity tariffs so as to cover all costs and to allow for a reasonable self-financing of its investment program. The other condition – along the same lines as in the case of Sida – was that the interest rate subsidy be placed into a fund to be used "to the satisfaction of the Bank" for the financing of rural electrification programs. About 100 million ZAR was expected to be contributed to this fund.

Originally EIB had planned to extend a loan both to Namibia and to RSA for their respective portions of the transmission line. Due, however to the fact that ESKOM's procurement procedures were deemed to be incompatible with the requirements of the Bank, the loan to RSA did not materialize.

Project Background

The Auas SVC was originally meant to be only of 50 mW, but was subsequently changed to 300 mW. It had to solve the 50 MHz resonance problem, which is unique for Namibia. Namibia has one other SVC, an AEG equipment installed in Omaruru in 1987. Most SVCs in the world are designed and installed for transfer purposes, but the one in Auas was needed in order to mitigate the50 MHz resonance problem. Without the SVCs it would not be possible to charge – energize – the line. Swedepower's study in 1996 had shown that the existing system was very sensitive to faults, and that there was a propensity for the system to destabilize and lose synchronization when a faults occur.

The SVC installed in Auas by ABB can be separated into two modules, in case one would want to ship it somewhere else. It was designed and tested in Västerås and manufactured in the ABB plant in Ludvika. The power-line built by the project was at the time of the start of the project said to be only the second power-line of its kind in the world, the first having recently been commissioned in South Africa. Its uniqueness consists in that it will minimize the effects of lightning, while the state of the art fiber optic lines can also be used for telecommunications purposes.

2.2 The Electricity Utility NamPower

NamPower (Pty) Ltd, which got its present name in 1996, was originally established in 1964 under the name SWAWEK – The South west African water and Electricity Corporation.

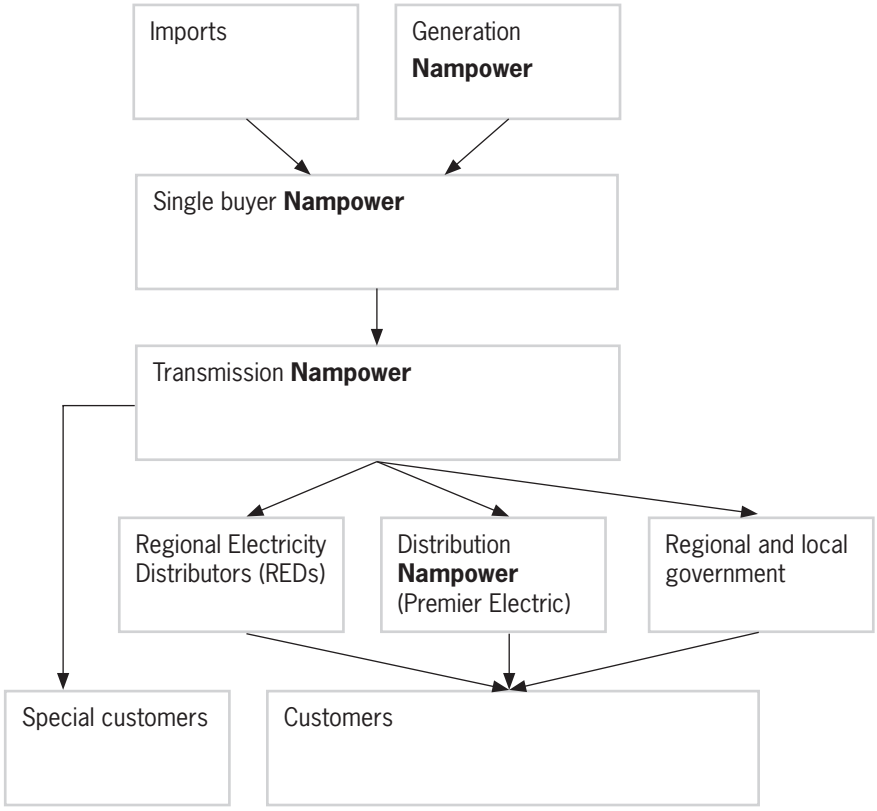
Nampower is not a typical parastatal. It is a so called PTY, *Property Limited Company,* a status which only a few of the parastatals have. The Government of Namibia is the sole owner, shareholder, of Nampower, and it is the Ministry of Mines and Energy, which holds all the powers and obligations afforded to a shareholder by the Companies Act. It is the cabinet, which appoints NamPower's board of directors and its Chairman. It is then the task of the Board to appoint the Managing Director.

The company has four regulated business units, namely generation, transmission, distribution and the single buyer function, which means that it has a monopoly on buying and distributing power from abroad. It also has non-regulated business units., e.g. various support services. It has a commercial arm consisting of Nampower investments including Nampower properties and Nampower International.

NamPower's Dominating Role

NamPower's role in the electricity supply of Namibia is all pervasive, dominating all levels and all components of the energy industry. It can be schematically described in figure 2:

Figure 2: NamPower's role in Namibia's electricity sector



Performance Agreement

In order to maintain a certain pressure on the 100-% state-owned but very independent company Nampower, the government has signed a *Performance Agreement* with Nampower. This agreement specifies quantitative achievement targets in more than a dozen areas. The most central is that the company's rate of return on total assets shall during a ten-year period be at least equal to the growth rate of the county's GDP or to the growth of population. It also specifies the requirements that the government has in terms of tariffs, dividends, investment policy, initiatives w.r.t. aids and HIV etc.

Other Projects

Nampower has recently awarded a contract to ABB/Alstom for the construction of a 400 kV transmission line from Kokerboom to the Skorpion Zinc mine. Also, ABB has won a tender to supply four thyristor rectifier plants to the Skorpion mine, said to be worth some Rand 38 million. In addition to the foreign loans shown in the above table, NamPower has (for other purposes) – according to its 2004 Annual Report – also contracted the following two international loans: From the Development Bank of Southern Africa 155 million Rand at 12.89%, repayable in three installments over 20 years. It also has secured a second loan from the EIB of 224 million Rand at an average interest rate of 8%, and repayable over 20 years.

Whenever Nampower engages in a so called "large project", the management of the project is handed over to an appointed "management committee" with wide ranging powers in all aspects of planning and implementing the project. The committee is lead by NamPower's Managing Director and includes five other key officers, including one named as project manger. So far this system has been applied in less than half a dozen cases, among them the 400 kV Interconnector project.

Recently Nampower has entered into a consortium including a Norwegian firm (TMP) as lead partner, in order to bid for a second telecommunications license in Namibia. It has also begun discussions with the government on the future use for telecommunications purposes of the optical fiber cables that have been installed in most of its transmission lines.

2.3 Namibia's Energy Sector

Namibia has today Africa's third highest electrification level at 20%, as well as one of the highest per capita consumptions of energy in Southern Africa. Only one fifth of its needs are satisfied by traditional fuels as e.g. wood for burning and heating purposes. With the on-going forceful program of rural electrification this share is expected to go down substantially over the next few years. There are in Namibia 1150 industrial and mining users who account for 26% of the country's demand for electricity. All of Namibia's 17 municipalities and 19 towns are served by grid electricity, and the urban access rate is 75%. Rural access today, however, stands at only 12%. In the document Vision 2030, Namibia is seen to have become an industrialized country, having attained an economic growth of 12%, which will put heavy demands on additional power supply.

Supply of Electricity

In recent years about half of the country's consumption of electricity has come from imports. The supply situation is shown in table 3.

Table 3: Power supply in Namibia, as at 30 June in GWh

	1995	1998	2001	2004
Domestic hydro power	1134	992	1211	
Domestic thermal	123	12	-	
Imports from RSA	758	1192	1045	
Imports from Zambia	-	15	21	
Total power supply	2015	2211	2277	

Today the cost of electricity in Namibia is – in general – very low for the following reasons:

Firstly, because most of the electricity comes from the water power in the Raucana station, which has been amortized along time ago. *Secondly,* because it receives very cheap electricity from RSA surplus capacity, and *thirdly,* because the country buys cheap surplus energy in the short term electricity market STEM within the SAPP. In the future the only source, which will remain cheap is Raucana. The coal fired Van Eck plant and the diesel driven Paratus, plant, because of their high operational cost, are today only used in emergency situations.

Namibia is today in a vulnerable situation, which can sometimes lead to very high cost of electricity consumption, like e.g. happened in November of 2005: There had been little rains in Angola, which prevented the Raucana hydroelectric power station from running at full capacity. By coincidence, South Africa simultaneously had to temporarily cut down in its supply, reportedly because of a temporary problem in the country's only nuclear power plant. Because of this Namibia, on an emergency basis, had to start firing up its coal power station Van Eck. This plant is situated just 10 kms from the City center and all the inhabitants could immediately see the smoke from Van Eck's twin chimneys filling up the Windhoek sky. To run three power sources simultaneously becomes extremely expensive for NamPower, and therefore the company was forced to consider power rationing or load shedding.

Installed Generation and transmission Capacity

The capacity installed in domestic generation and import transmission capacity as of year 2000 is shown in table 4.

Table 4: Generation and Import transmission Capacity in 2000

	MW
Raucana Hydro-power (near border with Angola)	249
Van Eck coal fired station in Windhoek	120
Paratus diesel power station in Walvis Bay	24
Total installed generation capacity	393
Transmission import capacity from RSA	675
Transmission import capacity from Zambia	3,5
Total capacity	1071,5

Nampower today owns and operates three power stations. The biggest is the hydro-power station in *Raucana* in the north which receives its waters from Angola, accounting for almost 50% of all electricity sold in 2004. Just 10 kms outside of the center of the capital Windhoek is the coal-driven power-station *Van Eck*, with a capacity of 120 MW and in the port town of Walvis Bay there is the *Paratus* station driven by diesel, with a generating capacity of 24 MW of electricity. Van Eck station, built in 1970, receives its coal from RSA, shipped to Walvis Bay from around the Cape. The station is currently being upgraded. The national control center for electricity is today in the NP head office in downtown Windhoek. Earlier it was hosed in the Van Eck station.

Because of the high and increasing price of coal, Van Eck is a very expensive source of energy for Nampower and is only use as back-up when absolutely necessary. Also the Paratus diesel power station is used only sporadically to provide peak-load needs. The latter two stations together account for only 2% of the electricity production. The Raucana power is supplied based on a *run-of-the-river* scheme, meaning that it operates according to level of rainfall in southern Angola, while the Van Eck and Paratus power stations are operated on standby schemes, meaning that they are put to work only when needed. This is when Raucana is *not* supplying and when there is – momentarily – no cheap electricity available from RSA.

Imports from RSA

About half of the country's consumption of electricity is currently being imported from RSA. Some smaller amounts of imports also came from Zambia and from Zimbabwe through its participation in an international spot market with participation of some of the southern African countries. Through this spot market Namibia also sells some small amount of power to RSA, Botswana and to Angola. Namibia's current reliance on RSA for about half of its electricity supply will soon become untenable. According to current projections, RSA's surplus will be over by the end of 2006. Due to its own need to supply its economic growth with energy, RSA will as of 2007 no longer be willing and able to supply Namibia with cheap, electricity. Furthermore, the transmission line in Northern cape is very congested, which could result in load curtailments in Namibia.

Even though Namibia today depends on imports for 50% of its electricity need, Nampower has great hopes to – in the near future – of being a net exporter to several of its neighboring countries. Even if Namibia manages to get a good supply agreement with RSA it will in the long run still need to develop trade with Zambia to secure its energy supply for the long run. According to the contract expiring by 31 December 2005, ESKOM has agreed to sell firm power (meaning that supply is guaranteed) to Nampower, while Nampower has agreed to sell to ESKOM emergency energy and any surplus energy.

ESKOM

NamPower's relationship with Eskom is of crucial importance to Namibia both in terms of imports today, and for possible exports in the long run. Eskom supplies about 95% of all electricity in RSA, which equals more than half of all electricity generated on the African continent. Eskom exports electricity to Botswana, Zimbabwe, Mozambique, Namibia, Swaziland, and Lesotho, and is said to be among the top five utilities in the world in terms of size and sales. Eskom, which currently operates 24 power stations with a nominal capacity of over 40,000 megawatts, is also said to be one of the Worlds lowest cost producers of electricity.

Transmission Network

The Nampower transmission network today consists of only one 400 kV line, namely the one built under the present project, running from Aries in South Africa via Kokerboom in the South up to Auas, near Windhoek.. The total length in Namibia is 988 kms. Further, the country has 521 kms of 330k lines, 1958 kms of 220 kV lines, 1588 kms of 132 kV lines, and 20762 kms of 66 kV lines (and below). Planning has been completed for a 220 kV transmission line from Katima Mulilo in the Caprivi economic zone to the Victoria Falls substation belonging to the Zambian utility ZESCO, which is to replace the existing 66 kV line. Other investment activities are being planned, or are on-going, to ensure future electricity trading with Botswana as well as with Angola. In Angola this work also entailed Nampower becoming engages in de-mining programs in southern Angola

Namibia's Generation Plan

A generation plan for Namibia was produced by Nampower in 2003, which carefully explains all available future supply options for the country, pointing out the financial costs as well as the economic and other impacts of the different individual investments and of different constellations of investments.

The plans described and discussed are often based on discussions and analyses, which have been carried out under the auspices of the regional power organization SAPP. And this is no coincidence, because it is consistently shown that the most economic way for the individual countries to secure their long run needs of power is through pooling. This turns out to be true for Africa just as it is true for Europe. Since the investment cost is so high one needs very high volumes of power production to reach low cost electricity. And such large volumes can normally not be produced based on the exclusive demand from domestic consumers. If however, the countries can sell electricity in times of excess capacity and buy in times of shortages through a regional pool arrangement, the power plants will be able to run at high utilization rates and the unit cost can come down dramatically.

The document also describes which types of power plants can usefully serve to supply *base-load* needs and which ones are more suitable for *peak-load* demand. The general rule is this: Plants which operate most economically at low utilization rates will usually be most suited for peak-load supply, while the type of generation which operates most economically at high utilization rates will be ideally suited for base load supply. Overall the type of power plant, which in Namibia can produce the lowest cost electricity are the small – run of the river – hydro projects, and for the future these can be developed in parallel with larger plants that cater to regional demand rather than exclusively domestic demand.

One conclusion to make based on the generation plan is that the ARIES-AUAS 400 kV Interconnector will be needed under almost any scenario for future expansion of the electricity production.

Future Supply Sources

When judging about Namibia's long term supply situation it is important to see it in relation to the future potential co-operation with the other countries in SAPP in general, and at the ability and willingness on the part of RSA to continue supplying part of its cheap surplus electricity to Namibia.
The alternative energy sources for the future that the country is currently looking into are the following:

– Hydro-electric power plant in *Popa Falls* in the Kavango river

– Hydro-electric power plant in *Epupa* on the Kunene river

– The *Kudu* gas field in the ocean outside of the southern city of Oranjemund

– The *Caprivi link:* transmission lines allowing imports from Zambia,

– The *Inga* scheme in the Democratic Republic of Conga. These are transmission lines, which hook up the Congo with SAPP including Namibia

In addition to these there are a number of other cross-border schemes under way or being planned. The Inga power project in the DPC Congo has an estimated total generation capacity of 40,000 MW, of which 1775 MW have already been installed. In 2003 the power utilities of five countries (RSA, Botswana, Congo, Angola and Namibia) created a joint company with the task of supplying power from Inga to RSA. The 400kV Interconnector will form an alternative route to the large potential hydro resources in the Democratic Republic of the Congo, which will complement the existing transmission link from Inga to Copper Belt region in Zambia.

The main potential of Namibia's domestic generation resources are summarized as in table 5.

Table 5: Future potential domestic generation capacity

Power source	Type	Potential capacity MW	Earliest commissioning date	Cost of energy, US cents per kWh
Lower Kunene	Hydro	+/- 2000	2013	4.2 – 4.8
Kudu gas	Gas turbines	800	2007	2.4
Orange River	Mini hydros	80		1.3
Okavango River	Hydro	30	2008	1.7

The Kudu project

Currently most of NamPower's investment plans are geared toward the Kudu gas field in the Atlantic Ocean off the coast of Southern Namibia. This field has proven reserves of 1,3 trillion cubic feet, which is enough to feed an 800 MW station for over 20 years, but probably there is as much as 1600 mW. Already an option–memorandum (by which RSA is able to buy much of the electricity generated from a future Kudu gas), has been signed between Nampower and ESKOM.

The project has three phases

1. to develop the gas field off-shore from Oranjemund

2. to plan and to carry out the investment into a 800 MW power plant and to produce electricity using the off-shore gas. This stage has by the government been mandated to Nampower.,

3. to build the transmission lines necessary to integrate the Kudu power into Namibia's national grid as well as into the lines going to ESKOM in RSA. Also this stage has been mandated to Nampower, which will work together with ESKOM.

Kudu could generate up to 16,000 MW, but can only be developed in co-operation with the other countries. If 800 is produced in the future only 200 would be used in Namibia while 600 is expected to exported to RSA. Or, they could send all of it to RSA and buy back the amount that the country needs from time to time. NamPower's cost for Kudu is estimated to be 550 million Rand. If the KUDU project can be seen as long-term solution to the country's energy needs, then the Caprivi link can be said to offer a short to medium tem solution to the energy balance problem.

Renewable Energy Sources

Almost all of public investment in rural electrification has so far gone to grid extension, and only about 2% to other activities such as e.g. solar energy. In the generation master plan set up by Nampower, generation of electricity from renewable sources such as solar and biomass power were not considered, because identified projects were not found to be commercially competitive nor technically supply reliable. NamPower, however, points out that this may change in the future with further technological developments and with higher electricity prices.

Solar energy is very expensive and not very efficient. Therefore it is not easy for Namibia to embark upon this power source even though Namibia's preconditions in terms of number of sun hours is one of the very highest – if not the highest – in the world.

Both w.r.t. sun and wind Namibia has one of the best endowments in the world, There is an average 3,300 hours of sunshine a year, and the wind speed along the southern coast ranges constantly between 6 and 8 meters per second. The country also has plenty of untapped hydro power. However, even if the country's potential in sun and wind power are very large relatively speaking, these sources are – internationally – still very expensive to develop in an economic way, and do therefore not appear to offer a solution in the near future.

Regional cooperation through the Southern African Power Pool, SAPP

The main tasks of the Southern African Power Pool, SAPP are to

- *advise* in the restructuring of the sector
- *promote* rural electrification
- *promote* the introduction of cost-reflective pricing, which will strike the balance of providing return on investment while at the same time offering affordable and competitive prices to the consumers
- *promote* interconnectivity of the member countries, and
- *develop* a competitive electricity market in SAPP, with the main goal of developing a regional spot market in the SADC region and to help transform SAPP from a cooperative pool into an competitive pool.

The 400 kV line was developed as an integral part of the SAPP regional network, and as such it can eventually form part of a regional grid connecting the Congo and Angola with RSA. Thus the Auas-Kokerboom-Aries line will provide an alternative connection of southern Africa to the large Inga supply in the Congo, beside the existing line from Inga to the copper belt in Zambia. If and when the Kudu power is developed then the 400 kV line will also be used to supply large amounts of electricity from Kudu to RSA. Therefore the 400 kV Interconnector project is integrated with the objectives of SAPP cooperation. When the Raucana transformers broke down during the period of the highest flows of water in Raucana, Nampower on an emergency basis had to increase its imports from RSA. However the country could the take advantage of the SAPP rules which allow the replacement or deferral of relatively expensive capacity in favor of relatively cheaper sources of supply.

For Namibia the imports from the pool today represent very cheap energy. But there is no guarantees of supply. It can be cut even within one hour's notice. These are so called non-firm energy contracts. SAPP's objective is to connect all the participating countries in order to achieve maximum energy efficiency. Today Malawi and Tanzania are the only ones not connected today. Included are Angola and the DR of Congo with its Inga hydropower station, which holds a potential generating capacity of some 40,000 MW, and the Western Corridor project, WESCO, connecting RSA, Namibia, Angola with Congo. This is envisaged to be functional by 2012. Zambia today has excess production capacity of power, while Botswana has discovered huge amounts of coal deposits. Therefore it would be very

advantageous for Namibia to establish an interconnection with Zambia. Today there is a 230 kV line from Congo to Zambia. By connecting onto the Zambian system Namibia would get access to the huge Inga capacity in the DPC.

2.4 Foreign Aid in the Energy Sector

Foreign aid for electrification has previously been given by Norway and by GTZ. Today EIB, Sida and the African Development Bank, as was mentioned above, provide support to rural electrification through the funds created by the grant elements of their respective soft credits to the 400 kV interconnector project. In 1999 Norway financed a consultancy study on the Restructuring and tariff structure of the Namibian electricity supply, and also supported training and capacity building.

USAID is currently funding a study on grid-code development in favor of ECB, and was previously funding another project, which ended in Dec 2004. In April 2005 USTDA sent a representative here to develop a proposal how to build commercial linkages between the USA and Namibia. EIB, which is the main foreign donor in Namibia's energy sector currently has a portfolio of 53 investments totaling loans of 1656,5 million Euro in electricity. In Africa it has programs in Algeria, Mozambique, Swaziland, Namibia, Sao Tome and Principe, and South Africa

Swedish Aid in the Energy Sector

Sida has always been actively engaged in the energy sector. In the last ten years it has supported about 80 different projects in 25 different countries, Many of them have been just financing of consultancy studies and various forms of technical assistance, often for various initiatives of reform and restructuring. Core support for investments have been most common in rural electrification, but also in district heating as well as generation and transmission.

In Africa Sida has supported the upgrading of a SCADA system for the national control center in Botswana, The support to Eritrea and Ghana includes rural electrification and substations. In Malawi Sida financed the building of nine sub-stations. The biggest recipient has been Mozambique, where Sida has supported two programs comprising a total of 17 sub-station s, and a 300 kms long transmission line. In Tanzania Sida's support has been most varied, ranging form technical assistance for institutional development, rehabilitation of existing investments, and to operation of gas turbines, substations and transmission lines.

In Zambia Sida has supported nine projects, all of them various forms of technical assistance, while in Uganda support has been given to rural electrification.

2.5 Other Evaluations

No other evaluation has been carried out of the present project, nor – as far as could be ascertained – of any of Nampower's other activities. In April 2002 the European Investment Bank, EIB, which was the lead donor in the Interconnector project carried out a "simplified" completion report *(Rapport Fin de Travaux – Simplifie'e;* dated 30 April 2002). This report is only 10 pages long – including 5 pages of forms and tables – and was, as far as I know, not based on any other analysis carried out at the time. Nevertheless, its conclusions and statements must carry a lot of weight because of the profound knowledge that the bank has from its continuous involvement in this sector.

2.6 Rural Electrification in Namibia

According to the agreement between Sida and the Namibian government the grant element of both the soft credits given by Sida to Nampower was to be paid into a special fund to be used for rural electrification. The concessionary loan for the interconnector investment carried a 25% grant element,

while the soft loan for the Bond enhancement facility consisted of a 76% grant. The total sum expected to be paid into the Sida-fund for rural electrification over 10 years was therefore expected to be 40 ND million. However, given that the Bond project did not materialize, the actual sum became yy ND.

Rural development was in Namibia grossly neglected in the past. The current electrification program, which started in the 1990s in the densely populated northern areas of the country, is of two types:

1. Commercial farming, and
2. Villages in neglected areas

It is the Ministry of Mines and Energy which is responsible for rural electrification.

Since independence Namibia has received considerable resources for rural electrification – from Norway, NAD 84 million until 1998, and from GTZ. In 1998 the rural electrification program received new important contributions in the form of the three funds created with the grant elements of the aid to 400 Interconnector project, namely the funds for EIB, Sida and the African Development Bank. The Swedish fund is regulated by the Co-ordination Agreement between Sida and the Namibian government signed 7 July 1998. In all, funds for rural electrification today come from the government's own budget resources, from the REDS, from NamPower, and from the donors.

A rural electrification *Master Plan* for each of the country's 13 regions was produced in 2000 and then updated and revised in October 2005. The work was financed by EIB funds – after they had approved of the study. NamPower invests into and builds the rural electrification project using its own funds. Then, after each project is finished, it goes to the Ministry of Mines and Energy and asks for reimbursement from one of the three funds. The Master plan in 2000 identified more than 2500 rural localities, with a total of 55,000 potential consumers, which had no access to electricity. Even in commercial farming, which is a very important economic sector for the country, there are still today a large number of farms which rely on diesel –driven electricity or which have no access to modern types of energy.

2.7 The Bond Market Facility

The purpose of this project was to support Nampower in carrying out a bond issue for the local market, whereby NamPower would raise 200 million Rand to be used to part-finance its investment into the 400 kV interconnector project. The plan was to make two bond emissions of 100 million Rand each. Among the project goals were to "prepare and assist NamPower so that it is capable of successfully carrying out the bind issue". At the time of its project decision Sida knew of no other donors being engaged in the financial sector of Namibia.

The rationale stated by Sida for this project was that a well functioning capital market positively contributes to economic development, and that it also positively contributes to reform of the financial system, and also helps enable the restructuring of public institutions and corporatization as well as subsequent privatization of state-owned companies. The Namibian market for long term credit is very undeveloped, and a large public utility like NamPower needed to get used to – in the future – satisfy an increasing share of its financing needs from the bond market. This would also have a strategic implication for NamPower as it would make the company known in the market and facilitate forthcoming capital market financing of future investments.

The project was seen by Sida primarily to correspond to its overall development objective of economic growth, and to a lesser extent the objective of economic and political independence, but not to have any bearing on any of the other five Swedish development objectives. Also, the project was seen to be well in line with Sweden's new country strategy for Namibia, which foresees a focus of Sweden's cooperation on economic cooperation. Rather than grant aid. It was also entirely in line with Sida's newly adopted strategy for Financial Sector development.

The Namibian Bond Market

The bond market in Namibia is not only small but also very non-liquid, i.e. the secondary market is almost non-existent. It is not transparent neither in terms of price indications nor in terms of full information on the volumes traded. In general this is in sharp contrast to the country's stock market, which shows a brisk development.

The capital markets are dominated by the government as main issuer of debt instruments. The total domestic debt outstanding amounted to about 11, 7 billion NAD at the end of September 2004, almost nine tenths of this of which consisted of government debt. Parastatals account for much of the issue of non-government bonds, with an outstanding stock of 700 million NAD. These issues are usually guaranteed by the government. The primary issuers are the Road Fund administration, the Agricultural Bank and the National Housing Enterprise.

Although the local bond market has grown significantly compared to what it was at independence, a lot is still left to do in terms of liquidity, transparency, efficient market trading and infrastructure, and number and size of bonds. The limited market development to date can be attributed to lack of active trading, limited supply of bonds, lack of skills and lack of diversity in the market.

3 Findings

3.1 The Logical Framework Analysis Matrix

Based on the objectives and targets of the project the correct *Logical Framework Analysis Matrix*, in my opinion, should be like the following one in table 6[2].

Table 6: Logical Framework Analysis Matrix

		Indicator	Source	Assumptions
Impact (Overall objective)	Make available adequate and least cost energy to the various economic sectors to promote economic growth and improve quality of life	Annual increase in electricity supply by 3.5%	NP Annual reports, Government statistics	Sustained economic reforms, Consistent energy policy, Sustained investment in energy
Effect (Project objective)	To strengthen the electricity network in Namibia, in particular through the interconnection of the Namibian national grid with that of RSA in 400 kV	1. Increase import capacity of interconnector from present 200 to 500 MW 2. Reduce losses in interconnector from present 12–20 to 9.5% 3. Improve technical reliability and stability of national grid	NP Annual reports, Government statistics	Dito

[2] This LFA matrix differs somewhat from the one presented in Sida's project document, and is more like the one used by the African Development Bank in its appraisal of the project.

		Indicator	Source	Assumptions
Outputs	1. 900 kms 400 kV overhead line from Kokerboom to Auas 2. Substation in Kokerboom: 400/220 kV, 2X315 MVA 3. Substation in Auas: 400/220 kV, 2X315 MVA, 220/132 kV, 2X40 MVA, and 220/66 kV, 2X40 MVA	1. Length of completed overhead lines and underground cables 2. Number of functioning erected transformer stations and panels 3. Number of connected new customers	NP project documentation, supervision report, project completion report	
Activities	1. Construction of 400 kV lines 2. Erection of 400 kV substations Substation arrangement Transformers and reactors **Static VAR compensator** 3. Wayleave compensation 4. Project management		Dito	

3.2 Implementation – Attainment of Output Targets

Overall, implementation of the project went very well, and several of the components were finished ahead of schedule. Only relatively minor setbacks in the implementation and the commissioning occurred along the way. There were some design problems with the transmission line insulators, initial foundations and reactor earthings. Also some serious shortcomings in the quality of transformers at the manufacturing stage led to a small delay in commissioning. Looking at the entire project, EIB's completion report concludes that "strict monitoring of procurement, procedure and safety aspects by Nampower ensured that a satisfactory calendar was respected by contractors, enabling commissioning without major delay;…the project has been satisfactorily implemented with only very limited time overrun". For overall *Project Performance* the project receives top score, namely "very good".

Project's Budget Outcome

The ex ante total cost at the time of project planning was 175 million Euro, while the actual cost at the end of the project was given as 164 million Euro. Overall the project has saved 6% of the total projected cost. Table 7, below, shows the main cost items for Namibia's part of the project at appraisal and at completion.

Table 7: Main cost items in Namibia of the project: at appraisal and at completion

	at appraisal (million Rand)	**at appraisal** (million Euro)	**at completion** (million Euro)	**% change**
Project management	77	8,1	11,2	+ 38
Transmission line	446	71,1	65,1	- 8
Kokerboom Sub-station	100			
Auas sub-station	140			
Total sub-stations	240	32,5	35	+ 8
SVC	132	28,2	19,3	- 32
IDC		9,3	9,3	+/- 0
Total	**895**	**151,7**	**142,4**	**- 6**

The biggest saving is in the component financed by Sida, namely the SVC. The main reason for this very large saving is the fluctuation in the exchange rate. In the period from 1997, when the contract between ABB and Nampower was signed, until 2000, when the project was completed, the value of the

Rand fell – against most international currencies – by some 30%. Against the Swedish Krona it fell from 0.75 in 1997 to 1,25 in 2001.

The project was divided into *two phases*. Phase one referred to the expansion of the existing transformer station in Kokerboom, and transmission line built to Aries. This transmission line was built by a consortium of ABB and Cegelec, and the transformers and reactors were delivered by ABB from RSA. Phase 2 included the transmission line from Kokerboom to Auas and the building of the new transformer station in Auas, where also the Sida financed stat var compensators were installed. The first leg of the project, namely the Aries to Kokerboom transmission line was successfully commissioned and energized on 1 July 1999, just one day behind the target which had been set 4 years previously.

The transmission line[3]

The design of the transmission line – a so called Cross Rope Chainette – is a structure which NamPower is very happy with. In its opinion it is of sound technical nature, it cost less and it was easier to construct than other alternatives. The design has been copyrighted by Eskom. The whole transmission line from the border to Auas, some 735 kms, was completed well before the contracted time by the contractors ABB (Pretoria) and Alstom. No major problems were encountered during the construction phase.

The installation of farm gates and clearing of the servitude was carried out by local Namibian companies, which to 70% used formerly disadvantaged people as laborers. Strict environmental monitoring was maintained all through construction work. Some design problems were encountered due mainly to incorrect specifications of the 400kV insulators.

To enhance the strength of the communications signal through the optical fiber cable, seven repeater stations were established at intervals of about 100 kms. All the repeater stations are today working satisfactorily. The cables were imported from India and were financed partly by a commercial loan that NamPower had taken.

The Kokerboom transmission station

The civil works were contracted to a wholly owned Namibian company with 100% Namibian work force. Because of its lack of previous experience this company, at the beginning, had some problems of interpreting and understanding the design documents. There were also some problems of soil stability. In spite of these problems, however, the works were completed as per schedule. The *stringing, earthing and erection* works, including the cabling, was contracted to Alstom of RSA. There were, in the opinion of NamPower, several shortcomings in Alstoms work, but the job was nevertheless finished on time. There were technical problems with the reactors delivered by ABB (RSA) in that they turned out to have improper earthing. Several of the reactors were sent back to the factory in RSA for repairs

The Auas substation

The cost of the Auas station was 250 million ND of which the Sida-financed SVC accounted for 120 million. The work was completed some four months ahead of schedule. The Auas transformer station occupies about 45 ha, but NamPower has purchased 400 ha of land in that spot. The civil works suffered difficulties because of several faulty designs by the company responsible for design, something which Nampower discovered only during the works. Nampower engineers were able to rectify these design shortcomings. The work was also set back due to heavy rains, because of which the works were two to three months behind schedule. In spite of all difficulties, however, the contractor managed to complete the job before schedule.

[3] Much of the detailed information in this section comes from Nampower's "Final Project Completion Report", dated December 2000, and thus reflects its point of view.

The African Development Bank financed the transformers and a reactor, which were manufactured by ABB Powertech (South Africa). There were some serious shortcomings in the quality of manufacturing of these transformers and reactors, with repeated failures in tests. Nampower considers that there appears to be a serious lack of quality monitoring in the ABB Pretoria plant, and believes the shortcomings "need to be carefully considered by Nampower for their future projects". Of the many components of the project it would appear that this is the one which was the only real negative experience.
Also some of the Sida money was used to buy four transformers (400kv x 15 kV) single phase transformers from ABB(RSA). One of the 4 was kept in reserve. These transformers, however, were all right in quality. It was only the 3-phase transformers financed by AfDB that had problems.

The problem consisted in that the *on-load tap changers* were not properly aligned and therefore produced a very high noise level. Nampower did not accept and one of the defective reactors was shipped back to the plant in RSA (Pretoria). At that stage NamPower said that it would not accept a one-year warrantee period, and demanded two or three years instead, which they got. NamPower perceived a general lack of quality control in the ABB products. As a result NamPower is today reluctant to buy from ABB in RSA. The company has had problems with ABB (RSA) products also in other projects. The problem with the equipment which needed to be replaced did not set the project back, as it was 3–4 months ahead of schedule both w.r.t. transmission and the transformer station.

Static Volt Ampere Reactor Compensator (SVC)

The work of designing, supplying and installing the SVC progressed as planned, even though delays were experienced in the beginning, caused by the delays in the civil works. Together with the staff of NamPower the supplier ABB (Västerås) undertook several design changes particularly in the control software. ABB only succeeded in solving the 50 MHz problem some 4 to 6 weeks before the equipment was shipped to the client. The software for the SVCs needed monitoring and adjusting, something which was achieved with participation of Nampower engineers. The SVC today is, in NamPower's words, functioning beautifully, and everyone seems to agree that the equipment has been able to supply the much needed stability to Namibia's transmission system.

The SVC was installed through a turn-key operation and was completed 18 months after signing contract. The SVC equipment is uniquely designed – it is not from the shelf technology. Three staff from Nampower were sent to ABB in Västerås not only for training but also in order to assist in modifying the product so as to suit the needs of Namibia. Even if the basic purpose of the presence of the Nampower staff was to train, there was a lot of interaction w.r.t. to the design of the SVC to be shipped to Namibia. To an extent ABB needed the presence of the NamPower engineers in order to properly solve the problem. Over a two year period the three technicians flew to Sweden at least once a month, and in all spent about one year in Sweden. The travel cost for the three NamPower engineers who went to Sweden, were paid for by NamPower.

The SVC, which consists of four transformers and has its own computer control system, was SVC designed to be available all the time. One cannot take the chance of running without the SVC, as this would risk damaging all the transformers and other equipment, however not the transmission lines themselves. That could stop operations for two years. In the SVC all the equipment – except for the four transformers – were manufactured and shipped from Sweden. Swedwater supplied a water cooler and cleaner. It is absolutely essential that the water be perfectly clean.

Training and Safety

Training was provided to several groups of NamPower staff during the course of the project, among them in Static VAR compensation – both hardware and software, and also on the SVC cooling systems, which was carried out at site. There were no cases of any major or fatal accidents during the whole course of the project,

Identified project risks ex ante

In its Tender documents Nampower identified the following project implementation risks:

> Delays caused by land ownership issues, Construction period environmental disturbances, Delay in completion, Delays caused by non-availability of equipment, Design faults and quality of works, Force majeure events, Changes in law or in costs, Non-performance of assets, Interruptions, Failure by Eskom to supply electricity, Insufficient cash flow to meet obligations, Operation and maintenance failures, Interest rate fluctuations, and foreign exchange risk

With respect to each risk NamPower also identified mitigating factors and initiatives. After the project has been implemented we can conclude that none of the risks materialized, at least not in any substantial way, and that NamPower had correctly identified mitigating factors[4].

3.2.1 Procurement

There was a special tender procedure for the SVC procurement containing design, supply, installation and commissioning of the Auas Static Var compensator. The following companies had been prequalified, all of whom except the General Electric, also submitted bids.

ABB Power systems (Sweden)

Alstom T&D, Power Electronic Systems (UK)

General Electric Company (USA)

Siemens (Germany)

Toshiba (Japan)

To manage the tender Nampower had retained three different external consultant companies to assist it – one for the technical evaluation, one for the commercial evaluation and one for the financial evaluation. NamPower's evaluation report of the received bids came in March 1999. The contract between the successful bidder ABB (Sweden), which was signed in April 1999, contains four volumes.
ABB's tender bid for the SVC was constructed such that it included a collaboration with Nampower's engineers. It was foreseen in the bid that the two parties need to cooperate in order to best solve the problem, which is unique for Namibia, namely *the 50 MHz resonance* problem. ABB's bid was the only one considered fully technically compliant. It was however not the cheapest one.

Sida, on its part, retained the consultancy firm Swedepower to monitor the procurement process and to confirm to Sida that it had been carried out in accordance with Sida's requirements. Originally Sida's legal department had reviewed the Namibian procurement rules and found these to be acceptable.
The coordination Agreement between Sida and Nampower specifies the rules for procurement as in table 8 below.

[4] These are some of the risk factors identified ex ante:
Inflation would risk cutting the demand for electricity of the company's private customers whose demand curve is thought to be highly inelastic. The bigger industrial users, however, would be able to sustain price rises. And given that Nampower's rates are competitive internationally, some cross subsidization could be sustained.
Currency: Debts contracted in other money than Rand would pose a considerable foreign exchange risk
Interest rates: Since Nampower has a very low debt equity ratio and because of its large financial investments, Nampower is not expected to suffer from high interest rates.
Relation with/dependency on Eskom: Nampower's significant dependence on trade with Eskom can potentially be seen as a risk in the event that Eskom, which is today wholly state owned, becomes the target of unbundling and/ or privatization. Even though this risk must be considered, a comfort can be derived from the fact that all of the dealings between Nampower and Eskom are based on mutual commercial interests, which should not be affected even if Eskom's ownership changes drastically. A case in point is the current cheap imports of electricity from RSA. The fact is that it is cheap because RSA has – at least for the time being – an excess production, which it wants to sell off – even if it is at a comparatively low price.
Tariff risk: Namibia's electricity tariffs are today competitive in relation to the other countries in Southern Africa. Therefore its tariffs are not expected to go down – if a harmonization of SAPP tariffs are made in the future.

Table 8: Procurement models allowed by contract NamPower/Sida

Form of procurement	Goods, Works and Services (in Rands)
Open Competitive Bidding	Above 1 million
Limited Competitive Bidding	1 million to 150,000
Informal procurement/ Direct purchasing	Less than 150,000

In the Auas station it was only the SVC/ABB part which was contracted out on a *turn-key* basis. For the rest of the station Nampower picked the best parts and equipment from various sources. In doing this the company was permitted to choose from a list of suppliers, which had, in a general tendering process, already been pre-qualified by ESKOM for a national contract for general purposes. This saved a lot of time for NamPower, but of course the co-ordination became a big task given that the number of different suppliers became quite large. In its capacity as contractor, NamPower constantly had to monitor the work of the many suppliers. Everything went well, however. Altogether there were 7 to 8 different suppliers – Siemens, ABB (RSA), Alstom, HTSA etc.

3.2.2 Coordination Among Donors

Like in most other development projects around the world, also this is one where coordination among foreign donors leaves much to be desired. Before the project, in the appraisal stage, there were in fact frequent contacts and dialogue between the donors, but one wonders today why the cooperation could not have been extended much further. It should, for instance, have been feasible to carry out a common appraisal of the project, since all four donors were in fact supporting the same investment. A small inconvenience would have been the fact that some of the donors had in mind to support a specific component of the project, based on the export interests of its country. The SVC equipment delivered by Sweden is a case in point. But it should not have been impossible to accommodate such differences among donors.

As for the period after project implementation, it is obvious that there has been no contacts whatsoever between the donors. None has even bothered to share with the others the limited follow-up reporting, which has taken place. In fact, none of the donors were apparently aware of what – if any – follow-up or evaluation has been carried out by the others. This is remarkable since all the donors have been supporting one and the same investment, and it deserves to be criticized, for the area of evaluation and follow-up is one where donors could save a lot of time and resources by cooperating and pooling their resources.

3.3 Functioning of Transmission Line/Substations Today – Effects of Project

The 400 kV transmission line from RSA to Auas has since commissioning been functioning very well and today provides all the intended services. The concerned parties are very satisfied, in particular NamPower claims to be satisfied with the functioning of the SVC equipment. The sharp decrease in transmission losses that has taken place is mainly attributed to the project. After the project the total transmission losses went down from about 16 to 10%. Then in 2003–2004 further down to 5%. The transmission line has a capacity of 500 MW, which can, in emergency cases be stretched to 600. Today it brings in only 200 to 300 MW, so there is a substantial excess capacity.

Looking at future needs in terms of an extension between Inga/ Angola and also Kudu, the Auas line can be seen as a strategic investment. A problem, as was mentioned previously, is that the line is connected to a region in the RSA, which is very industrialized and congested, and which therefore risks being cut due to insufficient supply of excess energy in the RSA.

The towers are also used as antennas for radio communication, and regarding the optic fiber cables, which have been installed, NamPower has plans to exploit in entering into the field of telecommunications. A Visit to the Auas transformer station revealed that the whole plant was immaculately clean. I could see no dust in any of the premises. It is being cleaned once a week. Positive air pressure is maintained so that the dust cannot enter the equipment. Even the lamps high up in the ceilings were kept perfectly clean from dust. There was some rust on the gates. According to Nampower this corrosion is due to humidity.

The SVC

The SVC has so far functioned very well, and has solved the voltage stability problem. Today, because of the SVC, the resonance problem that had plagued the Namibian grid is a thing of the past. It is the lines length of the line in itself which aggravates the voltage instability and the *near-50 Hz resonance problems* that existed in Namibia's power system. An uncommon feature of the project is that the SVC is installed in a system with very long lines, little local generation and fault levels lower than 300 MVA. The SVC installed is of a new type, developed by ABB for power applications. It has a unique control principle, which has since been patented. The inductive power is provided by three thyristor-controlled reactors. Another unusual feature of the Auas SVC is that each TCR valve has its own cooling system, making four in all. Therefore outage time is minimized and availability is increased.

With respect to the SVC there is only one thing which is not entirely satisfactory – the eight cooling fans. Nampower said from the beginning that they should be covered by roofing, while ABB maintained that this was done nowhere else in the world. However, today after only four years of use, it is clear that the plastic fans (rotor blades) as well as the cables are being slowly eroded by the exposure from sun. According to Nampower this is because of the very high local value of UVB radiation. The UVB radiation in Auas has been recorded as 2128 milliwatt per square meter, which is very high. Since the two years warrantee period, has passed, NamPower will have to pay itself for a roof being set up.

New connections

An apparent proof of that the project is fully functional is that there are now plans under way to connect the Kokerboom station to a new 400 kV transmission line for the Skorpion Zinc mine and a new substation called Obib, situated some 250 kms due west of the present line. Furthermore, there are other investments projects, such as building a 220 kV line from Windhoek to Walvis Bay and associated sub-stations to the station in Kokerboom, all of which build and depend on the existence and the functioning of the Sida-supported 400 kV line. The same two individuals, who were leading the project 6–7 years ago are today in charge of implementing the new projects.

The 400 kV line now being built from Kokerboom to Obib will also – if and when the Kudu project is materialized – form part of the future transmission line connecting Kudu to the national grid. One will then only need to extend the 400 kV line from Obib to Oranjemund, thus avoiding to have to build an entire line from Kokerboom to Oranjemund. The design of this new 400 kV line is planned to be similar to the one used in Aries –Auas line. From the documentation that has been prepared concerning the Kokerboom – Obib line, it is noteworthy that this new project relies on the fact that *"the technology used in the transmission lines and in the substations are mature and familiar to Nampower, and were recently utilized on the 400 kV Interconnector".*

The fact that a future project expressly professes to rely on the experience and knowledge regarding technology etc. acquired in a in a previous project, is as good an indication as any that the previous project must have been successful in attaining its output goal, and that these outputs are now providing the intended services.

F

aulty line location

There is a place near the airport where the transmission cables come dangerously close to the landing aircraft. A fear that Nampower has is that a landing plane will hit the cables and thus risk crippling the country's entire electricity supply. This line, which is a 220kV-line built in 2000, was designed by Nampower itself so the responsibility for the questionable location lies entirely with Nampower. This can be seen as result of insufficient planning capacity. The fact that Nampower, at the time of the construction, did not have an independent transmission department could according to the company be the explanation for this faulty planning. Part of this line had, however, been built already in the 1970s.

Operation and Management

Referring mainly to its handling of the 400 kV Interconnector project, Nampower is today portrayed not only as being strong financially, but also as a company, which is able to undertake and managed large investment projects. In EIB's opinion "Nampower remains one of the most successfully managed utilities of the Southern African region, and its management is committed to a clear business-oriented approach." EIB's engineers have found NamPower staff to be very qualified and experienced at the technical level, something which they saw as being confirmed in the 400 kV Interconnector project, where Nampower staff participated in developing sometimes complex technical solutions, some of which later gave rise to European patents.

3.4 Financial Feasibility

Nampower's project appraisal[5] calculated the *ex ante profitability and liquidity ratios* for the company's entire operations (not just the 400 kV interconnector investment project) and arrived at the results shown in table 9, below, where

ROCE = return on capital employed = net profit after taxes/ capital employed

ROA = net profits after tax plus interest paid on debt/fixed assets, investments and current assets

ODSCR = Operating debt service coverage ratio = Annual free cash flow from operations before debt service/ Debt service

CDSCR =Cash Debt service coverage ratio = Total available cash and liquid investments/ debt service

Table 9: Ex ante profitability and liquidity ratios of Nampower

Profitability ratios	5 year average	10 year average	15 year average
ROCE	1,76	2.37	4.12
Return on shareholder's funds	4.62	6.66	9.87
ROA	1.73	2.3	3.91
Liquidity ratios			
ODSCR	4.39	4.14	4.98
CDSCR	46.34	32.15	33.96

These ratios show that the company would remain in a very healthy financial position also when undertaking the 400 interconnector investment project.

AfDB in its appraisal calculated the FIRR to 14,7%, which is generally considered a satisfactory return for transmission line investments, and which is also higher than NamPower's average cost of capital, which is about 11%. The analysis was based on 35 years of project life and assuming an average electricity price of NAD 0.21 per kWh for 2001–2005, and after that 0.24. The future (potential)

[5] As presented in the Tender information document

benefits of the optical fiber cables were not included in the analysis. Sensitivity analysis showed that the project's financial profitability was rather robust. Increasing the investment cost with 10% would only lower the FIRR to 13,9, while increasing operating cost by 10% would yield a FIRR of 13.7%. If one simultaneously increased investment cost, operational cost and the purchase price of electricity from ESKOM, all by 10%, then a FIRR of 12,9% would be obtained.

Conclusion:

With respect to both of these calculations we can make the following conclusion: Since, according to available information, all the relevant cost and revenue data of the project have stayed well within the expected bounds of the appraisal, *we the actual financial profitability attained ex post is at least as good as the ex ante values.*

Financial strength and solvency of Nampower today

The above picture is amply confirmed when looking at Nampower's current financial situation. NamPower's financial strength and solvency was high at the time of the investment in 1997–98 and continues to be very good today, 5 years after the completion of the project. In 2001 Nampower had an operating profit margin of 25% on its core activity, namely that of producing and providing electricity. About one quarter of the company's gross revenue has in recent years come from financial investments. These are among the non-regulated activities when ECB calculates the allowed level of tariffs. If the financial investments are included NamPower's profit margin becomes 46% ! The company's position for three different points in time is shown in table10.

Table 10: Financial strength of Nampower[6], million Namibian dollars

	1998	2001	2004[7]
Operating incomes	374	549	808
Operating costs	287	412	756
Operating profit margin	86,7	135	52
Net income on financial investments (Interest earned – interests paid)	154,2	45 (117–72)	18
Profit before taxes	241	182	74
Taxation	68	25	16
Profits before dividends	173	157	58

Debt/asset ratio in 2004 was 14%, and Debt/equity ratio the same year 23%. This is very low in an industry, which depends on large infrastructure investments and very long pay-back periods. This means that the company – at least from this perspective – has plenty of potential to engage in new long term liabilities in order to finance new investments such as for instance Kudu. Nampower has today 1,6 billion in cash reserves in its bank account.

These cash reserves do not form part of the "revenue requirement". It is retained profits, thus shareholders money, and it is meant for future investments. NamPower is today building up cash reserves for future investments. Traditionally Nampower has always financed all its investments from its own cash flow. The investment in the Aries Auas transmission line was actually the first time that it relied on external finance, having secured support from four different donors, all on concessional basis. However the concessionality was in favor of the country, not the company NamPower, which has to pay full market value for the loans.

[6] The data for the following table has been taken from three sources: The annual reports of Nampower, EIB's completion report from April 2002, and a Document put out by the Namibian Research institution IJG (See list of references)

[7] This column has been computed from different sources using different accounting methodologies. The figures therefore do not match up exactly.

The operating profit of Nampower is directly and closely linked to the output of the hydro-power station in Raucana. Whenever the rainfall in southern Angola is low then Nampower has to import a large share of the country's power needs from RSA. Even though still high, the profit margin has gone down over the last few years. The main reason for this seems to be the increased import of electricity form other SADCC countries, following the breakdown of transformers at Raucana. Even if the import from RSA takes place at a very favorable rate, it is still much more expensive than the domestic power source coming from the Raucana hydro-station, which can deliver electricity at an extremely low marginal cost to Nampower. Also there has been a dramatic rise in the price of coal, which Namibia must import. Again, because of the constrained capacity in Raucana the country had to rely to a higher degree on coal fired electricity. International coal prices increased by almost 50% from the average paid in 2003 to the average in 2004.

It should be noted that the company's steady and comfortable profit margin is based partly on its financial investments, because the operational profit is not always very high. In fact, Nampower's core operations last year were not profitable, which means that its customers were subsidized by the profit that Nampower made from investments in to the so called non-regulated areas, i.e. mainly the financial investments.

With its large cash reserves, mainly accumulated from undistributed profits, Nampower is – together with the banks – an important actor in the Namibia's money and capital markets. According to financial observers in Namibia the company's experience in the capital market is evidenced not least by the fact that it has been able to secure for itself long term loans at very favorable rates. Of the current balance of Nampower's cash reserves, which is 1550 million Rand, as much as a quarter has been invested in RSA and another quarter in government bonds, leaving about 50% for Namibia's commercial banks. The relatively large share of funds held outside of the domestic banking system can be seen as a cautionary measure, because, if and when the company starts using these reserves, this would have a considerable effect on the local money supply and thus on the interest rate.

Tariffs

Nampower's profitability is impressive not least because it is attained in spite of the tariffs for electricity in Namibia today being lower than the LRMC level, meaning that they do not reflect all of the long run marginal cost involved in producing electricity. Namibian electricity tariffs are quite moderate compared to the neighboring countries. The LRMC is estimated to be 29–30 NC (or 5–6 US cents) per kilowatt-hour, while the actual tariff level is 18–20 NC (=3–4 US cents). NamPower is today subsidizing distribution customers, because in many cases the tariffs do not cover investments, only operations. According to the performance agreement with the government Nampower is allowed to raise tariffs only up to the level given by the country's consumer price index, while real price rises must be allowed by ECB, which is the government agency charged with setting tariffs.

The reason given by ECB why it has not yet allowed the tariff level to reflect the LRMC-level, which is what the Ministry of Mines and Energy wants it to do, is that it feels that too steep a rise would hurt some important industries. But ECB hopes to be able to achieve it in 2010 or 2013. In the meantime it will "find other ways for NP to recover its costs." The difference between the LRMC-level and the allowed tariffs are today covered by Nampower's incomes from its financial investments and also of course by the low import price of electricity that Nampower today pays to ESKOM. Currently a new agreement is being negotiated with ESKOM, and the new price is expected to be much higher. To the extent that electricity tariffs are allowed to go up Nampower's financial profitability will be even better than today's already comfortable position.

Allowed Costs

When calculating the tariff level that Nampower is allowed to charge, ECB defines "accepted" costs as distinguished from unaccepted costs. The accepted costs are the ring-fenced activities (See chapter 4.7

below), which can be counted to set a cost-reflective tariff. ECB believes Nampower to be somewhat "oversized", and ECB therefore will not include some activities among the "accepted costs," which are used to calculate the tariff. A case in point are the three airplanes owned by Nampower – one Lear-jet seating some 20 persons, one smaller propeller plane and one helicopter. The Lear-jet is used for frequent visits to Johannesburg and sometimes also to Europe as well as to some destinations within in the country. Of these ECB today includes only the helicopter as an "accepted cost" to be counted toward the allowed revenue requirement.

Calculations of Financial Impact on Nampower[8]

In connection with the on-going investment projects Kudu and the Walvis bay transmission lines, Nampower has carried out financial analysis calculations using a *total model*. It is a comprehensive model, which can forecast the impact on Nampower finances of any and all projects. This model thus incorporates the normal operating, investing and financing activities of Nampower, also the 400 kV Interconnector project. Also these results can be used to show the strong profitability and liquidity situation of Nampower today. The main profitability and liquidity ratios calculated are the same as above.

Table 11: The base case

	2002	2003	2004	2005	2006	10 year average
ROCE (%)	1.69	2.0	0.73	1.25	2.04	2.62
ROA (%)	3.04	3.09	3.65	4.0	4.31	4.27
ODSCR	1.11	2.01	1.65	1.54	1.83	2.03
CDSCR	8.77	7.25	7.3	6.72	7.74	9.93

The value of ROCE must be read remembering Nampowers's policy to revalue its fixed assets every 5 years. This increases the capital base without providing additional funds, and also increases depreciation thus lowering net income. The two debt service ratios show that the company is always on a comfortable margin.

Sensitivity Analysis

Table 12: Case A: Tariffs are raised at the same rate as ESKOM charges NamPower for imported electricity

	2002	2003	2004	2005	2006	10 year average
ROCE (%)	1.9	2.61	1.7	2.62	4.55	4.72
ROA (%)	3.2	3.54	4.35	4.99	6.17	5.85
ODSCR	1.21	2.24	1.9	1.99	2.72	2.8
CDSCR	8.86	7.55	7.8	7.57	9.49	12.25

We see that this rather realistic assumption w.r.t. higher tariffs will substantially improve all ratios. The reason why there is only a modest improvement in the CDSCR is that this ratio to a large extent reflects the incomes from Nampower's financial investments.

Table 13: Case B. Increase in real interest rates: Interest rates are assumed to increase by 30% while inflation remains unchanged.

	2002	2003	2004	2005	2006	10 year average
ROCE (%)	2.35	2.86	1.12	1.71	2.64	3.36
ROA (%)	3.61	3.77	4.50	4.89	5.27	5.16
ODSCR	1.39	2.09	1.51	1.6	1.91	2.16
CDSCR	8.46	6.74	6.58	6.27	7.38	9.69

[8] From "Preliminary Information Memorandum for the Scorpion Zinc Project and West Coast Transmission lines – Investec Financial Advisers, 3rd November 2004

Even such a rather drastic increase in the cost of capital will only marginally change the company's profitability and solidity. The main reason for this is that higher interest rates also mean that the company earns much more on its substantial financial investments

Table 14: Case C. Zero growth of electricity demand

	2002	2003	2004	2005	2006	10 year average
ROCE (%)	1.39	1.54	0.02	0.28	0.83	1.48
ROA (%)	2.81	2.75	3.15	3.32	3.45	3.44
ODSCR	0.97	1.84	1.43	1.25	1.42	1.69
CDSCR	8.57	6.94	6.8	6.01	6.63	8.64

Obviously, in this case the earnings ratios will drop, while the debt service ratios remain only moderately affected, and again the explanation is the large share of the company's earnings which come from its financial investments and not its sales of electricity.

Table 15: Case D. Increase in project capital costs of the Skorpion and Walvis Bay transmission lines of 20%

	2002	2003	2004	2005	2006	10 year average
ROCE (%)	1.63	1.91	0.25	0.74	1.51	2.25
ROA (%)	2.95	2.95	3.53	3.86	4.14	4.12
ODSCR	0.89	1.9	1.49	1.34	1.57	1.84
CDSCR	8.03	6.41	6.33	5.62	6.37	8.6

As we can see nothing very dramatic happens. The profitability ratios go down a little, while the debt service ratio are only affected moderately, well within the margins that the company is able to handle.

Table 16: Case E. After KUDU gas production comes on stream

	2005	2006	2007	2008	2009	2010
ROCE (%)	0.31	1.14	2.38	3.4	8.26	9.54
ROA (%)	3.29	3.64	4.43	4.96	8.75	9.68
ODSCR	0.62	1.42	1.84	2.4	3.52	4.22
CDSCR	3.8	4.34	5.31	6.9	9.68	13.17

The company's revenues will rise dramatically when it starts selling excess power to ESKOM

Conclusion

All the above analysis contribute in showing the picture of a financially very strong company, which has obviously not suffered financially due to the 400 kV investment project. Under all realistic scenarios there does not seem to be any danger of the company getting into trouble either w.r.t. its liquidity or its financial solidity.

3.5 Economic Analysis

As this evaluation has been able to confirm, the building of a transmission line from RSA to Windhoek has been a very good proposition for the country's economy, because the line will be needed under all realistic scenarios with respect to the future expansion of the power supply. In 1997, for the short and mid term scenario, the best (most economic) way for the country to secure its power need was to build the transmission line in order to allow increased imports from RSA. At the same time it is clear that the same transmission line – with the same capacity and the same location – will be needed if and when Namibia decides to develop further domestic generation capacity – irrespective of whether this is done

by exploiting the gas fields in the Atlantic Ocean (the Kudu project) or by further exploiting water resources in the north near the border with Angola.

In both of the cases the transmission line from Aries through Kokerboom to Windhoek will be needed, not only to serve the country's own consumption, but also in order to permit export of the country's future possible energy surpluses. In its completion report from April 2002 the EIB states that the project has "opened up considerable new opportunities" for Namibia to attract new industrial and mining companies such as a major textile plant in Windhoek and the large scale Skorpion Zinc Mine and Refinery in Southern Namibia.

Economic Internal Rate of Return, EIRR

The African Development Bank in its appraisal estimated the project's EIRR to be 21,1%, a value which would have come out even higher had the Bank not chosen to shadow price foreign exchange by a factor of 1.15 to reflect its supposed scarcity value. This factor was applied by the Bank to both the investment and to the operating cost, which is a somewhat unusual practice today when foreign exchange markets are free. None of the other studies in the sector have used a shadow price for foreign exchange.

Economic cost of unserved energy

Another circumstance, which could have made the estimate of EIRR even higher is the value chosen for *"unserved energy"*, which is supposed to reflect the economic consequences of power shortages to the Namibian economy. AfDB, somewhat conservatively, estimated this cost to be NAD 0.32 for 2001–2005 and to NAD 0.36 for 2006–2035, which is about 50% above the existing market price of electricity. This is a much lower estimate than has been used by other studies in Namibia, as well as for many electricity investments in other countries. Depending on the assumptions that the analyst makes with respect to the market demand facing the products produced by the main industrial users of electricity, and also with respect to the nature of the electricity supply industry, the appropriate measure of the real cost to the economy of unserved energy could be up to 10 times higher than the tariff level[9].

The Standard bank group of Namibia, acting as consultants for NamPower, had calculated the project's *economic profitability* to be about 18%, thereby also incorporating the alternative cost of unserved energy. In a different analysis NamPower had estimated the project's EIRR to 33,66%, based on a calculation that the total unserved energy in real terms would amount to US$ 549 million.

Conclusion

Based on the above analyses our conclusion ex post is that the economic profitability of the 400 kV Interconnector project is very good, just as high, or possibly even higher than the values estimated at appraisal. This follows from the fact that all the main cost items as well as revenues of the project have stayed well within the bounds foreseen at the appraisal.

3.6 Rural Electrification

The rural electrification program, today implemented mainly by NamPower, seems to be well planned and well implemented. However, there have been long delays in implementation.

Achievements to date

The 2000 plan foresaw that within the first 5 years, 602 localities would be electrified and that a total of 17,402 household connections would be achieved in the process. In actual fact only 148 localities with a

[9] The feasibility study contracted by NamPower for the Epupa Hydropower scheme in 1996, which was carried out by a consortium comprising Norconsult, Swedpower, Soapro and Burmeister and Partners (Project Formulation Report Volume II), estimated the cost of unserved energy at US$ 1.50 per kWh (=NAD 6.78)

total of 5874 household connections were achieved. For the different categories of consumers the rate of achievements in relation to plan can be seen in table 17 below.

Table 17: Localities and consumer categories connected in rural electrification programs

	Planned in 2000	Achieved by 2005	Difference
Localities	602	148	-75%
Households	11042	5874	-47
Business	4880	2374	-43
Schools	338	114	-66
Health facilities	142	31	-78
Boreholes	1000	270	-73

Up to June 2004 there was, in general, more finance available than NamPower had the capacity to build projects. At present there are some 300 projects in progress, a large number of which are rural electrification projects. In Nampower's own opinion, there will always be a back-log financially since the system works such that NamPower first builds, and only then asks for the money to be reimbursed to it. When ranking which communities should be electrified, the criterion of social and economic benefit take precedence over financial viability. In other words, the idea is to achieve maximum social impact of the investment program, not the highest financial sustainability.

Once a project is capitalized it is audited by NamPower's external auditors. All the projects financed by Sida funds have thus been – or should have been – audited. NamPower's external auditor has for the past 10 years been KPMG. At present NamPower is not altogether happy with this company as it has been extremely slow in carrying out the audits. In a few recent cases the audits came two years after the projects had been finished. EIB has asked for a special audit to be made of its account. Also Sida, if it wishes, can ask for such an audit to made.

With the introduction of the REDs *(=Regional Electricity Distributors;* see Chapter 4.7 below) as responsible for the country's retail distribution of electricity, follows that they will also assume an important role for undertaking rural electrification projects. Exactly what this role will be is not yet entirely clear. NamPower would like to have a co-operation model whereby NamPower finances and builds, and then turns the system over to the REDs. There has been a fear that, since the mandates of the REDs are primarily to act on a commercial basis, they would not be able to fully live up to the task of promoting socially desirable investments.

Lack of coordination among donors

The financing of the rural electrification today appears somewhat cumbersome, partly because the three donors – AfDB, EIB and Sida – all maintain their own rules and regulations on how their respective funds are to be used. Each fund has its own conditions. In addition to the three foreign funds also the Ministry has a budget of its own for rural electrification. In NamPower's opinion it is not always easy to use the EIB funds, as the Bank requires a positive net present value for each project. And in rural electrification projects it is not always possible to show a positive net present value. In EIB projects also the capital cost is included, but not in Sida's – where only the running costs are allowed. Depending on the net present value NamPower decide to use the funds from EIB, Sida, AfDB or NamPower's own resources. If it needs to be quick the company will use Sida funds, because then no time will be lost requesting approval, as is the case with the other funds. If however a project has a positive net present value then it is immediately sent to EIB.

Use of the funds for rural electricity projects

The EIB has so far been used relatively little, but recently the ministry has received a 11,2 ND million project approved by EIB. The EIB fund today contains 69,8 million, of which NamPower currently has

11,9 million worth of programs pending. So far only 3 million have been spent from the EIB fund, most of which was for upgrading the master plan. The Sida fund at present has 21,4 million unused balance after 12 million Rand have been spent on 5 groupings of projects, each consisting of 4–5 projects. According to current projections made be NamPower the remaining 21 million of Sida funds will have been all spent by June 2006. AfDB fund is fully utilized, a total of 5.5 million having been spent.

3.7 The Bond Market Enhancement Project

The Bond market enhancement project never got off the ground. As far as one can ascertain the reason was simply that, by the time the project was ready to be implemented, the interest rate level in Namibia (and RSA) had become so high (about 14–15% compared to today's rate of 7–8%), that it simply was not a good idea to seek long-term financing from the local capital market.

Since 2002 there has been a determined effort by the government to promote the emergence of private debt instruments, that could help finance longer term investment projects.. However with little success so far. For a parastatal like NamPower there is no restriction posed by the government or the Central Bank to issue bonds. In fact it is encouraged by the government. According to the Central Bank the prospects today for NamPower to successfully issue bonds seem to be very good. Besides, NamPower is currently about to receive a sovereign international credit rating. Reportedly the company is currently discussing a future bond issue in the order of 1 to 2 billion Namibian dollars as part financing for the KUDU project, which will be financed by foreign and domestic loans as well as probably locally issued bonds.

Possible renewed cooperation with Sida

In terms of renewed cooperation with Sida in this sector, both NamPower and the Central Bank today declare an interest to launch new bond development programs. One useful initiative could be that the Central Bank launches a program together with one or a few of the parastatals. There is currently a support (concessional loan) from Sida to the stock market in Namibia. A previous Sida initiative in setting up bond promotion initiatives in Namibia was in 1996 when Sida financed and arranged a seminar on this topic, which led to a plan called *Emerge 2001*. The initiative however turned out to be short lived.

A recent exchange of letters between Sida and Nampower indicates that the two parties have renewed plans to try out initiatives in the bond market. In a letter dated 3rd January 2001 Sida writes that "we would be prepared to discuss the possibility of Sida issuing a guarantee for the Walvis Bay transmission project to facilitate debt financing.. The Sida guarantee could be used to secure commercial bank loans, or alternatively as a credit enhancement to a possible Nampower bond issue. Sida guarantee could cover political and/ or commercial risk. If Nampower would issue a bond to partly finance the Walvis Bay transmission project, Sida could guarantee such an issue, effectively replacing the risk of Nampower with that of the Kingdom of Sweden. The rationale would be to attract investors to buy Nampower bonds with long maturities."

3.8 Reporting Requirement

In contrast to its professional and competent implementation of the project itself, Nampower's performance in terms of providing documentation and information can not be given a high mark. For an investment project as big as this, there should be a more substantial completion reports than just a 4 to 5 page narrative, which has been produced. A completion report should, among other things, also clearly present actual financial figures showing ex post profitability. No such report has been presented to Sida, as demanded by the Agreement, nor – as far as can be ascertained – produced by NamPower. This will not be to the company's advantage in a situation, where it is about to embark on new major

investment projects for which they are interested to attract external funding among them concessional loans and grants. Even if it is clear to anyone involved that the project was successful, it is still important to account for the result in a full and comprehensive completion report

Paragraph 8.4 of the Coordination Agreement with Sida states that

> "After completion of the project Nampower shall provide Sida with a result analysis report. This report shall *assess the effects achieved by the project in relation to the project objectives* (italics added) as stated in Clause1. The same shall apply for projects financed by the Subsidy Funds"

It is unclear if Nampower has supplied Sida with any kind of report, which might be said to qualify as completion report. In any case it is certain that no report has been submitted regarding *effects achieved*.

Donor follow-up

According to the Sida project memorandum Sida would – in parallel to Nampower and to the other external donors – follow up on the project, specifically the part financed by Sida. It is stated that the follow-op refers to procurement, installation and commissioning. Even with that narrowing down of the task it is doubtful whether one can say that Sida has actually carried out such follow-up. The Sida files do not contain one single document dated later than 2000, and the number of documents from the previous years is minimal. There were for instance in the Sida files no completion reports (that could be found) of any kind whether produced by the ABB, by the client Nampower, or by any of the other foreign donors.

As concerns the other donors, the lead donor EIB has produced a completion report, but a very short one (about 5 pages of text and 5 pages of tables). Also, it is remarkable that the little follow-up which has been done had not found its ways into Sida's files. In AfDB's project document (section 6.5.4) it is stated that "NamPower will submit a PCR within six months of the completion of the project activities". And further that "the Bank will prepare its own PCR. This PCR together with the sub-sector performance statistics and Nampower's results will form the basis for an overall ex post evaluation of the project". During the course of this evaluation I have tried to solicit these documents both from NamPower and directly from the AfDB, without any success. So I do not know if such documents were ever produced or not.

4 Evaluative Conclusions

4.1 Implementation and Attainment of Objectives w.r.t. Output and Effects

The overall conclusion that can be drawn, based on the above analysis, of project implementation and attainment of the objectives w.r.t. outputs and effects is that the project has been successful on all counts.

Implementation of all project components was carried out largely on time and keeping budgetary restrictions. There were some problems of design and of quality along the way – some of which momentarily may have appeared important –, but they were all satisfactorily solved, and none was actually allowed to delay the project's time schedule, nor lead to cost overruns. Nampower has acted efficiently and professionally and receives high marks from concerned parties, not least the European Investment

Bank[10] which acted as lead foreign financier of this project.

All the output targets of the project have been achieved to specification, and since commissioning the transmission lines along with the two substations, including the SVC equipment, are delivering all the intended services to the full satisfaction of, not least, NamPower engineers. A substantial proof of the good functioning of the line is that the experience gained is already applied as standards in new transmission line investment projects, and that these new investment projects rely on the stable functionality of the 400 kV line.

4.2 Economic Growth

By all available expert analysis the 400 kV was vitally needed to maintain and develop the country's future supply of energy. Furthermore, it has been shown in many studies in different countries, that adequate supply of energy is a precondition for economic development. The 400 kV interconnector project was shown to be profitable both in financial and in economic terms for the country. The conclusion therefore follows that there can be no question that the project has had a positive impact on Namibia's prospects for economic growth.

4.3 Equality and Poverty Reduction

In a *direct* sense, the transmission line will have a small beneficial effect on poverty alleviation because it will enable many poor people to get connected to the electricity grid. Potentially the most important effect of electricity expansion on the poor is, however, *indirectly* through the effect it can have on the general economic development by providing power to new investments in industry and small businesses. Several major studies have arrived at the conclusion that electrification is a precondition for economic development, and this seems to be just as true for poor segments of population in remote areas as it is for society as a whole. So, if experts have determined that a 400 kV transmission line in a certain place and of a certain specification is vital for developing the country's electricity supply, then, logically, we cannot but conclude that the transmission line in question will also be effective as a means of poverty reduction. This is true even if some would argue that, in the *short* run, investments in other sectors could more directly benefit the poor. Because, for a real economic development to take place – and to impact on the poor – the transmission line is needed.

A recent study on power sector reform in Africa argued that steps towards increased efficiency and privatization of the sector can have mixed results in terms of poverty reduction. On the one hand, by increasing efficiency, government funds can be saved and used instead for other support to the poor such as health and education. Also private participation can free public funds to be used for other purposes.

[10] In the standardized score card to be filled in as part of the completion report, EIB had recorded the following scores in the respective categories:

Compliance with technical definition	very good
Compliance with EIB procurement guidelines	very good
Operations and maintenance cost	"as planned"
Output	very good
Revenues	very good
Project's financial performance (FIRR)	not applicable
Economic rate of return	placed in category 10–15% which is called "very good"
Impact of exogenous factors	"neutral", meaning very good
Respect of loan conditions	very good This refers to the financial covenants
Compliance with environmental guidelines	full compliance = "very good"
Employment impact during operations	net increase, i.e. satisfactory
Project sustainability	"likely"
Regulatory and institutional framework	"no interaction"= Satisfactory
Obligation to send progress reports to EIB	full compliance
Project performance rating	very good
Economic development	very good

On the other hand however, there is a risk that market driven utilities, whether they be public or private, will focus primarily on the relatively richer communities and not on the poorer ones. In Namibia the private company Northern Electric is considered to have expanded operations successfully into new and poor areas, which previously had no access to electricity. Also, by introducing improved billing and by reducing technical as well as non-technical losses, the company was able to lower its tariffs to consumers.

One obvious way how increased efficiency and expansion of electricity can directly benefit the poor is when educational and health institutions, that previously had no electricity, are connected. Then also the rest of the communities can sometimes "ride on the back" of such institutions and receive connections for their households. According to a study[11] carried out, this is what has actually happened in Namibia. Also the way electricity tariffs are constructed can have an impact on poverty reduction. When cost-reflectivity of tariffs is achieved on an aggregate level rather than for individual locations, as is the case in Namibia, this implies that the introduction of uniform tariffs (which is mandated by ECB for the RED system) will lead to cross-subsidization from places with high customer density to remoter areas with low population density.

4.4 HIV

An investment in a transmission line cannot really be said to have any bearing on the question of HIV/AIDS, at least not in any direct sense. In an *indirect* sense one can of course speculate that as more communities (including rural ones) receive their electricity from the grid, it will become easier to fight the Aids epidemic. But this is not an effect, which is certain nor is it measurable.

In terms of fighting the HIV/AIDS disease at company level, NamPower is reputed to be in the forefront among parastatals. It currently runs a "know your status campaign", in which over 50% the work force has taken part on a voluntary basis. The project gives to the employees, who are HIV positive and in need of treatment, a chance to make use of the benefits offered by the company through its medical aid fund. NamPower provides a 100% employer contributed medical aid benefit, which gives all employees as well as their registered dependents access to Anti Retroviral Therapy and related services. The company also runs a voluntary testing program. In 2002 tests showed that of 507 employees, or 14%, of those who had volunteered for the program, were found to be infected with the HIV disease. Another indication of NamPower's commitment to combat the HIV-disease is that last year NamPower recruited a HIV/AIDS expert, who at the time was working as National Program Officer in the Swedish Embassy.

4.5 Environment

A comprehensive environmental impact study, carried out before the project, generally concluded that there were no major ill effects to be expected from the project. It routinely recommended that environmental monitoring be carried out at various stages of the construction. No ill effects were subsequently revealed by these monitoring exercises.

Among minor effects, the following negative impacts in terms of environment were identified before the project: Loss of some land, destruction of scattered trees, waste disposal during construction, as well as creation of transient nuisance in the form of dust, noise, vibration, and traffic flow during construction. The crossing of the Orange River of the transmission line would only have a moderate impact on the biological environment. There would only be a rather small negative impact on erosion potential, groundwater resources, archeology and tourism. The presence of power lines could have some negative impact on birds, and there could be some potential negative effect on human health due to induced effects from Electro-magnetic fields.

[11] Power Sector Reform in Africa: Assessing the Impact on Poor People, August 2005 (Energy Sector Management Assistance Program, ESMAP)

Nampower's Tender information document made the following conclusions with respect to findings of the Environmental Impact Assessment, EIA, report:

– Construction would entail access road and route clearing operations, but the disruptions would be short term

– Incidental cross terrain transportation of equipment may cause temporary damages, but wayleaves and site access have been negotiated with land owners, thus minimizing negative effects

– With the exception of visual effects there are few long term effects on the environment given that most of the area is sparsely populated and does not have extensive flora or wildlife

On the other hand, there are potentially beneficial environmental effects of electrification. An obvious one is that the physical environment in peoples homes will improve, because with access to electricity there will be less need for Namibian households to burn fuels such as wood and paraffin, which is today often done in enclosed spaces with inadequate ventilation. As a result indoor air environments are degraded and can be harmful to the residents.

All the appraisals carried out of the project had concluded that the project is environmentally sustainable.

4.6 Gender

Like the case of HIV/AIDS, also w.r.t. gender, we can conclude that there is no direct effect from investing in a transmission line. But again, in an *indirect* sense, we can imagine circumstances, where women could be beneficially affected from an investment in a transmission line.

Women constitute the largest group in rural areas. They are the suppliers and the end-users of energy for the household consumption of fuel-wood. Even though they are the main end-users there is limited involvement by women in planning and implementing most projects in the energy sector. Women do not have access to information or appropriate technologies. They are often *not* in a position to make or to influence decisions. Furthermore, women are, through their household work, exposed to indoor smoke pollution, which is a major cause of lung disease among poor women and children, to a probably larger extent than men are. Also, the long distances that woman have to walk to collect firewood is a strain on their productivity.

Electrification generally will improve the welfare of the households. Women are no longer disadvantaged and do not need to walk long distances to collect wood. Electricity in remote areas makes it easier for children to read and do their homework. Because of electricity, incubators can be used in maternity wards. In Namibia the rural electrification program has contributed to improved rural water supply. Electric water pumps make life easier for women and children who previously often had to fetch water from far away. The availability of reliable electricity will promote the establishment of small and medium size firms, and such firms will create employment opportunities for women.

4.7 Institutional Aspects; Reforms

Power sector reform conventionally begins with an initial stage of commercialization and corporatization of state-owned utilities, which is followed by their un-bundling and the introduction of competition when country size allows, and by private sector participation. Many countries in Africa have begun this process, but as of 2005 no African country can be said to have completed the process. In the case of Namibia the country has not yet gotten near to the unbundling stage, only to ring-fencing, which is a modest first step. Overall one may conclude that the reform[12] of Namibia's power sector is one which so far includes neither real competition nor any real private sector participation.

[12] The EIB in its completion report 2002 does not address the topic of restructuring and reform, it only states that "the bank will have to follow up closely on the restructuring of the electricity sector."

Un-bundling

In Nampower's opinion, Namibia being a small country, it is not possible for it to unbundle all the functions as would be possible in a bigger country. Distribution, in its opinion, could be possible, but not transmission and generation. All of Namibia has only about 300,000 tax payers, and for competition to work you need a critical mass of number of people. Therefore in Namibia, some would argue that the scope for competition is limited. A case in point is transmission. If one were to unbundle transmission then the remaining company would be very small. The head of ECB does not agree with this reasoning. Referring to Uganda he believes that a separation could be carried out in Namibia. In Uganda, whose total demand for electricity is 300 mw (compared to the 500 MW in Namibia), generation, transmission and distribution have been unbundled into three different companies. This at least indicates that successful unbundling can at least be tried also in small countries. NamPower does not share this view.

The Electricity Control Board, ECB

Restructuring is the responsibility of the Ministry of Mines and Energy, which has mandated the ECB to pursue the task. One of ECB's mandates is to introduce competition in the electricity sector. ECB also has the responsibility to regulate electricity tariffs, which it sets independently without asking the government, but does so based on a frequent dialogue with the Ministry.

In comparison with the regulating agencies of the other countries in southern Africa some see the ECB as being in the forefront, claiming that its (regulation) system – and the way NamPower and ECB cooperate – works well compared to other countries. Initially there is said to have been some tension between the ECB and NamPower, but no longer today. However, one may suspect that NamPower, being such a large and important company, holds a lobbying power far beyond the strength that ECB could hope for.

In the process of ring-fencing Namibia may be ahead of other countries. Reportedly, even the RSA is interested to learn from Namibia how to create REDs and how to separate the distribution function. Electricity tariffs in Namibia are lower than in RSA, but higher than in Botswana, a country which does not yet have a regulating agency like the ECB. In Zambia the tariffs are lower. There the regulator has found it very difficult to operate free from government interference. In Zimbabwe the regulator has not really yet started to function. Tariffs are quite low and there is a lot of interference on part of the government. Mozambique does have a regulator but it has not yet started to operate because of financial problems.

Ring-fencing

According to government's current policy, NamPower is supposed to separate its generation, transmission and distribution businesses in order to ensure that the respective charges set are cost-reflective. This is to be achieved mainly through the process called "ring-fencing". ECB has encouraged NamPower to "ring-fence" its different functions, but has not gone so far as to ask for unbundling. Ring-fencing means creating a profit and loss center. The ring-fenced departments do not have to be separated physically in terms of personnel, office space, or organizational departments, but every department ring-fenced must be balanced in terms of its costs and its revenues. The demands posed on NamPower in terms of ring-fencing imply that financial as well as operational boundaries should be erected around the components of the electricity business, which are regulated, namely generation, transmission and distribution. And the ring-fencing in question has two major regulatory objectives, *firstly* to ensure that there be no cross subsidies between the respective business units, and *secondly,* to allow competing new entrants equal access rights to the monopoly components of the business. The ring-fencing initiatives are expected to have major implications for Nampower's accounting, management structures, and will require corporate restructuring to be met.

In addition to ring-fenced activities there are support services in the form of overhead costs, the cost of which are included in calculating the allowed tariffs. ECB does not regulate the cross-border traffic of imports and exports, because there is nothing to regulate, since it should be a natural task of NamPower to always strive to negotiate the best possible price. Among the *unregulated* activities are property, telecommunications and Administration and internal services. Conceivably the import and export business could in the future be placed into a separate company. In addition, NamPower has revenue from bank interest payments, i.e. from the retained profits which they keep in bank accounts. Also, in the future, there is envisaged to be other type of business, e.g. optic fiber cables, but telecommunications will for NamPower be a strategic investment, not an active operation.

NamPower started its ring-fencing activities two years ago, and in 2004 the company for the first time produced financial statements for the transmission and generation activities separately, which could then be used by ECB in its effort to determine proper future tariffs. As of today ring-fencing has only affected accounting. No separation has taken place in terms of operations, personnel, or the organization of departments.

Regional Electricity Distributors: REDs

As part of the restructuring of the electricity supply industry in Namibia, the government has decided to establish five *Regional Electricity Distributors,* or as they are commonly known – *REDs* in the country. ECB is the agency which, on behalf of the Ministry, has been charged with creating the five REDs. The REDs will consist of all stakeholders in the pre-defined regions who own distribution electricity assets in that region. In other words the REDs will replace the electricity distribution departments of individual municipalities, that of Nampower and of the Regional Councils, which used to provide electricity to small villages without village councils of their own. In practice Nampower customers such as farmers and municipal end-users will, in future, become RED customers.

According to the arrangement, NamPower as well as other parties owning the relevant assets, are required to hand over to the REDs all its customers and distribution assets. The government welcomes private sector participation in the REDs. In fact the private sector participation is seen as crucial as it is it that is expected to inject required new capital as well as expertise. So far only two licensed REDs have been established, while the total number of electricity licenses issued amounts to 111. Even if the RED system may be seen as step forward from what was earlier, some see a danger that it may be a way to actually crowd out potential private sector investment in the electricity sector, which is what many believe is what happened when Northern electricity had to leave the scene.

In Namibia the plan is to completely remove NamPower from distribution. There will be five regional distribution companies, of which three are operational today, while the other two are expected to start operating in 2006. NamPower, however, owns shares in these distribution companies. In the North Central red it owns 37% of the shares, which is a controlling majority because most of the other owners are small,. In Erongo, on the other hand NamPower holds only 9% of the shares, while in the Central RED NamPower is expected to hold 6–9% of the shares, and in the Southern RED 50%.

Northern Electricity

In 1996 a private company Northern Electricity, was contracted to operate the existing distribution infrastructure in the north. Under the agreement the company did not own any assets but was responsible for all other costs and revenues. The company is considered to have been very successful. It was able to vastly improve collection of dues, it extended supply to new customers and it was in many cases able to lower tariffs. Despite of this its presence in the electricity sector came to an end in 2002 – apparently as a result of pressure from both NamPower, the Ministry and from local authorities, who all – for their own reasons were apparently not ready to allow new actors into this potentially profitable activity. This can be seen as a successful example of Private Public Partnership, which was not allowed to continue because of political pressures form old monopoly interests.

Tariff reform

In 2001 a major tariff study were carried out under the auspice of ECB. The study made a careful review of the existing tariff structure and developed a tariff methodology based on the principle of cost-reflective pricing. The study, among other things, found that presently in Namibia there exist a multitude of electricity service-related tariffs and levies. Even if ECB has established a standard methodology for setting tariffs, the existing tariffs today are very different for different distributors and for clients in different locations. Customers can pay anything between US cents 2,7 to 10.5 per kWh. Many local authorities are overcharging their electricity customers in order to subsidize other services. This is contrary to the government's policy that that electricity tariffs must be cost-reflective.

As a condition for the loan EIB had requested that the Namibian side undertake to continuously reform the electricity tariffs so as to cover all costs and to allow for a reasonable self-financing of its investment program. Analyzing the present tariff level, one can conclude that the relevant Namibian authorities (i.e. ECB) have continued to try to achieve this objective, but that it has not yet been able to successfully reach the target. Nampower considers that today's tariffs are too low, and would like to see a hike up to 45 N cents per kWh from today's 32 cents. Already at the time of Sida's preparation for this project – in 1997 – the situation was that the tariffs only covered running and maintenance cost of producing electricity, but not allowances for capital costs of future investments. And then, just as today, the authorities declared their intention that (as soon as possible) tariffs would be raise to reach the LRMC level. Today, 6–7 years later, they are in this respect not closer to this goal.

It is expected that electricity tariffs will increase substantially in the near future. There are several reasons for this, of which the most important is the renegotiations of the supply contract with Eskom in South Africa. Even if the tariffs are expected to go up in the near future, it is nevertheless expected that in the very long run, electricity tariffs should decrease in real terms due to increased competition and through more effective and efficient supply of electricity because of the REDs.

Single Buyer model

In the Single Buyer model all generators and importers of electricity will sell their power to the Single Buyer who will then sell to the REDs (Regional Electricity Distributors), and if necessary to large users. Referring to the limited size of the Namibian electricity market, the government's policy in terms of the wholesale market for electricity is the single buyer model. Since there are just a handful of electricity producers, it is not seen to be feasible to operate a competitive whole sale market for electricity. The government notes however that internationally a single buyer model has often served as s transitional stage before a country is ready to enter into a competitive market.

In terms of generation however it is expected that new entrants will come in the form of or independent power producers (IPPs). The IPPs will be allowed to generate and also to sell independently of NamPower for exports. The single buyer NamPower, on the other hand, will be responsible for buying electricity from its own ring-fenced power producers, to buy from abroad and to buy from the domestic IPPs. The policy states that "local generators will have preference over imported power with regard to access to the market". It is not specified exactly how such preferential rules will be exercised. In general it is however expected that the single buyer must be guided by economic efficiency, which presumably must mean that he must buy the power from the cheapest source available – whether domestic or imported.

The policy allows NamPower, in fact encourages it, to participate with equity in the investments of IPPs, but assumes that its role as single-buyer will not be compromised. In other words NamPower is expected to purchase electricity without being influenced by its own economic interests in the respective sellers of power. Locating the single buyer in NamPower obviously constitutes a risk of conflict of interest, because the company is itself a power generator and could thus be tempted to exploit this position.

Grid Code

The ECB is currently working with a US consultant firm to develop a grid code system for Namibia. A grid code typically establishes the technical requirements for connection to and use of an electrical system, ensuring reliable, efficient and safe operations. Namibia's current grid code[13] is thought to be comprehensive in that it contains all the necessary elements, but is in some areas vague and contains some inconsistencies such as market structure and approach to transmission pricing.

4.8 Additionality

Additionality is a concept which is often hard to define even theoretically. And in practice it is almost impossible to prove that a particular piece of external aid was in deed additional to what would otherwise have been spent on the project in question, at least if the analysis is made over a longer period of time. In this project it seems clear that no additionality has taken place with respect to the Swedish funding. *Firstly,* NamPower is, and has for several years been a well managed company with plenty of liquidity and stable ratios of solidity, and there is no question in my mind that it would have decided to go ahead with this important investment, and financed the SVC out of their own finds or out of commercial borrowing, had the Swedish soft loan not been available.

Secondly, it appears that the African Development Bank had already decided to finance the SVC before it new that Sida was interested. The AfDB appraisal document specifies the Bank's portion to be ZAR 187 million (compared to the 65 million, which were agreed after Sida came in an contributed the balance 187–65 = 122). The appraisal document also specifically states that the SVC will be financed by the African Development Bank.

Sida was aware of this and the Sida project document (on page 18) states that *"the Stat VAR compensators have partly a "double" financing, as AfDB has allocated a sum over and above Sida's credit"*. Therefore Sida already knew that its funds would not be additional in relation to the volume of foreign financing. It could of course still have hoped that the foreign financing – whether emanating from AfDB or from Sida – would be additional in terms of enabling the investment. But that turned out not to be the case.

4.9 Relevance

The SVCs installed today in Auas will be used even if one day Namibia stops importing power from the RSA, for the 400 kV Interconnector will be used under any of the scenarios that are foreseen for the future in the country's generation plan. If and when KUDU comes on line, at least half of the power can be expected to be exported to RSA, and also then the SVCs will be needed. The same goes for possible future power coming from Angola, Congo and/or Zambia. Under all conceivable future scenarios with respect to Namibia's energy supply – even in the case of imports from Inga – the 400 kV interconnector, including the Sida-financed SVC in Auas, will be needed.

The relevance of this interconnector project can be measured also by the importance of [international] interconnection for achieving economic energy supply. By interconnecting different national grids each country can get more reliable electricity supply at a lower cost. Pooling of generation capacity gives the opportunity to utilize more diverse primary energy sources. The larger market achieved via interconnection also enables economies of scale to be realized in the operation of power plants and in accommodating demand growth. Interconnection also facilitates the introduction of competition into electricity supply.

[13] A summary comprehensive listing of all of Namibia's rules and regulations in the electricity sector is provided in the document: *NamPower (Pty) Ltd.: Report for European Investment Bank, 2003"*

The 400 kV will at the very least be a necessary investment to secure the country's supply of electricity. At best it could in the future stand out as the backbone of an international southern African power pool, which allows the individual countries to trade power to each other on the spot market, thus allowing everyone to attain economies of scale in their domestic power production and to secure the lowest possible cost of electricity for its inhabitants. The conclusion to make is then that the investment in the ARIES-AUAS 400 kV Interconnector is highly relevant.

4.10 Sustainability

Overall prospects for sustainability of the 400 kV Interconnector must be seen as very good. It now serves as a backbone of the country's electricity supply and in all likelihood it will be well looked after. And the pre-conditions seem to be there – technologically, financially, environmentally and economically.

Technologically, NamPower has shown a high level of proficiency and efficiency, not least in the way they handled the 400 kV Interconnector investment. The existing electricity infrastructure, although much of it is quite old, seems to be well maintained and looked after.

Financially, the company is, and has been, doing very well, and the only likelihood that the investment would run into financial problems would seem to be a scenario where electricity tariffs are not allowed to rise in a natural manner, or where a future incorrect un-bundling or privatization were to leave unsustainable business units behind.

Environmentally, there is not much to fear. Except for the electricity radiation the transmission line is not a polluter, and besides, it has been built in locations so as to minimize interference with other society functions.

Finally, *economically,* as we have argued above, the 400 kV transmission line will be a necessary component under any conceivable scenario of future electricity supply. It is therefore hardly conceivable that the line would become unsustainable from an economic point of view in the next few decades.

5 Lessons Learned

Function of parastatals

A lesson learned could be that also a 100% government owned parastatal can be able – under appropriate circumstances – to independently implement a large and complicated project, and also to efficiently run a large company. This should, however, not be construed as an argument for avoiding or delaying necessary unbundling and eventual privatization, for that is an avenue which must always be considered and tried. But the knowledge that a parastatal is functioning well, will provide the necessary perspective when designing the mode of and the process of various initiatives of unbundling and/or privatization.

Lack of coordination among donors

Even if the foreign donors have maintained a frequent dialogue with each other during the stage before the project, it still turns out that the desired level of coordination leaves much to be desired. And even though the donors did talk to each other before the project, and even though they know of each other's almost identical requirements with respect to the project's follow-up and eventual evaluation, the post-project coordination or dialogue between them turned out to be non-existent. Not only did they fail to

coordinate their evaluation efforts, but they even forget to share with each other the follow—up and evaluation which takes place.

6 Recommendation

The need to coordinate with other donors – at the very least in such projects, where the scope and objectives of the respective support plans are identical – should be mandated explicitly in Sida's project memoranda, and also included in the formal financing decision. Possibly it can also be included as a paragraph in the project agreement which is signed with the recipient government.

Annex 1 Terms of Reference

Terms-of-Reference for the Ex-post Evaluation of two aid interventions by Sida in the Namibian Energy sector

(1) a 210 million SEK soft credit as part-financing for a new 400 kV Transmission line from RSA to Windhoek, and

(2) a 90 million SEK soft loan to enhance the development of the local bond market for energy investments

The Projects

Sida's decision to support the above two projects was made in 1998. The objective of *the transmission line project* was to safeguard the supply of imported electricity from the RSA for the growing domestic household as well as industrial market. The main contents of this project are: (1) construction of a 900 km long 400 kV transmission line from Aries in the RSA to Auas near Windhoek, (2) building of a new transformer station in Auas, and (3) upgrading and expansion of the existing transformer station in Aries. The Swedish funds were specifically used to finance importation of *Static Var Compensators* (SVS). Of the total cost of the project, which was projected to be about 1,300 million SEK, Sida financed about 14%, the European Investment Bank 37%, the African Development Bank 12%, the French Government 4%, while about 34% of the total financing was to be covered by Nampower itself.

The objective of the *bond market development project,* which was constructed in the form of a guarantee for Nampower's bond issues, was to enhance Nampower's capability to issue long-term bonds in the local market, which in its turn would allow Nampower to finance its obligations in the transmission project. Among the main ingredients of this project at the activity level are the creation of a Namibian Electrification Trust, instruct and negotiate with banks and other partners to create and contract a structure capable of managing bond issues. At the output level the main target was that the bond issue be accepted by the market and fully sold out, and that a secondary market for security options and for bonds is created in Namibia.

The two projects are totally different in their objectives as well as in their project activities and outputs and must therefore be evaluated as two separate projects.

Both the Sida loans were given to the Namibian government, which in its turn entered into an on-lending agreement with Nampower at commercial credit conditions, while keeping the grant element for the state. The grant element of the Swedish financing was to be used by the Namibian government to develop the country's rural electrification.

As concerns the *rural electrification activity* on part of the government this is an activity which is totally separated from the two Sida financed projects, and must therefore in consequence be evaluated as a separate project. However, for Sida in this instance this is not a main activity, only a side condition pertaining to Sida's wish with respect to how the grant element is to be used. So therefore this activity needs only be followed up and discussed at a fairly superficial level.

The Evaluation[s]

The interventions were completed in 1999, and today, five years after project completion, the need for an *ex post evaluation* pertains to the following separate projects/activities:

Firstly, the outcome of the transmission line project, whereby the main attention shall be given to the component financed by Sida, namely the installation of the *stat var compensators,* delivered by ABB, in the Auas transformer station.

Secondly, the outcome of Sida's support to enhance Nampower's capability as an independent actor in the local bond market, guaranteeing its issuance of bonds to provide financing for the transmission line project.

Thirdly, there is a need for Sida to assess whether the grant element of the Swedish credit was in deed used (as additional finance) to develop rural electrification, and to what effect. It is understood that this third element will be analyzed with less depth and ambition than the two former ones.

Methodology

The transmission line and the bond market projects will be evaluated applying the usual methodologies prescribed for Sida's ex post evaluations[14].

a. This implies that the outcomes of the respective projects will be evaluated against Sida's main evaluation criteria, which are
   Effectiveness (measured at the levels of project output and project effects respectively)
   Impact
   Relevance
   Sustainability, and
   Efficiency.

Under each of these criteria the proper analysis will be performed as prescribed by the Sida manual. *Inter alia,* in the case of the transmission line project this implies that, under the heading *efficiency,* an assessment will be made of the project's financial as well as economic rates of return.

b. The analysis of the attainment of project and other objectives and targets will be based on a *logical framework analysis* matrix as well as a goal/ means hierarchy constructed specifically for this evaluation.

c. The above evaluation criteria will be analyzed in relation to Sweden's general objective of development cooperation, which in 2003 by the Swedish parliament[15] was formulated such that "the main goal for development cooperation is to create the pre-conditions for poor people to improve their living conditions". This is the so called *"poverty objective",* which is to be seen as the overall objective of all of Sweden's development cooperation, and which means that any evaluation must address the question if and to what extent the project has benefited the poor.

The same document of the Swedish Parliament points out the following components as being particularly important:

- democracy and good governance
- respect for human rights
- gender equality
- sustainable use of natural resources and protection of the environment economic growth
- social development and security
- conflict prevention and resolution, and
- global public goods

[14] See Sida's Evaluation Manual "Looking Back, Moving Forward", Stockholm 2004
[15] Policy for global Development: Swedish Parliament, December 16, 2003

Each of these components will be analyzed and discussed commensurate with the relative importance it is deemed to have in the respective projects.

d. Furthermore, the evaluation criteria will be analyzed against the particular objectives and limitations that are contained in the *Swedish country aid strategy for Namibia.*

e. As for the third evaluation task, namely the assessment of the government's use of the grant element in its work to develop rural electrification, this will also, in principle follow the methodologies prescribed by the Sida Evaluation manual, but it will be much shorter and much more superficial than the other two evaluations.

f. The analysis will also include the question of *additionality:* Would the transmission line project have been undertaken also in the absence of the Swedish financing?

g. With respect to the Bond Guarantee project an important aspect to be addressed by the evaluation is the risk that the Sida support could in any way have acted to distort the natural development of a bond market in Namibia.

Work Plan and Time Schedule

While the documentation from the preparation phase of the projects is voluminous (the Sida files contain about 15 full ring binders), there are no project documents – nor any correspondence – from a later date than the year 2000. Therefore one can expect that the task of procuring the necessary documentation for this evaluation may become relatively time consuming. Given that, however, the three separate evaluations presented above will be carried out following a traditional mix of preparations/ desk studies, field studies and analysis, namely:

Phase 1: Preparations and desk study. (7 working days)

1. Planning and setting up an interview program for visit to Namibia
2. Procuring and reading available written documentation: from Sida files, from the other donors involved, related documentation available on the internet
3. Working out a detailed evaluation methodology and report structure
4. Interviews with ABB personnel responsible managing this project, and with Swedepower, which in 1995 made a comprehensive study of the country's energy situation.
5. Interviews with responsible staff at Sida, SEK and EKN

Phase 2 (to be considered): *Visit to the European Investment Bank in Luxembourg* (2 days)

The EIB was the lead donor in the transmission project, and the main party – on the donor side – responsible for project monitoring and documentation. Therefore, it could be well worth while to visit the EIB headquarters in Luxembourg in order to collect documentation and to interview the responsible project officers

Phase 3: Visit to Namibia (10 days)

1. Visit to the *Auas* transformer station
2. Visit to the transformer station in *Kokerboom* in RSA and possibly to the Aries station

Among the interviews to be made are at the following institutions:

3. *Standard Bank Group* which is the main provider of local finance for this project, and who apparently is also responsible for a large part of the financial analysis performed for the transmission project
4. *Nampower* headquarters in Windhoek: interviews with the persons mainly responsible for the project as well as with other relevant persons
5. Interviews with responsible staff, and studying of project files at the *Swedish Embassy* in Windhoek
6. A relevant selection of knowledgeable persons within the *Namibian government,* among them the Ministry of Mines and Energy and institutions such as the Namibian electrification Trust.
7. Aid officers from the local *donor community,* among them the EU office.
8. The South African Energy company ESKOM, with which Nampower maintains a very close cooperation in this project as well as in all other operations.
9. The *Namibia Central Bank,* and a number of the banks and other actors participating in the local bond market.

It is envisaged that the visit to Namibia will take place during November 2005.

Phase 4: Analysis and report writing (6 days)

This work includes one working day ear-marked for completing the final report based on comments received on a draft evaluation report.

Reporting

A draft report will be submitted to Sida at the latest 15 December, and a final report two weeks after receipt of comments from Sida on the draft report.

Annex 2 Persons Met

Nampower

Louis Becker	Head Control and Telecommunication
Neville Beckmann	Group Treasurer
Ronald Bosch	Senior Manager Network Operations
Leake S. Hangala	Managing Director
Reiner Jagau	Chief Technical Adviser
Udo Kleyenstuber	Transmission Specialist Engineer
Horst Mutschler	Specialist Engineering and Design
Kris Nair	Head Nampower International
Chris Ndivanga	
Karl-Heinz Wagner	Manager Electrification
Gordon Walters	General Manager Group Finance
Christo Visser	Manager Electricity Pricing
Joseph S. Iita	Ministry of Mines and Energy, Permanent Secretary
Paul Hartmann	Bank of Namibia, Deputy Governor
Phillip N. Shiimi	Bank of Namibia, Senior Manager Financial Markets Department
Siseho C. Simasiku	Electricity Control Board, Chief Executive Officer
Horrack Kutazo	RERA, Regional electricity Regulators Association of Southern Africa, Assistant Executive Secretary
Tina Dooley-Jones	USAID, Director of Technical Programs
Tony Edmunds	IJG Associates Ltd., Windhoek
Göran Hedebro	Embassy of Sweden, Charge' d'Affaires a.i., Head of Mission
Dag Sundelin	Embassy of Sweden, First Secretary

Annex 3 References

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