Criteria for the allocation of grant funding for electrification to the provinces

CECILE THOM

1998
ENERGY & DEVELOPMENT RESEARCH CENTRE
University of Cape Town

Executive summary

Introduction

This paper discusses the allocation of grant funding available for the electrification of poor and historically neglected areas and communities to the provinces in South Africa. The focus of the paper is on allocation principles and criteria, but the process by which allocation takes place is also discussed, as it was found that these aspects cannot be divorced altogether.

It is not yet clear whether grant funding available for electrification at a national level will be primarily allocated to regional electricity distributors (REDs), operational entities within a single national distributor, and/or local authorities. This depends on the outcome of the restructuring of the electricity distribution industry. Nevertheless, whatever the nature of the actual funding streams, government will need to guide the allocation of available resources to the different provinces. This is important for planning purpose as well as for political reasons.

Criteria currently used

The three national bodies involved in the funding of household electrification – Eskom, the National Electricity Regulator (NER), and the Development Bank of Southern Africa (DBSA) – all have some way of allocating resources to different provinces.

DBSA

The DBSA has developed an index to guide the allocation of its resources to the different provinces for infrastructure lending, particularly for water, sanitation, electricity and road projects. This index comprises the average of the following two criteria:

- Poverty: The 'poverty gap', which is defined as 'the amount of money needed to adjust the income of families below the poverty line, to above or on that line', is used as a measure of the poverty of the provinces.
- Economic potential: The real GGP of a province is used as a measure of its economic potential.

NER

The NER is responsible for the allocation of the R300 million grant from Eskom to the local authorities for electrification. The NER identified the following three criteria that can be used to guide the allocation of electrification subsidies to the provinces:

- The 'total need for electrification' in the provinces, measured in terms of the numbers of unelectrified houses in the provinces.
- The 'need for electrification in urban areas', which is measured in terms of the numbers of unelectrified houses in 'urban' areas in the provinces.
- The 'demand for electrification in urban areas', measured in terms of the numbers of electricity connections for which funding applications were received from local authority distributors in the provinces.

A composite allocation index was obtained by taking the average of the 'Urban needs' index, the 'Urban demand' index, and the composite DBSA index.

Eskom

The main allocation criteria that were used by Eskom to plan for 1998 are the following:

- The numbers of potential connections in Eskom's engineering (or planning) areas.
- The projected average cost per connection in each engineering area.

- Political demand for electrification in the provinces.
- The numbers of unelectrified houses in the provinces.
- The electrification plans of other major utilities in the provinces.

These criteria were not used to calculate an index which sets the allocations to the different provinces. Rather, the criteria seemed to be applied during the allocation process followed by Eskom.

Conclusions

The following conclusions have been drawn from the analysis of criteria currently used by electrification agencies in South Africa:

1. There seems to be broad agreement that it is best to use a small number of key criteria that are simple and clear, to ensure that all concerned parties can understand the basis for the allocations to provinces. The organisations discussed here all used a fairly small number of key criteria for the allocation of resources to provinces – the DBSA used two, the NER three (four if the two DBSA criteria are considered separately), and Eskom used five.
2. It is essential that the allocation of resources be done through a process during which all the important criteria are carefully considered. It can take the form of a planning process (e.g. in Eskom's case) during which different criteria are considered at different stages of the process. Or it can take the form of a process of evaluating actual funding applications, as in the case of the DBSA and NER. Human judgement needs to play an important role in the allocation process.
3. It is helpful to establish an index for each of the key allocation criteria if at all possible, as indices can guide the allocation of resources very effectively. However, not all the important criteria can necessarily be quantified and therefore captured in indices. Some criteria may have to be considered without the aid of an index, as is done by the DBSA and NER when assessing actual funding applications.
4. Individual indices can be combined to form a composite allocation index. However, indices that reflect opposing objectives or considerations (e.g. the need for poverty alleviation, and the need to support economic growth; or the need to minimise costs, and the need to address inequalities) should not be combined in a single composite allocation index. They should rather be weighed up against one another in the allocation process, applying human judgement to make the final allocations.

Criteria supporting social and economic objectives

The social and economic objectives of the electrification programme have not been clearly defined as yet. Nevertheless, the DBSA index with its dual nature seems to reflect quite well what many people regard as the goals of the programme – on the one hand, addressing poverty, and, on the other, supporting economic development. For the purpose of this discussion a distinction is made between criteria that support 'economic growth' on the one hand, and those that support 'socio-economic development' on the other.

Criteria supporting economic growth

The following criteria could be used to allocate grant funding for electrification to the provinces in order to support economic *growth*.

- Contribution of provinces to the national economy, measured by real GGP .
- Macro-economic impact of electrification undertaken in the provinces.

Electrification funds could be allocated to the provinces to maximise the impact of electrification on the national economy as far as possible. For this purpose a macro-economic analysis of the

electrification programme would have to be done, including an investigation of the effects of varying the rate of electrification in the different provinces.

- Electrification projects contributing to economic growth.

This criterion offers a direct way to assess the degree to which each province requires grant funding for electrification projects that contribute to economic growth. The suggested approach is to allocate funds to the provinces on the basis of planned electrification projects in poor and historically neglected areas that are expected to contribute significantly to economic growth. Criteria would need to be established to select the projects that will be supported. It is envisaged that the funding allocated to one of these projects would comprise the shortfall between commercial finance and other funding sources, such as a concessionary loan, on the one hand and the total costs of the project on the other.

Criteria supporting socio-economic development

The majority of electrification projects are undertaken in residential areas where major spin-offs in terms of economic production are unlikely, although this does not mean that the contribution of electrification to these areas is insignificant. An attempt was made to identify criteria which would ensure that electrification supported socio-economic development most effectively.

- Number of unelectrified facilities providing services in the different provinces.
- Complementary development initiatives in the provinces.

The impact of electrification on its own is fairly limited. There are a variety of initiatives that would complement an electrification programme and thus enhance the impact of the programme by developing human and organisational ability, assisting people in providing for themselves, and providing basic infrastructure in impoverished areas.

- Economic assessments of electrification projects.

As household electrification forms an important part of an electrification programme, it is desirable to capture household-level benefits in a criterion for the allocation of subsidies to provinces, in addition to the criterion on social infrastructure already discussed. One possible criterion is the average economic net present value (NPV) per electricity connection that is expected for electrification projects in each of the provinces.

- Targeting different socio-economic groups

Another option that was considered in order to define a criterion based on socio-economic benefits at a household level was to give greater priority to certain socio-economic groups in the electrification programme. One possibility is to give most weight to one particular group. For example, greatest priority could be given to communities in *metropolitan and other areas* where significant economic growth is experienced (even though the electrification projects themselves do not contribute significantly to economic growth). Another possibility is to treat every province separately, and to allocate most weight to the group with least access to electricity, and least weight to the group with greatest access to electricity in each of the provinces. The weights would therefore probably differ from province to province. This would promote greater *social equality* in access to electricity among different socio-economic groups in each of the provinces.

- Poverty levels in the provinces.
- Numbers of unelectrified houses in the provinces.

Conclusions

The social and economic criteria discussed in the paper have been assessed according to four basic criteria. Based on these considerations, the preferred economic growth criterion is 'Electrification projects that contribute to economic growth'. If this proves too difficult to apply –

for example, if the number of applications received makes it impossible to conduct this selection at a national level – another criterion would have to be developed. Although 'Contribution to the national economy' seems the best alternative, it is not satisfactory because of the complete dominance of Gauteng in the index. The criterion 'Macro-economic impact of electrification' cannot be recommended, as this would need to be developed further, and it is not clear whether this would offer a meaningful way to allocate the resources.

It is recommended that the criterion 'Unelectrified social infrastructure' be used for socio-economic purposes, preferably with a wider range of facilities than schools and clinics only. At least one of the other socio-economic criteria should be used in conjunction with this, preferably one which captures the socio-economic benefits at a household level. As 'Economic assessments of electrification projects' would require extensive analysis without necessarily resulting in a satisfactory criterion, this should not be considered. It is recommended that 'Targeting socio-economic groups' be investigated further with the aim to define a clear criterion that can be used for allocation purposes. In spite of the shortcomings of this criterion, it seems to be the only real option for establishing a criterion that reflects the fact that the socio-economic impact of electrification on households and communities can differ substantially. If this option cannot be developed further, or proves unsatisfactory, either one of 'Poverty levels' and 'Numbers of unelectrified houses' could be used as the second socio-economic criterion. Seeing that there seems to be a correlation between these indices, using the average could also be considered.

The criterion 'Complementary development initiatives' is an important one, as it draws attention to the importance of other development initiatives in creating the conditions that would enhance the impact of electrification. It is recommended that this criterion be investigated further with the intention of focusing it more – for example, identifying a few specific initiatives that could be used to assess the provinces, as well as some criteria that could be used to assess the success of these initiatives.

Other important considerations

The following financial and political considerations need to be included in the allocation process as far as possible.

- Average connection costs in the provinces.

The average cost per connection varies considerably between the provinces. In order to treat all provinces in an equal manner, the actual costs of extending the grid, whether due to historical or geographical factors or both, need to be factored into the allocation of funds to the different provinces as far as possible.

- Political demand for electrification.

Local councillors responsible for 'rural' areas may want to continue to provide input to the provincial allocation process even when a national policy has been established. The numbers of unelectrified houses in the provinces, as captured in the 'Total needs' index defined by the NER, seem to have been regarded as a fair allocation criterion from this perspective.

Recommendations

Recommended process for the allocation of grant funding to provinces

The process recommended for the allocation of grant funding for electrification to the provinces, using the preferred criteria, is outlined here. Two alternative processes that could be used if the recommended criteria are not accepted are also outlined in the paper.

1. Apply the criterion 'Electrification projects that contribute to economic growth' without establishing an index. That is, allocate funds to actual electrification projects that will contribute to economic growth in poor and historically neglected areas and communities,

and will be implemented in the year under consideration. This establishes the total amount that will be used to support economic growth in the provinces in that year, while the rest of the funds can be used to support socio-economic development.

2. Establish indices for the criteria 'Unelectrified social infrastructure' and 'Targeting socio-economic groups'. Calculate a *composite index for socio-economic development* by taking the average of these two indices, thereby giving equal weight to the electrification of households and the electrification of social infrastructure.
3. Apply the criterion 'Complementary development initiatives' by modifying the composite socio-economic index somewhat to reward provinces where the selected complementary initiatives exist and are successful, and penalise those where very little exists and very little is achieved. An index should not be established for this criterion, as it would not be meaningful. Human judgement would have to be applied.
4. Modify the socio-economic index once more to compensate provinces where the highest average connection costs are experienced as far as possible.
5. Use this modified socio-economic index to allocate the funds available to support socio-economic development in the provinces (at the end of step 1). This establishes the full allocation to each of the provinces for a particular year.
6. The political acceptability of this allocation could be assessed by comparing it with allocations based on the criterion 'Numbers of unelectrified houses' in the provinces (the 'Total need' index of the NER), which can be seen as a measure of political demand at a provincial level.

Criteria for allocations to planning areas

The project selection and prioritisation processes discussed by Banks (1998), which deal among other things with decisions on the technology options (grid or non-grid) to be employed, are undertaken within planning areas that are considerably smaller than the provinces. Most of the *recommended* and some of the alternative criteria discussed above can be used to allocate grant funding to such planning areas. These are:

- Electrification projects that contribute to economic growth.
- Unelectrified social infrastructure.
- Complementary development initiatives.
- Numbers of unelectrified houses.
- Average connection costs.
- Political demand for electrification.

Structured provision for consultation with political leaders would probably need to form part of the allocation process at this level.

Contents

Acknowledgements

I would like to express my appreciation to all the people who have been willing to share their experience and thinking with me during the course of this research project. These include Priscilla de Gasparis (DBSA), Deon Stassen (DBSA), Johan du Plessis (NER), George van der Merwe (NER), Steve Boshoff (NER), Paul Galen (NREL), Paul Maré (Eskom), Joe Lesejane (Eskom), Chris Lithole (Eskom), Rodney Buttle (Eskom NGE), and Sandra Bezuidenhoudt (Eskom NGE).

I would further like to acknowledge the financial support received from the DBSA for this work, as well as from the project 'The role of electricity in the integrated provision of energy to rural areas' that is funded jointly by the DME, Eskom TRI and NORAD.

Finally, I am deeply indebted to both Bill Cowan and Douglas Banks of the EDRC who has greatly contributed to the development of my thinking on this subject – Bill, particularly in the form of pertinent questions and comments, and Douglas through regular discussions and a sharing of ideas. I would also like to thank other researchers at EDRC who have participated in discussions about this work, particularly Hilton Trollip, who is an associate researcher, and Bronwyn James.

1. Introduction

The Department of Minerals and Energy (DME) is in the process of developing energy policy for South Africa. Specific attention is also being given to an electrification strategy to consolidate and possibly extend the electrification initiatives in progress at present. These include Eskom's national grid electrification programme, grid electrification undertaken by local authorities, and schools and clinic grid and non-grid programmes. Greater activity is envisaged particularly in the area of household solar electrification, which has been slow to get off the ground.

One of the important issues in electrification policy is the allocation of financial resources available for electrification at a national level to smaller entities such as provinces, local authorities, and/or regional electricity distributors (REDs). This is the subject of this paper, which, it is hoped, will make a contribution to the debate on this issue.

1.1 Conceptual framework

1.1.1 National electrification planning

The allocation of financial resources at a national level forms part of a national electrification planning process. There is no national planning process in place as yet in South Africa, in spite of the fact that most electrification is done with public funds, and virtually all the bodies involved in electrification and the funding of electrification are in the public sector. It is expected, however, that such a process will be established as a result of current developments in electrification policy and strategy.

It is further expected that government policy and strategy on electrification will clarify the objectives of the national electrification programme, as well as the way in which it will be funded. Allocation decisions need to be made by considering the objectives of the programme, as well as the financial resources available for electrification.

1.1.2 Beneficiaries of the electrification programme

The term 'electrification' as used in this paper specifically refers to the electrification of impoverished and historically neglected areas and communities in South Africa, including 'black' townships, informal settlements, most of the former 'homelands', and farmworker communities.

1.1.3 Urban and rural areas

The terms 'urban' and 'rural' are not useful for electrification planning in South Africa, as the definitions that are currently used are both inadequate and inconsistent (Udjo 1997). However, as these terms cannot be avoided, specific definitions are used throughout this paper. The term 'officially urban' refers to areas included in the official definition of urban areas – that is, proclaimed urban areas by the time of the first democratic elections in 1994, and thus excluding most informal settlements, even those bordering on proclaimed urban areas. Similarly, 'officially rural' areas refer to all areas outside of proclaimed urban areas, including informal settlements bordering on proclaimed urban areas. Other terms that are used are 'functionally urban' areas and 'functionally rural' areas, which are based on the DBSA's definition of 'functional urbanisation'. This includes the following areas (Calitz 1997):

- proclaimed urban areas;
- informal settlements adjacent to proclaimed urban areas; and
- unofficial 'mining towns' – comprising the employees at mines and their families, with infrastructure and services provided by mining companies – with more than 5 000 residents.

This definition appears to be widely used at present for planning purposes as a measure of real urbanisation (Calitz 1997). The DBSA estimated that the difference between functional and

official urbanisation in 1994 was 13% nationally, while major differences were found in the Northern Province (26%), the Free State (26%), and the North West (24%), as shown in Table 1. The differences are therefore highly significant from a planning perspective.

Table 1: Different estimates of urbanisation in South Africa
Sources: CSS (1997), Calitz (1997), NER (1996)

Province	*Functional urban / rural pop. in 1994 (DBSA)*	*Official urban / non-urban pop. in 1994 (DBSA)*	*Official urban / non-urban pop. in 1996 (CSS)*	*Urban / rural pop. in NER database (1996)*
Eastern Cape (%)	50.5 / 49.5	36.0 / 64.0	37.3 / 62.7	32.5 / 67.5
Free State (%)	79.7 / 20.3	53.5 / 46.5	69.6 / 30.4	53.2 / 46.8
Gauteng (%)	98.2 / 1.8	96.9 / 3.1	96.4 / 3.6	95.6 / 4.4
KwaZulu-Natal (%)	50.9 / 49.1	40.0 / 60.0	43.5 / 56.5	40.3 / 59.7
Mpumalanga (%)	51.0 / 49.0	35.2 / 64.8	38.3 / 61.7	30.1 / 69.9
Northern Cape (%)	79.2 / 20.8	76.6 / 23.4	71.7 / 28.3	67.2 / 32.8
Northern Province (%)	43.5 / 56.5	17.2 / 82.8	11.9 / 88.1	9.8 / 90.2
North West (%)	61.9 / 38.1	37.6 / 62.4	34.8 / 65.2	30.5 / 69.5
Western Cape (%)	94.2 / 5.8	88.9 / 11.1	89.9 / 10.1	85.1 / 14.9
South Africa (%)	**65.9 / 34.1**	**52.5 / 47.5**	**55.4 / 44.6**	**49.0 / 51.0**
Total population	43.1 million	43.1 million	37.9 million	42.1 million

1.1.4 Funding resources

While a range of financing options are available for electrification, including commercial and concessionary loan options, a national planning process will only have jurisdiction over the allocation of *grant* funding to different entities. This paper is therefore specifically concerned with the allocation of grant funding available for electrification at a national level. As a result, electrification projects that are financially viable, and require no financial assistance other than commercial financing, are not included in the discussion.[1]

1.1.5 Institutional framework

A discussion on allocation criteria is meaningless unless it is done with reference to the institutional environment within which allocation decisions are made. No national institutional framework for the planning and financing of electrification yet exists, but it is expected that this will be addressed in the current policy and strategy development processes of the DME.

The main organisations currently involved in funding electrification in South Africa are Eskom, the Development Bank of Southern Africa (DBSA), the National Electricity Regulator (NER), some of the local authorities (e.g. Durban Metro Electricity), the Independent Development Trust (IDT), and the DME. These organisations generally play different roles, and have together managed to keep the national electrification programme on track, but complex relationships exist among them which have not always been conducive to cooperation. Clarity is required on their respective roles and responsibilities, and it is expected that the forthcoming policy and strategy on electrification will address this.

Eskom generally raises funds from the capital and money markets, but has been cross-subsidising its electrification programme to a large degree from retained earnings. It has also obtained loan financing for electrification from the DBSA in the past. Eskom has further

[1] Davis et al (1996) recommended that commercial projects (for example, projects involving the upgrading of existing infrastructure and expanding of the networks where a reasonable rate of return can be expected) be financed through the capital markets and retained earnings, as is currently the practice.

provided R300 million in grant funding to assist local authorities with electrification in 1997, and again in 1998. These funds are being allocated by the NER, with the DBSA acting as banking facility (Banks 1998). Local authorities can apply to the NER for capital subsidies, and for concessionary loan financing from the DBSA. The IDT has funded a clinic electrification programme as part of a larger clinic building and upgrading programme. Finally, the DME has been administering funds for the schools electrification programme (grid and non-grid) which has been implemented by Eskom.

Some of the problems with this system, particularly from the perspective of the household electrification programmes, have become widely recognised (Davis et al 1996). The institutional environment for electrification funding is set to change considerably with the long-awaited restructuring of the electricity distribution industry, and the imminent taxation of Eskom. Broadly speaking, the main institutional models favoured by different role players seem to be:

1. The establishment of a National Electrification Fund that will be administered by a government-appointed agency, which will allocate grant funding for electrification to different entities, such as regional electricity distributors (REDs), and/or local authorities.
2. The establishment of a national electricity distributor, combining Eskom and local authority electricity departments, which will allocate electrification funding internally to different operational entities, guided by government policy.
3. The inclusion of electrification in the Consolidated Municipal Infrastructure Programme (CMIP) of the Department of Constitutional Development and Provincial Affairs (DCD), which allocates funding for infrastructure development directly to local authorities.

While these institutional options differ substantially, government will in all cases need to establish criteria and guidelines for the allocation of resources, which are available for electrification at a national level, to different entities.

1.1.6 Provincial allocations

As discussed above, it is not yet clear whether grant funding available for electrification at a national level will be primarily allocated to REDs, operational entities within a single national distributor, and/or local authorities. Nevertheless, whatever the nature of the actual funding streams, government will need to guide the allocation of available resources to the different provinces. This is important for planning purposes, as the provincial governments are responsible for planning and coordinating a range of development sectors. It is equally important from a political perspective.

The allocation of public resources is a political function, and the provinces are important political entities in South Africa. In the absence of government policy on this matter, political processes have already impacted significantly on the allocation of electrification resources to the provinces. Electrification has become highly politicised since the onset of Eskom's national electrification programme in the early nineties, as well as the establishment of national targets in the Reconstruction and Development Programme (RDP) base document, and its use in the 1994 election campaign. This has resulted in considerable political demand for grid electrification, including the electrification of 'rural' areas. The demand is expressed not only by national and provincial politicians, but also by local councillors and tribal authorities. Eskom in particular has experienced increasing pressure from political lobby groups in recent years regarding the allocation of resources to the provinces as well as to particular areas within provinces. Bopela (1997) has indicated, for example, that political lobbying played an important role in the allocation of Eskom's electrification resources for 1998 to the provinces.

Government policy therefore needs to set guidelines as well as criteria for the allocation of grant funding for electrification to the provinces. It is hoped that this paper will contribute to the development of policy in this regard.

1.1.7 Electrification targets

When discussing national electrification planning, the question of national targets tends to arise, as this has been the main aspect of national planning thus far. This paper does not deal with target setting, as provincial connection targets cannot be established simply on the basis of the grant funding available for electrification in each of the provinces. However, connection targets form an essential part of agreements between the authorities responsible for national electrification, and the utilities responsible for implementing the electrification programme. It is envisaged that such targets would be set through a process of negotiation between these bodies, taking into consideration the operational planning done by the utilities.

1.1.8 Grid and non-grid planning

Another question which tends to arise when national electrification planning is discussed is whether planning includes grid electrification only, or grid as well as non-grid electrification. The approach taken in this paper is to make no distinction between grid and non-grid electrification at a national level, but to allocate resources to the provinces without reference to the supply technologies that may be employed. As discussed by Banks (1998), technology choices are more appropriately made when detailed electrification planning is done for specific areas.

1.1.9 Electricity vs. other services

Judging from current debates on the funding of electrification in the future, other infrastructural and service needs in poor areas will play an increasingly important role in determining the subsidies available for electrification from the public sector. In particular, the taxation of Eskom seems imminent, and this will bring the most significant resource for electrification in South Africa under fiscal control, so that electrification will have to compete with other national priorities in the future. The question has been raised whether the public funds that have been used for electrification, compared to the public funds used to improve water supply in poor areas, for example, accurately reflect the relative priority of these services from a national perspective. This is an important issue, as electrification is certainly not the 'driver' of development it was considered in the past. In fact, the impact of electrification in poor areas seems to depend greatly on a range of conditions, including the provision of other services.

1.2 Content and outline of the paper

In summary, this paper discusses the allocation of grant funding available for the electrification of poor and historically neglected areas and communities to the provinces in South Africa. The focus of the paper is on allocation principles and criteria, but the process by which allocation takes place is also discussed, as it was found that these aspects cannot be divorced altogether. The following matters are given particular attention:

- In section 2 the criteria and approaches that are currently used by national agencies involved in electrification to allocate resources to different provinces are discussed and analysed.
- Criteria that capture some of the key objectives of the national electrification programme – that is, supporting economic growth as well as broader socio-economic development – are discussed in section 3, and recommendations are made regarding the best criteria to use.
- Some pertinent financial and political issues in South Africa that also need to be considered during the allocation process are discussed in section 4.
- In the final section a recommended allocation process is discussed, as well as some alternative processes. Some attention is also given to the use of the proposed criteria for allocating resources to planning areas within provinces.

2. Criteria currently in use

The three national bodies involved in the funding of household electrification – Eskom, the NER, and the DBSA – all have some way of allocating resources to different provinces. The criteria and procedures used by these bodies have evolved during the last few years as they became more involved in electrification. The criteria currently used are presented and analysed in this section. This provides the starting point for the broader discussion on criteria that follows. The operational criteria (that is, criteria used for the selection and/or prioritisation of electrification projects) used by these organisations are discussed by Banks (1998), and are referred to where necessary.

2.1 DBSA

The DBSA has developed an index to guide the allocation of its resources to the different provinces for infrastructure lending, particularly for water, sanitation, electricity and roads projects (DBSA 1996). Concessionary loans have been provided to Eskom and local authorities for electrification projects. Each application has been evaluated according to a range of criteria, which are discussed by Banks (1998).

The allocation of funds to specific projects is guided by the allocation index, which is based on a limited number of key criteria. The DBSA does not allocate specific amounts to the different provinces, but uses the index to calculate 'indicative amounts per province' (DBSA 1996). As the allocations by the DBSA are essentially demand-driven, and since other criteria are also considered in the allocation process, the actual allocations to different provinces do not necessarily correspond to these 'indicative amounts'.

The DBSA is concerned with the allocation of loan finance for various infrastructure projects, rather than the allocation of grant funding for electrification specifically, which is the focus of this paper. Nevertheless, the DBSA index is of great interest to this discussion, particularly as it encompasses much broader issues than those directly related to electrification. The two key criteria comprising the DBSA allocation index are the poverty and economic potential of provinces.

2.1.1 Poverty

The DBSA identified the levels of *poverty* in the different provinces as one of the key criteria for the allocation of its resources to provinces (DBSA 1996). A large number of poverty indicators were identified,[2] from which the following quantifiable indicators were selected to be included in an assessment of an appropriate measure of poverty:

- *income* (poverty gap);
- *health* (infant mortality);
- *education* (number of people of 13 years and older with an education of less than standard 5);
- *infrastructure* (number of households without water in the house, on site or reasonably accessible from a community facility; number of households without waterborne sanitation or septic tanks; number of households without electricity);
- *unemployment.*

After assessing different combinations of these variables, it was decided to use the 'poverty gap' as a measure of the poverty of the provinces. This is defined as 'the amount of money needed

[2] It is not clear why the poverty indicators discussed in the DBSA document do not include some that specifically refers to women, who comprise the majority of the poor in South Africa. The two gender-specific indicators included in the discussion in fact both refer to men: the number of households with large numbers of 'unmarried sons', and the number of households with 'unemployed men or men engaged in irregular poorly paid casual work' (DBSA 1996).

to adjust the income of families below the poverty line, to above or on that line' (DBSA 1996). According to the DBSA document, this gives an indication of the magnitude and intensity of poverty, and 'by indexing the various amounts needed per province, a clear indication of the need for poverty alleviation can be obtained'.

The use of the 'poverty gap' as the only measure of poverty means, however, that poverty is only measured in terms of income. While it is acknowledged in the DBSA document that poverty is a more complex matter, it is also reported that the use of more complex measures of poverty did not make any significant difference to the results.

2.1.2 Economic potential

Another key criterion used by the DBSA for the allocation of its resources to provinces is the *economic sustainability or potential* of provinces (DBSA 1996). The following quantifiable indicators were included in the assessment of an appropriate measure of economic potential:[3]

- *economic production* (GGP; GGP growth; GGP per capita);
- *income* (number of households with an income above the poverty line);
- *education* (number of people of 13 years and older with a qualification of standard 5 or higher);
- *infrastructure* (number of households with water in the house, on site or reasonably accessible from a community facility; number of households with waterborne sanitation or septic tanks; number of households with electricity);
- *employment* (migrant workers; formal employment; informal employment).

After assessing different combinations of these variables, it was decided to use the real GGP of a province as a measure of its economic potential. This is, however, a very broad and indirect indicator of economic potential. The DBSA (1996) makes the following point about its shortcomings:

> Unfortunately, the absolute value of the GGP generated in the provinces reflect the respective historical utilisation of part of the potential in each of the provinces. GGP fails to capture the untapped resources of an area which could play a role in i.e. [*sic*] future growth potential.

Nevertheless, it is reported that the use of more complex measures of economic potential did not make any significant difference to the results.

2.1.3 Composite allocation index

Allocation indices were established for the two criteria discussed here, reflecting the relative poverty of the provinces, and the relative economic 'potential' of the provinces respectively.[4] These are presented in Table 2. The composite allocation index used by the DBSA was obtained by taking the average of these two indices, thereby effectively giving equal weight to each of the key criteria.

The composite index was clearly established with the intention of capturing the divergent needs the DBSA aims to address in a single entity. However, combining two indices that reflect very different and, in fact, opposing objectives in a single composite index is not a satisfactory way of doing this.[5] The combined index does not have any real meaning, in spite of the fact that

---

3 These criteria virtually form a mirror image of the ones used to measure poverty.

4 An index is established by normalising the values for the provinces in relation to the country as a whole - for example, the poverty index comprises the ratio of the 'poverty gap' for each province, to the 'poverty gap' for the country as a whole; and the economic potential index comprises the ratio of the real GGP of each province, to the real GGP of the country as a whole. The indices discussed in this paper are all expressed as percentages, with the value for the country as a whole being 100 (rather than 1).

5 This view was expressed strongly by a number of EDRC researchers at a seminar on allocation criteria in November 1997.

each of the indices separately represents a very specific objective. This is illustrated by the following example.

As discussed below, the NER refers to the composite DBSA index as the 'RDP' index. It seems that the DBSA index is regarded as a measure of the development resources that should be allocated to each of the provinces to support the RDP. However, one cannot convincingly argue that the DBSA index reflects the RDP objectives, or anything else for that matter. In fact, an index based solely on poverty levels may capture the RDP objectives more accurately.

The danger further exists that a composite index can be applied in a mechanical way, without appreciating what the individual indices were trying to capture. In this way the meaning of the indices can be lost if they are combined. This matter is discussed further later in this section.

Table 2: Allocation indices developed by the DBSA
Source: DBSA (1996)

Province	*Poverty index*	*Economic potential index**	*Composite index*
Eastern Cape	24.2	5.6	14.9
Free State	7.6	6.6	7.1
Gauteng	10.1	38.0	24.1
KwaZulu-Natal	21.5	15.2	18.3
Mpumalanga	8.8	8.8	8.8
North West	6.0	5.8	5.9
Northern Cape	1.7	2.2	1.9
Northern Province	17.2	3.8	10.5
Western Cape	3.4	14.0	8.7
Total	100	100	100

*The GGP for 1991 was used. It is not known in what year the poverty data was collected.

2.2 NER

The NER is responsible for the allocation of the R300 million grant from Eskom to the local authorities for electrification. The funds are allocated in response to applications received from local authorities, which are evaluated according to a range of criteria discussed by Banks (1998).

As with the DBSA, an allocation index was developed to guide the allocation of funds to the different provinces, based on a limited number of key criteria. The NER also does not allocate specific amounts to the different provinces. As the allocation of the funds is essentially demand-driven, and since other criteria are also considered in the allocation process, the actual allocations to different provinces do not correspond to the amounts calculated by means of the index.

2.2.1 Key criteria

The NER identified three criteria that can be used to guide the allocation of electrification subsidies to the provinces (Du Plessis 1997). The first criterion is the 'total need for electrification' in the provinces, measured in terms of the numbers of unelectrified houses in the provinces. The 'Total needs' index in Table 3 therefore comprises the ratio of the unelectrified houses in each province, to the unelectrified houses in the country as a whole (refer to footnote 4).

As the R300 million grant is available to local authority electricity distributors only, the NER gave particular attention to criteria that reflect 'urban'[6] conditions. The second criterion defined by the NER is the 'need for electrification in urban areas', which is measured in terms of the numbers of unelectrified houses in 'urban' areas in the provinces. This is captured in the 'Urban needs' index in Table 3, which comprises the ratio of the unelectrified 'urban' houses in each province, to the unelectrified 'urban' houses in the country as a whole.

The 'demand for electrification in urban areas' is the third criterion defined by the NER. This is measured in terms of the numbers of electricity connections for which funding applications were received from local authority distributors in the provinces. The 'Urban demand' index thus comprises the ratio of the 'urban' connections applied for in each province, to the 'urban' connections applied for in the country as a whole.

2.2.2 Composite allocation index

A composite allocation index was obtained by taking the average of the 'Urban needs' index, the 'Urban demand' index, and the composite DBSA index, thereby giving equal weight to each of them (Du Plessis 1997).

Table 3: Allocation indices developed by the NER for 1998
Source: Du Plessis (1997)

Province	*Total needs index*	*Urban needs index*	*Connections applied for by local authorities*	*Urban demand index*	*Composite index**
Eastern Cape	22.57	13.82	45 573	13.47	14.06
Free State	6.22	9.98	53 117	15.70	10.93
Gauteng	9.12	34.26	81 105	23.97	27.43
KwaZulu-Natal	22.87	14.57	33 087	9.78	14.15
Mpumalanga	7.28	7.02	40 589	12.00	9.27
North West	10.09	5.99	28 671	8.47	6.79
Northern Cape	1.37	2.41	5 527	1.63	2.00
Northern Province	16.77	3.21	14 610	4.32	6.01
Western Cape	3.71	8.74	36 025	10.65	9.36
Total	100.00	100.00	338 304	100.00	100.00

* Comprises average of composite DBSA index, 'Urban needs' index, and 'Urban demand' index

Combining the 'Urban need' and 'Urban demand' indices does not seem problematic in principle, as they capture similar considerations. A composite index comprising these two indices would therefore be internally consistent.

A practical concern, however, is that the 'Urban needs' and 'Urban demand' indices shown in Table 3 may be based on different data sets for 'urban' areas. Table 1 (see section 1.1.3) indicates that the NER database in 1996 still reflected the 'official' rather than the 'functional' definition of urban areas. Unless the data in the NER database had been substantially revised before the indices were calculated, the 'Urban needs' index is based on 'official' urbanisation figures.[7] The data used to establish the 'Urban demand' index, on the other hand, probably include some informal settlements, as local authorities are now generally responsible for service provision in informal settlements adjacent to 'officially urban' areas.

---

6 Refer to the discussion in section 1 on definitions of 'urban' and 'rural' areas in South Africa.

7 This would also mean that the 'Urban needs' index in Table 3 is highly inaccurate, due to the exclusion of most informal settlements from the official definition of urban areas.

Furthermore, combining these indices with the composite DBSA index seems inappropriate in light of the concerns raised earlier about the uncertain nature of the DBSA index.

It is important to consider the implications of the use of an allocation index as a *guide* to allocation rather than to make final allocations, as is done by both the DBSA and NER. This not only means that other criteria than those captured in indices are also considered during the allocation process, but also that human judgement plays an important role in the allocation of funds. This matter is returned to in the next section.

2.3 Eskom

Eskom's approach to electrification planning and the allocation of resources has undergone numerous changes since the utility embarked on its national electrification programme (see, for example, Thom et al (1995)). For internal planning purposes Eskom's national targets and electrification budget are divided among four engineering areas. Eskom also reports on the allocations to different provinces, though, because of its political significance.

2.3.1 Key criteria

The main allocation criteria that were used by Eskom to plan for 1998 can be summarised as follows:

1. The numbers of potential connections – that is, unelectrified houses within areas where Eskom has supply rights, that could be electrified at an acceptable cost due to the proximity of the grid – in Eskom's engineering (or planning) areas.
2. The projected average cost per connection in each engineering area.
3. Political demand for electrification in the provinces.
4. The numbers of unelectrified houses in the provinces.
5. The electrification plans of other major utilities in the provinces.

These criteria were not quantified and weighted, and then used to calculate an index which sets the allocations to the different provinces, as done by the DBSA and NER. Rather, the criteria seem to be applied during the allocation process followed by Eskom.

2.3.2 Allocation process

The allocation process primarily involves the national Electrification Planning office, Electrification staff in the engineering areas, and network planners in the Distribution Technology division.

The process seems to be driven largely by the national RDP connection targets to which Eskom has committed itself (300 000 new connections annually until 1999). The fact that Eskom has supply rights only in particular areas, most of which are outside of 'officially urban' areas (refer to section 1), adds a further constraint to the process. Greatly simplified, it could be said that the process starts with the identification of potential connections in the different engineering areas. Because of Eskom's restricted access to 'officially urban' areas, most of the potential connections are identified in the provinces with large unelectrified 'rural' populations, such as the Northern Province and Eastern Cape.

The second factor that seems to drive the process is the stringent capital expenditure targets which have been set by Eskom's management. Eskom staff have emphasised that financial considerations, and particularly the cost per connection, have become critical in the allocation of Eskom's resources. Preliminary costing is therefore done to obtain a projected average connection cost for each engineering area. Theoretically the numbers of connections in less costly engineering areas could be maximised, and the numbers of connections in more costly engineering areas minimised to obtain a least-cost plan within the constraints mentioned above. However, these are not the only factors considered in the process.

While potential connections and projected connection costs seem to 'drive' the allocation process, the outcome of the allocation process also seems to be 'pulled' in a certain direction by political considerations. Bopela (1997, personal communication) has indicated that, in response to the political demand for electrification in the provinces, resources have been allocated to agree as closely as possible with the percentage of all unelectrified houses in the country found in each of the provinces,[8] within the constraints faced by Eskom. The main exception to this has been KwaZulu-Natal, where the large electrification programme conducted by Durban Metro Electricity has meant that Eskom's programme in the province has been reduced accordingly.

The final allocations[9] to engineering areas and provinces are reached through interaction among the different groups in Eskom involved in the allocation process. The process is iterative, and does not follow a linear step-by-step course.

2.4 Discussion and conclusions

2.4.1 Dealing with conflicting criteria

As discussed above, it seems inappropriate to combine criteria that capture opposing values in a single index. An alternative way of dealing with conflicting criteria in an allocation process is discussed here, with reference to the process followed by Eskom. For the purpose of this discussion it is assumed that Eskom uses indices in the allocation process:

1. The first step would then be to establish an index based on the numbers of potential connections in each of the provinces.
2. The second step would involve the modification of this index to minimise the costs of the electrification plan as far as possible.
3. The next step would be to establish a new index based on the numbers of unelectrified houses in the different provinces (e.g. the 'Total needs' index of the NER).
4. This index would be modified in the step that follows to reflect the projected impact of other large electrification programmes in any of the provinces.

Two indices would therefore be established in this manner – one reflecting a least-cost plan within Eskom's areas of supply, and the other reflecting the unequal access to electricity between the provinces. While each of these indices is internally consistent, they represent largely opposing considerations. If following the approach of the DBSA or NER, a composite allocation index would be calculated, comprising the average of the two indices. However, an alternative approach would be to make the final allocations by applying human judgement, using the two indices to inform the decision. This would be equivalent to choosing (rather than calculating) a final allocation index which lies somewhere between the two individual indices.

2.4.2 Conclusions

The following conclusions can be drawn from the analysis of criteria currently used by electrification agencies in South Africa:

1. There seems to be broad agreement that it is best to use a small number of key criteria that are simple and clear, to ensure that all concerned parties can understand the basis for the allocations to provinces. The organisations discussed here all used a fairly small number of key criteria for the allocation of resources to provinces – the DBSA used two, the NER three (four if the two DBSA criteria are considered separately), and Eskom used five.

---

8 This corresponds to the 'Total needs' index established by the NER.

9 It should be pointed out that the final allocations to different provinces and engineering areas established by Eskom are not necessarily fixed, even after implementation has started – that is, if one engineering area is unable to electrify at the required rate during a particular year, and another is ahead of its plan, a part of the former's target and budget can be shifted to the latter.

2. It is essential that the allocation of resources be done through a process during which all the important criteria are carefully considered. It can take the form of a planning process (e.g. in Eskom's case) during which different criteria are considered at different stages of the process. Or it can take the form of a process of evaluating actual funding applications, as in the case of the DBSA and NER. Human judgement needs to play an important role in the allocation process.
3. It is helpful to establish an index for each of the key allocation criteria if at all possible, as indices can guide the allocation of resources very effectively. However, not all the important criteria can necessarily be quantified and therefore captured in indices. Some criteria may have to be considered without the aid of an index, as is done by the DBSA and NER when assessing actual funding applications.
4. Individual indices can be combined to form a composite allocation index. Indices that reflect opposing objectives or considerations (e.g. the need for poverty alleviation, and the need to support economic growth; or the need to minimise costs, and the need to address inequalities) should not be combined in a single composite allocation index, however. They should rather be weighed up against one another in the allocation process, applying human judgement to make the final allocations.

3. Criteria supporting social and economic goals

In this section attention is given only to social and o-economic objectives of electrification programmes in South Africa, while political and financial considerations are discussed in section 4. The social and economic objectives of electrification have not been clearly defined as yet. Nevertheless, the DBSA index with its dual nature, discussed in section 2, seems to reflect quite well what many people regard as the goals of the programmes – on the one hand, addressing poverty, and, on the other, supporting economic development. Certainly the most challenging aspect of the allocation of electrification funding to different entities is making provision for both of these largely opposing imperatives, particularly considering the extreme inequalities that exist in our society and economy. This section briefly considers these goals, and, more specifically, considers some allocation criteria which capture these goals to different degrees.

3.1 Criteria supporting economic growth

There is concern in the electricity sector that the electrification programme does not focus sufficiently on areas with economic potential but is effectively a social programme, as the emphasis is on the electrification of households and social infrastructure such as schools and clinics.[10] It has further been argued that the current allocation criteria used by Eskom disadvantage provinces where the numbers of unelectrified houses are relatively small, even if significant economic potential exist which would benefit from electrification.

Experience has shown that electrification can have a significant economic impact on areas where a dynamic and diversified economy exists prior to electrification (see, for example, Rogerson (1997)). It has been argued, however, that it is only under very specific conditions in South Africa that electrification can contribute to economic development in impoverished and historically poor areas, particularly in the former homelands – for example, where irrigation schemes for small farmers are being established, and all the other required inputs are being provided (Tapson 1998). Tapson further argues that some grant funding is often required to make an electrification project financially attractive to the utility, even if the agricultural project with which it is linked will be commercially viable. It is therefore important to consider the role of grant funding in supporting electrification that contributes to economic development in poor and historically neglected areas.

Before a discussion of possible criteria, it is necessary to consider what is meant by 'economic development'. This is a broad term which can be understood in different ways. It is often used to refer to economic growth in particular, which is characterised by an increase in production for the market (as measured by entities such as the GDP and GGP at a national level). On the other hand, it is also used to refer to a range of improvements in socio-economic conditions, which are discussed in 3.2 – for example, improved access to higher quality services, and improvements in health and safety conditions. For the purpose of this discussion a distinction is therefore made between 'economic growth' on the one hand, and 'socio-economic development' on the other.[11] In the rest of this section the focus is on criteria that could be used to allocate grant funding for electrification to the provinces in order to support economic *growth*.

---

10 Although businesses are electrified as part of residential projects, the numbers are not reported separately from household connections, making it impossible to even start monitoring the extent to which electrification is supporting small enterprises.

11 Clearly economic growth and socio-economic development cannot be separated completely, but this is an appropriate distinction, as economic development can take place at the cost of social development – for example, if economic growth objectives are pursued at the cost of people's ability to provide in their material needs, of their health and the quality of their environments, or their control over matters that effect their day-to-day existence, all of which are aspects of social development.

3.1.1 Contribution to national economy

One of the criteria used by the DBSA to allocate its resources (a significant proportion of which goes to electrification) to the different provinces, is the economic potential of the provinces, measured by their real GGP. Some reservations about the use of GGP as a measure of economic potential were raised in section 2. The GGP can, however, be used as a measure of the contribution of a province to the national economy. It is suggested that the contribution of provinces to the national economy be considered as a criterion for the allocation of grant funding for electrification to the provinces. An allocation index can be established using the real GGP, as shown in Table 2 (section 2).

A concern from the perspective of this paper is the fact that the GGP is not meaningfully linked to electrification – that is, it gives little indication of the degree to which *electrification* in each province can contribute to economic growth. Furthermore, the GGP provides no indication of the extent to which provinces require electrification *subsidies* for projects that will contribute to economic growth, which is the central issue considered in this paper. For example, as Gauteng has by far the largest provincial economy in South Africa, it would be strongly favoured by an allocation index based on GGP (see Table 2). Financial analyses have indicated, however, that Gauteng generated more than half of the total surplus in the distribution industry and would be a net contributor to a National Electrification Fund (Davis 1996). The electricity utility responsible for Gauteng would probably be in a better position to raise commercial finance for electrification than most other utilities in the country. The contribution of provinces to the national economy thus does not seem particularly suitable as a criterion for the allocation of grant funding for electrification to the provinces.

3.1.2 Macro-economic impact of electrification

A possible alternative criterion is the macro-economic impact of electrification that is undertaken in the different provinces. Electrification funds would thus be allocated to the provinces to maximise the impact of electrification on the national economy as far as possible. For this purpose a macro-economic analysis of the electrification programme would have to be done, including an investigation of the effects of varying the rate of electrification in the different provinces.

Attempts have been made to analyse the macro-economic impact of the national electrification programme. For example, Conningarth Consultants (1995) attempted to quantify the macro-economic effects of the national electrification programme, including the effects on GDP, job creation, capital requirement and the national balance of payments (Davis 1995). They specifically considered the effects of appliance acquisition, income substitution, and capital investment on the national economy.

It appears, however, that no studies have been done to investigate the macro-economic effects of varying the rate of electrification in the different provinces. It is not clear whether this would be a worthwhile exercise to undertake – for example, whether changes in provincial electrification rates are likely to impact significantly on factors such as appliance acquisition, income substitution and capital investment at a national level. Furthermore, Davis (1995) points out the following difficulties in performing macro-economic analyses of electrification programmes satisfactorily:

> Since the principal beneficiaries in most electrification projects are low income households, electrification projects will usually result in positive income distribution effects. However, within this target group higher-income households are likely to benefit more since appliance acquisition and electricity use will be influenced by household income. The inclusion of income distribution effects in a cost-benefit analysis requires the determination of weights with which to value distribution. The determination and use of these 'social weights' is controversial and difficult.

While this criterion explicitly links electrification with economic growth, it is therefore not clear whether it can be assessed and quantified in a meaningful way. As in the case of the previous

criterion discussed, it also does not provide a measure of the need for *subsidies* to support electrification projects that contribute to economic growth.

3.1.3 Electrification projects contributing to economic growth

Both of the criteria discussed above are indirect ways of assessing the degree to which each province requires grant funding for electrification projects that contribute to economic growth, as highly aggregated data would have to be used to establish the indices. By comparison, the criterion discussed in this section is of a direct nature.

The suggested approach is to allocate funds to the provinces on the basis of planned electrification projects in each province that are expected to contribute significantly to economic growth in poor and historically neglected areas. For the purpose of this discussion 'economic growth' can be defined as a quantifiable increase in commercially productive activities in an area, including agricultural, commercial, manufacturing and service activities of a formal and informal nature. The activities would have to be accompanied by job creation at a local level if they are to contribute to the local economies in any significant way. They would generally *exclude* production for self-consumption, and much of the 'survival' activities in the informal sector, as such activities are not easily quantifiable, while an increase in these activities can be an indicator of greater poverty rather than of economic development (Rogerson 1997).

In order to apply this criterion, applications for the funding of electrification projects that contribute to economic growth would need to be invited. Criteria would further need to be established to select the projects that will be supported. These could include the economic and financial net present value (NPV) of the electrification projects, and projected growth in local production and job opportunities. It is envisaged that the funding allocated to one of these projects would comprise the shortfall between commercial finance and other funding sources, such as a concessionary loan, on the one hand and the total costs of the project on the other.

The majority of electrification projects currently undertaken in poor and historically neglected areas in South Africa are unlikely to have a significant effect on economic growth in the areas concerned. Most of these projects are undertaken in residential areas, and mainly contribute to socio-economic development in a broader sense – for example, by improving the infrastructure, and by providing access to a high quality energy service to households, some productive enterprises, and social and community services. These projects are considered in the section 'Criteria to support socio-economic development'.

Nevertheless, the electrification of certain residential areas – for example, some townships and informal settlements in metropolitan and major urban areas – may contribute to a quantifiable increase in commercially productive activities, and therefore qualify for grant funding according to the criterion discussed here.

Electrification projects that form part of broader initiatives to achieve economic growth in poor and historically neglected areas could also qualify for grant funding on this basis. The following are examples of such initiatives:

- spatial development initiatives;
- agricultural development projects involving small farmers;
- intensive programmes to start and provide support to small, medium and micro-scale enterprises (SMMEs).

An important feature of these initiatives is that electricity is not provided on its own, but in conjunction with other inputs. Applications for electrification subsidies would probably draw on feasibility studies and business plans for the broader economic development initiatives concerned. Ideally the results of environmental and/or social impact studies on specific development initiatives should also be included in the applications for electrification subsidies. The allocation authorities would have to clarify whether electrification subsidies would be allocated to economic development projects that are in conflict with environmental and social development goals.

Preparing funding applications of this nature would probably require a collaborative effort by electricity utilities and the national and provincial departments and public agencies responsible for economic development, such as the Department of Trade and Industry, Ntsika Enterprise Promotion Agency, and the Departments of Agriculture. It should therefore create an incentive for these bodies to work collaboratively on development projects.

The number of electrification projects that would qualify for funding based on this criterion in any particular year is expected to be relatively small. It should therefore be possible to process funding applications at a national level. If this were not the case, it would make the application of this criterion very difficult, if not impossible.

3.2 Criteria supporting socio-economic development

In the previous section, criteria were discussed that could be used to allocate grant funding for electrification to the provinces in order to support economic growth. Mention was also made of the need to fund electrification that supports broader socio-economic development in poor and historically neglected areas, which is the focus in this section. Socio-economic development is taken as referring to a myriad possible improvements in a society and economy, such as:

- better access to infrastructure and higher quality services, and to basic goods such as food and fuel;
- higher health, nutritional and educational status, and better working, living and environmental conditions;
- better access to resources that enable people to provide for themselves (livelihoods), and higher disposable incomes;
- greater organisational and institutional capacity, and greater control by people over matters that effect their day-to-day existence;
- stronger social support networks, more time for creative, social and leisure activities, and greater self-esteem;
- the increased status, wealth, income, education and power of women and other marginalised groups.

This may or may not be accompanied by economic growth as defined earlier.

As mentioned before, the majority of electrification projects are undertaken in residential areas where major spin-offs in terms of economic production are unlikely, although this does not mean that the contribution of electrification to these areas is insignificant. The impact of electrification on 'rural' areas in South Africa has been discussed in various papers.[12] It ranges from an initial boost of 'survivalist' enterprises (Rogerson 1997) on which many people rely for their livelihood, to household use of electric lighting and, in many cases, the convenience of appliances such as kettles and hot-plates (James 1997). One thought-provoking finding has been that women who have control over the household income, and experience increased demand on their time due to work outside of the home, seem more likely to use electricity extensively for cooking; in comparison, households which consist of men only tended not to have electric stoves (James 1997). This indicates that the social and economic empowerment of women may be an important factor in enhancing the benefits of electricity to households. This matter is returned to later in the discussion.

Realising the potential benefits of electricity is dependent on a wide range of factors, including the effective education and involvement of local people (see discussion in James (1998a)), as well as effective coordination between electrification and the health, education, water supply and other sectors. If these were in place, it would greatly enhance the impact of electricity in poor and historically neglected areas.

---

12 See Gordon (1997), Ross et al (1997), Rogerson (1997), Thom (1997), James (1997), Development Planning & Research (1998), Tapson (1998), and Crawford Cousins (1998).

It was mentioned earlier that the current electrification programmes in South Africa are viewed as social programmes as the emphasis is mainly on households and social infrastructure such as schools and clinics. However, these programmes have been driven largely by political, rather than social, imperatives, which has meant that the emphasis has been on the numbers of connections. Relatively little attention has been given to the socio-economic objectives of the programmes. In the research for this paper an attempt was made to identify criteria which would ensure that electrification supported socio-economic development most effectively. The first two criteria discussed below serve this purpose to some extent, focusing on social infrastructure and development initiatives that would complement an electrification programme respectively.

The difficulty of defining a criterion that captures the socio-economic benefits of electrification at the *household* level is illustrated by the degree of analysis that would be required to use the third criterion discussed below.[13] In order to define an alternative criterion based on socio-economic benefits at a household level, the effect of targeting specific socio-economic groups more than others in the electrification programme was considered. This approach has some potential, but may also be problematic, as discussed in 3.2.4 below. The simplest socio-economic criteria that relate to household electrification are the ones discussed in the last two sub-sections below. These are already used by the organisations involved in the funding of electrification in South Africa. However, neither of these reflects the fact that the socio-economic impact of electrification on households and communities can differ substantially.

3.2.1 Unelectrified social infrastructure

Although the electrification of households is a crucial part of an electrification programme, the emphasis on numbers of connections in the South African programme has meant that the focus has been on households rather than on social services that meet needs in a communal way. The provision of social services such as education, health and water supply is an important aspect of socio-economic development. While the extent to which households benefit from electricity depends largely on their wealth or poverty (which is not only determined by income), all households can potentially benefit from improvements in service provision. It is therefore necessary to ensure that the allocation of electrification subsidies to the provinces reflects the importance of social services.

The number of unelectrified facilities providing social services in the different provinces could be used as an allocation criterion for this purpose. Details such as the facilities that would be included, and whether all these facilities would be given the same weight, would have to be established at some stage.

Facilities that are provided by the state – for example, schools, hospitals and clinics, training centres, police stations, and tribal authority offices – are generally included in current electrification programmes, sometimes requiring special application procedures. Schools and clinics are the only facilities which have received specific attention, with dedicated funding allocated to electrify these facilities. Water supply seems to be the most important public service which has been neglected thus far in the electrification programme, specifically in areas which have been without effective local authorities – i.e. 'officially rural' areas. This, in spite of the potential that seems to exist for the use of electricity for water pumping (Development Planning & Research 1998). Facilities such as crèches and community centres that are generally run by community-based organisations seem to be treated in the same way as households and businesses, and receive no special assistance to be electrified.

With the exception of schools and clinics, statistics on unelectrified facilities are not readily available. It would therefore be necessary to collate and analyse available data on other facilities before they could be included in this criterion.

---

[13] It is mainly at the level of project selection that socio-economic criteria can be used effectively (see discussion by Banks (1998)), although this is also hampered by inadequate local-level data, including qualitative data.

The allocation index for this criterion could comprise the ratio of the unelectrified facilities in each province, to the unelectrified facilities in the country as a whole (refer to footnote 4). The electrification of facilities such as schools and clinics in itself does not have a major impact on the quality of the services provided, however. Generally a number of other critical inputs are required to provide good services, such as the motivation and training of staff, and the facilities and equipment required to perform key functions (Thom 1997). Ideally this should be reflected in the allocation index, but this would probably not be feasible because of the detailed analysis that would be required.

3.2.2 Complementary development initiatives

It has been mentioned earlier that the impact of electrification on its own is fairly limited. There are a variety of initiatives that would complement an electrification programme and thus enhance the impact of the programme by developing human and organisational ability, assisting people in providing for themselves, and providing basic infrastructure in impoverished areas. The following are some examples:

- Initiatives to improve health and education in a broad sense, not only including clinic and schools building and upgrading, but also water supply, sanitation and nutritional programmes, training of health and education workers, education programmes, etc.
- Initiatives to address energy needs and problems that will not be addressed adequately through electrification, particularly problems regarding safety, access and affordability of fuels used for thermal purposes (water- and space-heating, and cooking).
- Initiatives to support people's efforts to provide for themselves, including advice and assistance (e.g. in marketing) to people involved in their own enterprises (including 'survival activities'), food gardening and agriculture (also for self-consumption).
- Initiatives aimed at organisational development and the social, political and economic empowerment of people in general, and women in particular (see earlier discussion about the importance of women's empowerment).
- Provision of basic infrastructure such as roads and telecommunications services.

The extent to which such programmes are underway and are shown to be effective in the different provinces would be an important criterion for the allocation of electrification subsidies, even though it would not be possible to quantify it. It could provide an incentive for policy-makers and decision-makers at provincial and local level to take responsibility for creating the conditions that would enhance the impact of electrification. The criterion could only be applied in a meaningful way, however, if reliable information on the key programmes in the provinces is available.

3.2.3 Economic assessments of electrification projects

As household electrification forms an important part of an electrification programme, it is desirable to capture household-level benefits in a criterion for the allocation of subsidies to provinces, in addition to the criterion on social infrastructure already discussed. The only possible way that could be identified for doing this was to use economic assessments of electrification projects. This option is discussed briefly, although it is not recommended as it has a number of serious shortcomings.

Economic cost-benefit analyses (CBAs) of potential electrification projects are undertaken by the DBSA and Eskom, using a CBA model that was developed for this purpose with the assistance of the EDRC. The CBA methodology and the benefits and costs that it captures are discussed by Banks (1998). Typically CBAs of electrification projects consider consumers' surplus effects, and in some cases externalities such as 1) the environmental and health effects of electricity use, 2) the multiplier effects of electricity use, and 3) productivity improvements resulting from higher energy service levels (Davis 1995). It therefore captures some, but

certainly not all of the socio-economic benefits of electrification, mainly because not all the important benefits can be quantified. This is a major concern about this approach.

One possible criterion is the expected economic net present value (NPV) per electricity connection in the different provinces, based on the average for electrification projects in each of the provinces. In order to establish this, a national study would have to be undertaken to do economic assessments of electrification projects in each of the provinces, which would clearly be a major undertaking. It also would not be easy to define fairly representative samples of the projects undertaken in each province. Furthermore, as the results would have to be comparable, the CBA methodology would have to be used in a consistent manner throughout the study. It would further be of value if the assumptions made in the analyses could be verified over time to improve the quality of CBAs. The national study would probably have to be repeated every few years as the nature of electrification projects changes. This approach would therefore be time-consuming and highly costly to apply, which is another serious drawback.

3.2.4 Targeting specific socio-economic groups

As mentioned above, another option that was considered in order to define a criterion based on socio-economic benefits at a household level was to give greater priority to certain socio-economic groups in the electrification programme.

In order to apply this approach, a number of groups in the population would need to be defined (see below). Furthermore, the percentage of households in the different provinces that fall within each of the groups would need to be assessed, as well as the percentage of these households without electricity. A decision would further have to be made on the relative importance (weight) to be given to the groups in the electrification programme. Once this has been done, an allocation index could be established for this criterion.

One possibility is to give most weight to one particular group; for example:

- communities in *metropolitan and other areas* where significant economic growth is experienced (even though the electrification projects themselves do not contribute significantly to economic growth), and where people are therefore likely to benefit most from electricity;
- the most impoverished areas which are in greatest need of development (that is, applying the principle of social equity), and would certainly benefit from access to electricity, although not as much as the first group; or
- the intermediate group that does not fall in either of the other two categories, which probably comprises the majority of poor and historically neglected communities.

Another possibility is to treat every province separately, and to allocate most weight to the group with least access to electricity, and least weight to the group with greatest access to electricity in each of the provinces. The weights would therefore probably differ from province to province. This would promote greater *social equality* in access to electricity among different socio-economic groups in each of the provinces.

Considerable analysis would be required to develop and apply a criterion based on this approach, although not nearly as much as a criterion based on the economic assessments of electrification projects (see above) would require. Furthermore, as the impact of electrification on different households in the same socio-economic group can differ substantially due to a range of factors, it would be very difficult and possibly unwise to generalise to this extent (James 1998b). Nevertheless, this seems to be the only real option for establishing a criterion that reflects the fact that the socio-economic impact of electrification on households and communities can differ substantially.

3.2.4.1 Defining socio-economic groups

Different socio-economic groups could be defined by using characteristics such as access to income, access to resources, and access to basic services. Examples of some of the household

groups in South Africa which have been defined by May et al (1995) are briefly discussed here. One set of criteria that was used to define different groups was household access to basic amenities such as housing, water supply, sanitation facilities, fuels, clinics, schools and roads. The four groups that were defined in this way are shown in Table 4. The information presented pertains to African 'rural'[14] households, which was the main category that was analysed.

Table 4: Access to basic amenities among African 'rural' households
Source: May et al (1995)

	Group 1	*Group 2*	*Group 3*	*Group 4*
Access to basic amenities	good	reasonable	poor	virtually none
% of ARHs* in the group	2.5	22	51.5	24
% access to grid/non-grid electricity among ARHs	NA	69	6	0.5
Priority given to electricity by ARHs	NA	6	3	6

* ARHs – African 'rural' households

May et al (1995) found that 70% of all 'officially rural' households were in groups 3 and 4 with the worst access to amenities, compared to 15% in 'officially urban' areas. As many as 21% of all 'rural' households had little, if any, access to services, being in group 4. They further found that African 'rural' households in the two worst-off groups (3 and 4) regarded *piped water* as the highest priority among a range of possible improvements to their quality of life, with *jobs* in the second place.

The priority given to electricity by each group is of particular interest for the purpose of this discussion. The relatively low priority given to electricity by 'rural' Africans in the better-off second group could be related to the fact that more than two thirds of these households had access to some form of electricity (from generators, car batteries or the grid). Unfortunately it is not clear how many had access to grid electricity specifically. The fact that households in group 4 had little, if any access to services probably explains the relatively low rating given to electricity. For example, 69% of the 'rural' African households in this group had access only to unprotected sources of water, with only 3% having access to public standpipes or taps.

May et al (1995) also found that female-headed households were 'more likely to experience poverty' than male-headed households, with approximately 75% of the former being poor compared to 64% of male-headed households. They further observed that female-headed households were at an even greater disadvantage when it comes to access to *services*. This raises the question whether there is a need to define groups that will be targeted differentially in the electrification programme on the basis of gender differences in access to income, wealth/resources and services.

3.2.5 Poverty levels

One of the criteria used by the DBSA to allocate its resources to the different provinces is the poverty levels in the provinces, measured by the 'poverty gap' (see section 2). There are different ways in which levels of poverty can be assessed, another example being the human development index (HDI) for each province (DBSA 1995). This is a measure of poverty that includes a range of indicators in addition to a lack of income.

Using poverty levels as an allocation criterion would be much simpler than using any of the criteria discussed above. It is not clear, however, whether it is appropriate to use this as a criterion for the allocation of *electrification* subsidies. Poverty levels in the provinces certainly give an indication of the extent to which provinces require funding to address poverty and support basic socio-economic development. However, the 'poverty gap' is not meaningfully

[14] This refers to the 'officially rural' population, as discussed in section 1.

linked to electrification – that is, it does not contain any specific indication of the extent to which electrification is relevant to the alleviation of poverty in a province. Extremely impoverished areas – for example, those where infant mortality and malnutrition are rampant – undoubtedly require greater resources, but providing electricity to such areas is unlikely to have any significant impact on the situation.

3.2.6 Numbers of unelectrified houses

As discussed in section 2, both Eskom and the NER use the numbers of unelectrified houses in the provinces as one of their criteria. The NER refers to this as the 'total need for electrification' in the provinces, which is captured in the 'Total needs' allocation index presented in Table 3 (section 2). The use of this criterion should have the effect of reducing the inequalities in access to electricity that exist between the provinces. As such it is particularly concerned with *political* rather than social equality[15] in access to electricity. However, as with the previous criterion, it presents a fairly easy way of allocating resources to the different provinces. It is further interesting that the 'Total needs' index established by the NER for 1998 allocations is very similar to the 'poverty gap' index defined by the DBSA, as shown in Table 5. This seems to indicate a correlation between household access to electricity in the provinces, and the poverty of provinces. The greatest difference between the indices is observed in the case of North West province.

Table 5: Comparison between 'Poverty' and 'Total needs' indices
Sources: DBSA (1996); Du Plessis (1997)

Province	*Poverty index*	*Total needs index*
Eastern Cape	24.2	22.6
Free State	7.6	6.2
Gauteng	10.1	9.1
KwaZulu-Natal	21.5	22.9
Mpumalanga	8.8	7.3
North West	6.0	10.1
Northern Cape	1.7	1.4
Northern Province	17.2	16.8
Western Cape	3.4	3.7
Total	100	100

3.3 Conclusions

The allocation criteria discussed above are assessed in Table 6 using the following criteria:

- Is the criterion appropriate for the allocation of grant funding for electrification to the provinces?
- How much work would be required to develop the suggested approach and define the criterion clearly if necessary, and/or to establish an index where possible?
- Is the criterion easy to understand conceptually?
- Is the criterion easy to apply – for example, would an index be available, and to what extent would the criterion be captured effectively by the index?

The assessments attempt to reflect the discussions on the various criteria as far as possible.

---

15 Greater *social* equality can only be achieved if people from all social groups gain more equal access to electricity. A possible approach to achieve this was outlined in 3.2.4.

Table 6: Assessment of possible allocation criteria

Criteria	*Appropriate for its intended purpose?*	*Is work needed to develop the criterion / an index?*	*Easy to understand?*	*Easy to apply?*
Economic growth criteria				
Contribution to national economy	Only partly	Very little	Yes	Yes
Macro-economic impact	Only partly	Yes	Fairly	Fairly
Projects linked to economic growth	Yes	Yes	Yes	Depend on no. and type of applications
Socio-economic development criteria				
Unelectrified social infrastructure	Yes, with some reservations	Yes, if more than schools and clinics are included	Yes	Yes
Complementary development initiatives	Yes	Yes	Fairly	No, very difficult
Project economic assessments	Only partly	Yes, probably an unrealistic undertaking	No	Fairly
Targeting socio-economic groups	Yes, with some reservations	Yes	Fairly	Fairly
Poverty levels	Only partly	Very little	Yes	Yes
Unelectrified houses	Only partly	Very little	Yes	Yes

Based on the above considerations, the preferred economic growth criterion is 'Electrification projects that contribute to economic growth' (3.1.3). If this prove too difficult to apply – for example, if the number of applications received makes it impossible to conduct this selection at a national level – another criterion would have to be developed. Although 'Contribution to the national economy' (3.1.1) seems the best alternative, it is not satisfactory because of the complete dominance of Gauteng in the index. The criterion 'Macro-economic impact of electrification' (3.1.2) cannot be recommended, as this would need to be developed further, and it is not clear whether this would offer a meaningful way to allocate the resources.

It is recommended that the criterion 'Unelectrified social infrastructure' (3.2.1) be used for socio-economic purposes, preferably with a wider range of facilities than schools and clinics only. At least one of the other socio-economic criteria should be used in conjunction with this, preferably one which captures the socio-economic benefits at a household level. As 'Economic assessments of electrification projects' (3.2.3) would require extensive analysis without necessarily resulting in a satisfactory criterion, this should not be considered. It is recommended that 'Targeting socio-economic groups' (3.2.4) be investigated further with the aim to define a clear criterion that can be used for allocation purposes. As discussed earlier, in spite of the shortcomings of this criterion, it seems to be the only real option for establishing a criterion that reflects the fact that the socio-economic impact of electrification on households and communities can differ substantially. If this option cannot be developed further, or proves unsatisfactory, either one of 'Poverty levels' (3.2.5) and 'Numbers of unelectrified houses' (3.2.6) could be used as the second socio-economic criterion. Seeing that there seems to be a correlation between these indices, using the average could also be considered.

The criterion 'Complementary development initiatives' (3.2.2) is an important one, as it draws attention to the importance of other development initiatives in creating the conditions that would enhance the impact of electrification. It is recommended that this criterion be investigated further with the intention of focusing it more – for example, identifying a few specific initiatives that could be used to assess the provinces, as well as some criteria that could be used to assess the success of these initiatives.

4. Other important considerations

In addition to the social and economic objectives of the electrification programme, there are specific aspects of the South African situation that need to be recognised and included in the allocation process as far as possible. Some political and financial considerations are briefly discussed here.

4.1 Average connection costs in the provinces

The average cost per connection[16] varies considerably between the provinces. As shown in Table 7, it was lowest in the Western Cape and highest in KwaZulu-Natal. In 1996, on the other hand, Mpumalanga had the lowest cost per connection, and the Northern Cape the highest. In most of the provinces the costs have been higher than the national average in both 1995 and 1996. These are the Eastern Cape, Free State, KwaZulu-Natal, North West and Northern Cape. In Gauteng, Western Cape and Mpumalanga they have been consistently below the national average, while Northern Province was very close to the national average in both years.

Table 7: Comparison of average costs per connection in the provinces in 1995 and 1996
Source: NER (1996)

Province	*Costs in 1995 (R)*	*Costs in 1996 (R)*
Eastern Cape	3 150	3 539
Free State	2 981	3 421
Gauteng	2 475	2 607
KwaZulu-Natal	3 866	3 716
Mpumalanga	2 539	2 570
North West	3 009	3 600
Northern Cape	2 979	3 718
Northern Province	2 987	3 212
Western Cape	1 474	2 830
National	2 949	3 245

KwaZulu-Natal had the highest cost per connection in 'officially rural' areas in 1995 (R5 055), and Free State in 1996 (R5 859), although the nature of 'officially rural' areas differ substantially between these provinces. The high costs in KwaZulu-Natal can be attributed mainly to the scattered settlement patterns in the African traditional areas, as well as the topography, which is characterised by deep ravines. In the Free State it is attributed mainly to the need for network expansion to electrify 'black' residential areas of small towns (Boshoff 1997). The cost is further expected to increase considerably in the Eastern Cape as the electrification drive starts to focus more on the former Transkei, which has a limited network compared to other populous areas. The undeveloped nature of the network in this area is attributed to the fact that, unlike most of the other former homelands, the Transkei mainly comprised one large consolidated area. As a result, it has not greatly benefited from the building of electricity lines to commercial farms in the 1970s and 1980s. In the Northern Cape the low average population density and long distances between settlements also result in relatively high costs.

This paper deals with the allocation of funds to the provinces, rather than the allocation of connection targets. In order to treat all provinces in an equal manner, the actual costs of

[16] This information has been obtained from the NER's progress reports on national electrification for 1995 (NER 1995) and 1996 (NER 1996). The costs exclude farmworker house connections, but include all other connections in poor and historically neglected areas.

extending the grid, whether due to historical or geographical factors or both, need to be factored into the allocation of funds to the different provinces as far as possible. This could be done according to the following principles: The allocation to the Northern Province could be kept unchanged as long as the costs remain close to the national average. Allocations to provinces where the connection costs are lower than the national average could be decreased, taking into consideration the percentage difference between the connection costs in each province and the national average. The savings made in this way could then be allocated to the other provinces as equitably as possible, again taking into account the percentage difference between the connection costs in each province and the national average.

4.2 Political demand for electrification

As discussed in section 1, there is considerable political demand for electrification in South Africa, including 'rural' electrification. Furthermore, government policy is required to guide the criteria and process for allocating national grant funding for electrification to the provinces.

However, local councillors responsible for 'rural' areas may want to continue to provide input to the provincial allocation process even when a national policy has been established. It seems unlikely that local politicians will simply accept allocations made according to national policy – each level of government have particular issues that concern them, and service delivery is of particular concern to local government. Eskom's experience in this regard suggests that local politicians want the assurance that their province is receiving its fair share of the available resources to address the inequalities in access to electricity that exist between the provinces. The numbers of unelectrified houses in the provinces, which are captured in the 'Total needs' index defined by the NER (see section 2), seemed to be regarded as a fair allocation criterion from this perspective.

The NER has also taken into account the demand for electrification expressed by local authorities when making provincial allocations. The NER informs all local authorities responsible for 'officially urban' areas of the funds available for electrification subsidies, as well as the procedure and requirements for applying for these funds. They therefore attempt to give all local authorities an opportunity to access the funds. As discussed in section 2, the NER further captures the applications that are received from local authorities in each of the provinces in an 'Urban demand' index, which is used to guide allocations to the provinces. This is seen as a measure of the demand for electricity in 'urban' areas. It would, however, require a major administrative effort to apply a similar approach to the whole country.

5. Recommendations

In this final section the recommendations of this paper are summarised, drawing particularly on the conclusions discussed at the end of sections two and three about the allocation process and the preferred criteria respectively. A process is recommended for the allocation of grant funding for electrification to the provinces, using the preferred criteria. Two alternative processes that could be followed if the recommended criteria are not accepted are also outlined. Finally, the application of the criteria discussed in this paper for the allocation of grant funding to planning areas smaller than provinces is briefly considered.

5.1 Allocations to the provinces

The criteria and considerations to be used in the allocation process can be summarised as follows:

- Economic growth criteria:
  - Recommended: Electrification projects that contribute to economic growth (3.1.3)
  - Alternative: None at this stage (see 3.3)
- Socio-economic development criteria:
  - Recommended: Unelectrified social infrastructure (3.2.1)
  - Recommended: Complementary development initiatives (3.2.2)
  - Recommended: Targeting socio-economic groups (3.2.4)
  - Alternative to 3.2.4: Poverty levels (3.2.5) and/or Numbers of unelectrified houses (3.2.6)
- Other considerations
  - Average connection costs (4.1)
  - Political demand for electrification (4.2)

5.1.1 Recommended allocation process

As indicated in 3.3, it is recommended that the criteria 'Complementary development initiatives' and 'Targeting socio-economic groups' be investigated further before they are included in the allocation process. Assuming that they are accepted as criteria, and that the criterion 'Electrification projects that contribute to economic growth' is also approved, the following allocation process is recommended:

1. Apply the criterion 'Electrification projects that contribute to economic growth' without establishing an index. That is, allocate funds to actual electrification projects that will contribute to economic growth in poor and historically neglected areas and communities, and will be implemented in the year under consideration. This establishes the total amount that will be used to support economic growth in the provinces in that year, while the rest of the funds can be used to support socio-economic development.
2. Establish indices for the criteria 'Unelectrified social infrastructure' and 'Targeting socio-economic groups'. Calculate a *composite index for socio-economic development* by taking the average of these two indices, thereby giving equal weight to the electrification of households and the electrification of social infrastructure.
3. Apply the criterion 'Complementary development initiatives' by modifying the composite socio-economic index somewhat to reward provinces where the selected development initiatives exist and are successful, and penalise those where very little exists and very little is achieved. An index should not be established for this criterion, as it would not be meaningful. Human judgement would have to be applied.
4. Modify the socio-economic index once more to compensate provinces where the highest average connection costs are experienced as far as possible, as discussed in 4.1.

5. Use this modified socio-economic index to allocate the funds available to support socio-economic development in the provinces (at the end of step 1). This establishes the full allocation to each of the provinces for a particular year.
6. The political acceptability of this allocation could be assessed by comparing it with allocations based on the criterion 'Numbers of unelectrified houses' in the provinces (the 'Total need' index of the NER), which can be seen as a measure of political demand at a provincial level (see 4.2).

5.1.2 Alternative allocation processes

If the proposed criteria 'Complementary development initiatives', and 'Targeting socio-economic groups' are not accepted, the allocation process could be as follows:

1. Apply the criterion 'Electrification projects that contribute to economic growth' without establishing an index. That is, allocate funds to actual electrification projects that will contribute to economic growth in poor and historically neglected areas and communities, and will be implemented in the year under consideration. This establishes the total amount that will be used to support economic growth in the provinces in that year, while the rest of the funds can be used to support socio-economic development.
2. Establish indices for the criteria 'Unelectrified social infrastructure' and 'Numbers of unelectrified houses'. Calculate a composite index for socio-economic development by taking the average of these two indices, thereby giving equal weight to the electrification of households and the electrification of social infrastructure.
3. Modify the socio-economic index to compensate provinces where the highest average connection costs are experienced as far as possible, as discussed in 4.1.
4. Use this modified socio-economic index to allocate the funds available to support socio-economic development in the provinces (at the end of step 1). This establishes the full allocation to each of the provinces for a particular year.
5. The political acceptability of this allocation could be assessed by comparing it with allocations based on the criterion 'Numbers of unelectrified houses' in the provinces (the 'Total need' index of the NER), which can be seen as a measure of political demand at a provincial level (see 4.2).

If the criterion 'Electrification projects that contribute to economic growth' is not accepted either, a process such as the following is recommended:

1. Establish an economic growth index based on an alternative criterion (preferably not 'Contribution to national economy').
2. Establish indices for the criteria 'Unelectrified social infrastructure' and 'Numbers of unelectrified houses'. Calculate a composite index for socio-economic development by taking the average of these two indices, thereby giving equal weight to the electrification of households and the electrification of social infrastructure.
3. Rather than combining the two indices, which capture somewhat opposing values, mathematically, 'choose' an index which lies between the two, using human judgement (see 2.4.1).
4. The political acceptability of this index could be assessed by comparing it with the 'Total need' index of the NER that captures the criterion 'Numbers of unelectrified houses'. The latter can be seen as a measure of political demand at a provincial level (see 4.2).

5.2 Allocations to planning areas

The project selection and prioritisation processes discussed by Banks (1998), which deal among other things with decisions on the technology options (grid or non-grid) to be employed, are undertaken within planning areas that are considerably smaller than the provinces. Most of the

recommended and some of the alternative criteria discussed above can be used to allocate grant funding to such planning areas. These are:

- Electrification projects that contribute to economic growth (3.1.3)
- Unelectrified social infrastructure (3.2.1)
- Complementary development initiatives (3.2.2)
- Numbers of unelectrified houses (3.2.6)
- Average connection costs (4.1)
- Political demand for electrification (4.2)

Structured provision for consultation with political leaders would probably need to form part of the allocation process at this level.

References

Banks D I 1998. Criteria to support project identification in the context of integrated grid and off-grid electrification planning. Energy and Development Research Centre, University of Cape Town.

Bopela T 1997. (Former national electrification planning manager at Eskom). Personal communication, November 1997.

Boshoff S 1997. (National Electricity Regulator). Personal communication.

Calitz J M 1997. (Demographic specialist at DBSA.) Personal communication.

Conningarth Consultants 1995. Macro-economic impact of household electrification. Report prepared for the Human Sciences Research Council.

Crawford Cousins C 1998. A question of power: The electrification of rural households. Energy and Development Research Centre, University of Cape Town.

Davis M 1995. The economic benefits of electrification. Appendix attached to James (1996).

Davis M 1996. The financial impacts of electrification on the electricity distribution industry. Energy and Development Research Centre, University of Cape Town

Davis M, Pickering M & Steyn G 1996. The distribution of power: Recommendations on electrification policy. Energy and Development Research Centre, University of Cape Town; Johannesburg: MEPC.

DBSA [Development Bank of Southern Africa] 1995. South Africa's nine provinces: A human development profile. March 1995. Halfway House: DBSA.

DBSA [Development Bank of Southern Africa] 1996. Operations committee assignment: Allocation of DBSA resources at a provincial level. May 1996. Halfway House: DBSA.

Development Planning & Research 1998. The role of electricity in the provision of water in rural areas of South Africa. Energy and Development Research Centre, University of Cape Town.

Du Plessis J 1997. (National Electricity Regulator.) Personal communication.

Gordon A 1997. Facilitating education in rural areas of South Africa: The role of electricity and other sources of energy. Energy and Development Research Centre, University of Cape Town.

James B 1996. Criteria used for the selection of electrification projects in rural areas. Energy and Development Research Centre, University of Cape Town.

James B 1997. Current-limited supplies of electricity in the context of South African rural areas. Energy and Development Research Centre, University of Cape Town.

James B 1998a. Community participation in rural electrification. Energy and Development Research Centre, University of Cape Town.

James B 1998b. (Senior researcher at EDRC.) Personal communication.

May J, Carter M & Posel D 1995. The composition and persistence of poverty in rural South Africa: An entitlements approach. Johannesburg: Land & Agriculture Policy Centre.

NER [National Electricity Regulator] 1995. Lighting up South Africa 1995: Progress report on electrification. Sandton: NER.

NER [National Electricity Regulator] 1996. Lighting up South Africa 1996: Progress report on electrification. Sandton: NER.

Rogerson C 1997. Rural electrification and the SMME economy in South Africa. Energy and Development Research Centre, University of Cape Town.

Ross F, Matzopoulos R & Phillips R 1997. The role of rural electrification in promoting health in South Africa. Energy and Development Research Centre, University of Cape Town.

Tapson D 1998. The role of electricity in the development of small-scale agriculture in South Africa. Energy and Development Research Centre, University of Cape Town.

Thom C 1997. A development framework for rural electrification: Some preliminary findings. Energy and Development Research Centre, University of Cape Town.

Thom C, Davis, M & Borchers M 1995. Review of South African experience in rural electrification. Energy and Development Research Centre, University of Cape Town.

Udjo E O 1997. (Directorate of Analysis, Central Statistical Services.) Personal communication during seminar at EDRC.

EDRC REPORT SERIES

Criteria for the allocation of grant funding for electrification to the provinces

CECILE THOM

ENERGY & DEVELOPMENT RESEARCH CENTRE
University of Cape Town