

Municipal and District Municipality Responsibilities regarding Electrification Planning - The Role of Integrated Development Plans and Prioritisation between Grid and Non-Grid Technologies



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1 Introduction

The National Electrification Program (NEP) started in 1994. Since then significant achievements have been made and more than 3.2 million households have gained access to electricity services throughout the country.

In their White Paper on energy policy the South African Government has stated their vision and goal of universal household access to electricity.

The backlog on electricity services is still significant and most households who do not yet have access are generally located in the rural areas of the country. These areas are sparsely settled and remote from established backbone infrastructure and reticulation costs are expected to be higher. The challenge now lies in taking the NEP further and achieving the goal set by government. There are many obstacles but a well-structured integrated planning process at local level will contribute significantly towards this goal.

This paper outlines the recent change in the governance of the NEP which has coincided with local government restructuring and initiation of the non-grid programme. The paper then identifies planning challenges that have since become apparent at Local and District Municipality level in rural areas and closes off with a proposed solution as already implemented at two District Municipalities in kwaZulu-Natal.

2 Background

The South African Government's white paper on energy policy released in 1998 states their goal of universal household access to electricity. The white paper broadly separates the energy sector into demand and supply sub-sectors. The demand side is generally analysed in terms of the energy requirements of households, industry, commerce, mining, transport and agriculture. Supply sub-sectors include the electricity, nuclear, oil, liquid fuels, gas, coal, renewable energy sources and transitional fuel (low smoke) industries. The white paper also states recognition to the fact that universal access to electricity will include non-grid options i.e. Solar home systems (SHS) and mini-grid using distributed generation.

Until 2000, governance of the NEP was carried out by Eskom and Transitional Local Councils (TLC's). Their task included electrification planning, design, construction and operation and maintenance. At that stage Eskom was also responsible for financing the NEP in their licensed areas.

In 2000 government assumed responsibility for the NEP through the Department of Minerals & Energy (DME). An Integrated National Electrification Program (INEP) was announced and DME set out to

establish the INEP Business Planning Unit (INEP BPU) who would be responsible for the planning, allocation of funding and programme control. This unit has since engaged all licensed electricity distributors with requests for 3-year rolling plans to be submitted.

This change in NEP governance coincided with the final restructuring stage of local government. TLC's were redefined as Metro's and District or Local Municipalities. In some cases complete new Local and District Municipalities had to be established in the rural areas. Soon after the restructure a legal obligation was placed on these new local government structures to prepare Integrated Development Plans (IDP's) for the areas under their jurisdiction.

In 2001 DME approved the non-grid programme and concessions were allocated to public private partnerships to deliver rural non-grid electricity supplies in South Africa. Pilot projects were then initiated in 2002.

DME are now in the process of establishing a central planning mechanism through a national electrification modelling tool designed to link with IDP's.

3 Problems and Challenges

3.1 Planning void

The above sequence of events led to a situation where there are now a number of players involved in the planning and delivery process of electricity services in rural areas. These are:

- Community – Legislation requires that a consultative process must be followed when planning delivery of services;
- Local Government – District and Local Municipalities obliged through legislation to plan and establish basic services within its area of jurisdiction (electricity and community lighting services included);
- Eskom – Licensed distributor of grid electricity in most the rural areas and are therefore mandated to submit applications to the INEP Business planning Unit for grid electricity on behalf of the Local and District Municipalities (there are exceptions where Local Municipalities are also licensed by the NER to distribute electricity in the rural areas). Eskom are also contracted in by DME to execute the construction of electrification projects in Local and District Municipalities which do not have the capacity.
- Non-Grid Concessionaires – Mandated to apply for non-grid electrification grant funding and also implement SHS projects on the ground.
- DME – responsible for macro planning and funding on a national level.

Eskom have engaged the new Local and District Municipalities and included their participation in the planning process through their IDP's.

Local and District Municipalities in the rural areas are relatively young entities. In most cases they do not have the capacity or expertise to prepare detailed integrated plans for the delivery of electricity services. The IDP's completed recently generally deal with electricity services at a high level and do not adequately co-ordinate or integrate with other projects and service sectors. They do not scope electrification projects properly and have little or inaccurate budgeting detail. They are usually politically driven plans with little consideration given to technical and financial constraints. They also do not make provision for non-grid electrification.

DME have initiated a national centralised planning process which will engage with the IDP's of the Local and District Municipalities. This process is not yet in place but this planning approach will probably not be able to take into account the detail of electrification dynamics at Local and District Municipality level.

3.2 Conflict between grid & non-grid electrification

Non-Grid concessionaires have no technical constraints when installing their services. Also, their installation cost is fixed regardless of settlement density. However, they are expected to operate along commercial lines after the service has been established. From a business point of view it is also in their interest to target densely populated settlements, including settlements which are close to their energy centres.

Since the initiation of non-grid electrification cases have been cited where non-grid electrification installations have been made in close proximity to grid electrification. Other cases have been reported where non-grid electrification has been installed in settlements planned for grid electrification the following year.

This un-coordinated planning and contesting of customers between grid and non-grid electrification jeopardises the INEP initiative and leads to wasted resources.

Clear rules or areas need to be established where grid and non-grid electrification can be marketed. However, these must not be too rigid leaving marginal customers without a choice.

3.3 Connection costs

The remaining areas which are not electrified are generally sparsely settled and remote from bulk infrastructure – most of the “low hanging fruit” has been picked. The average cost per connection limit of R3500 set for grid electrification will rule out many of the remaining settlements if considered in isolation.

The challenge now lies in carefully co-ordinating electrification with electricity requirements of all the other service sectors and leveraging available funding for these projects into establishing bulk electricity infrastructure to discount the average cost per rural connection within the set limits.

3.4 Future grid planning

In the absence of integrated long term electrification planning including time-phased spatial load forecasts, network operators (typically Eskom) have no fore-warning of the implications on their distribution and sub-transmission networks. As result network expansion plans are not timeously identified and actioned which can again impact on electrification delivery. This uncoordinated approach also leads to cases of sub-optimal network expansion planning where these potential loads are not factored into other regional developments.

3.5 Information

Accurate information is possibly the single most important enabler towards good planning. Demographic information for rural areas has become outdated over the past couple of years. The information that is available is not well co-ordinated or freely shared, leading to a situation where duplication of data acquisition occurs among sectors. Not only does this result in unnecessary expenditure but it also leads to ‘various versions of the truth’.

3.6 Communication

The many stakeholders in the electricity sector for rural areas emphasises the importance of having a means or mechanism of clearly communicating details of the electricity services plan. This is currently not happening and vital information is not being communicated i.e.:

- Electrification priorities (Sequence of electrification - in what order will villages and settlement areas be connected and approximately when);
- Areas where Grid and Non-Grid electrification is required;
- Preferred routes of future power lines;

- Funding sources (Not limited to DME but also other service sectors as well as possible donor funding)

4 A Solution

Although not fully operational, macro planning of the national electrification program is currently underway at DME. This is important to ensure equity on a national basis. However, macro planning will not be able to effectively deal with the problems and challenges as pointed out above. A bottom-up planning approach at regional level which must slot in below and support the macro plan is also needed. This is illustrated below.

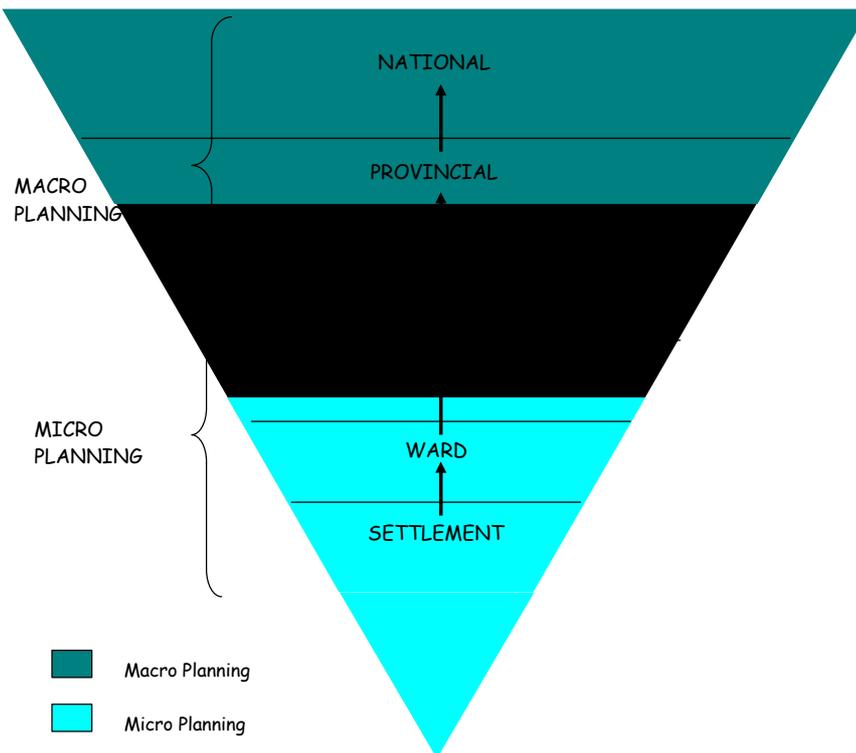


Figure 1: Respective Roles of Macro and Micro Planning

Micro planning at Ward, Local Municipality and District Municipality level is key towards achieving the goals set out by Government and compliance with legislation. This micro planning must focus on the dynamics of all service sectors at the lowest level possible, the rural villages.

Micro plans must then aggregate upwards to Local Municipality and District Municipality levels. At District Municipality level these micro plans must interface with the national macro plan. Overlap at this interface is necessary as targets and criteria must be communicated from the macro plan to the micro plan.

The micro plan for electricity, Electricity Sector Development Plan (ESDP) should support the IDP as illustrated below:

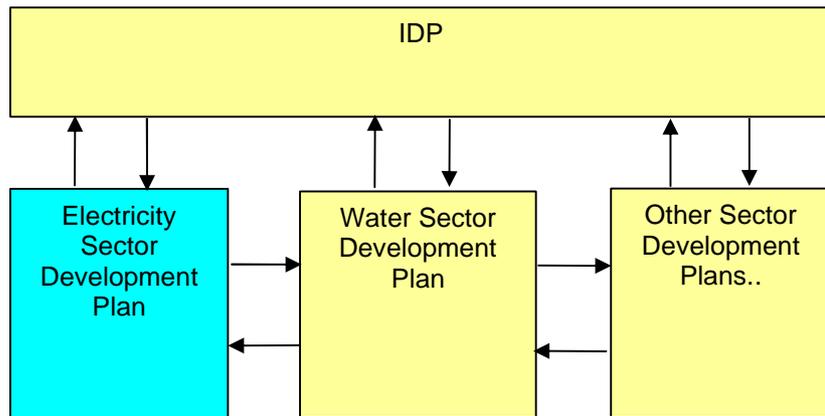


Figure 2: Sector support to IDP

5 Benefits of an ESDP

5.1 Demand versus supply side planning

An ESDP focuses on demand side planning. It establishes an accurate electrification plan which can be cross linked with other services sectors. It also establishes load forecasts and high level reticulation requirements i.e. preferred line routes which can be incorporated into Eskom's Network Development Plans (NDP's). This load and reticulation information is then communicated to Eskom who in turn focus on the supply side planning as illustrated below.

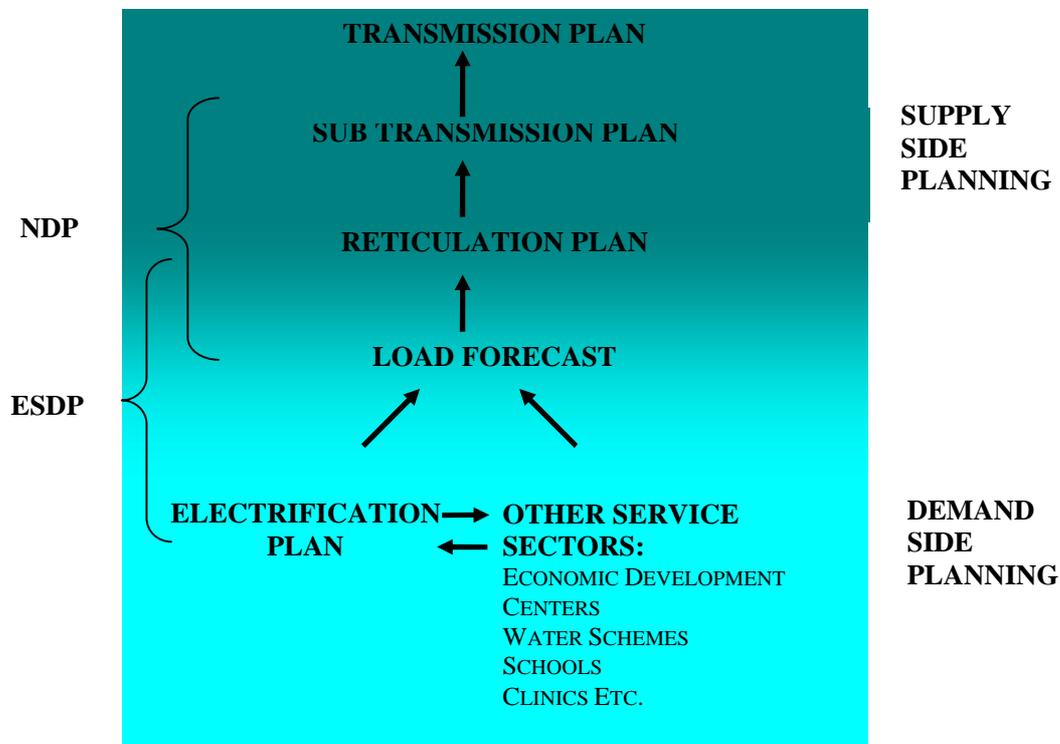


Figure 3: Interface and overlap between Energy Sector Development and Network Development Plans

5.2 Holistic planning and leveraging of savings

A shortcoming of the current electrification funding methodology is that strict application of a per unit subsidy (e.g. R3,500 per connection) does not allow for holistic development planning of a geographic area or electrical network over time. Evaluating electrification potential at a fine-grained level and on an annual basis will preclude the grid-electrification of certain areas which in the greater context, would be electrifiable within the allowed financial parameters.

One way of overcoming this limitation is the careful grouping of settlements within a project to achieve the benefit of cross-subsidisation. This is illustrated below where villages A & B as isolated projects will result in village B being excluded due its cost exceeding the limit. On the other hand grouping villages A & B as a single project will result in village B also qualifying for grid electrification. Reducing the average cost per connection in this manner makes marginal villages and settlement areas viable for grid electrification.

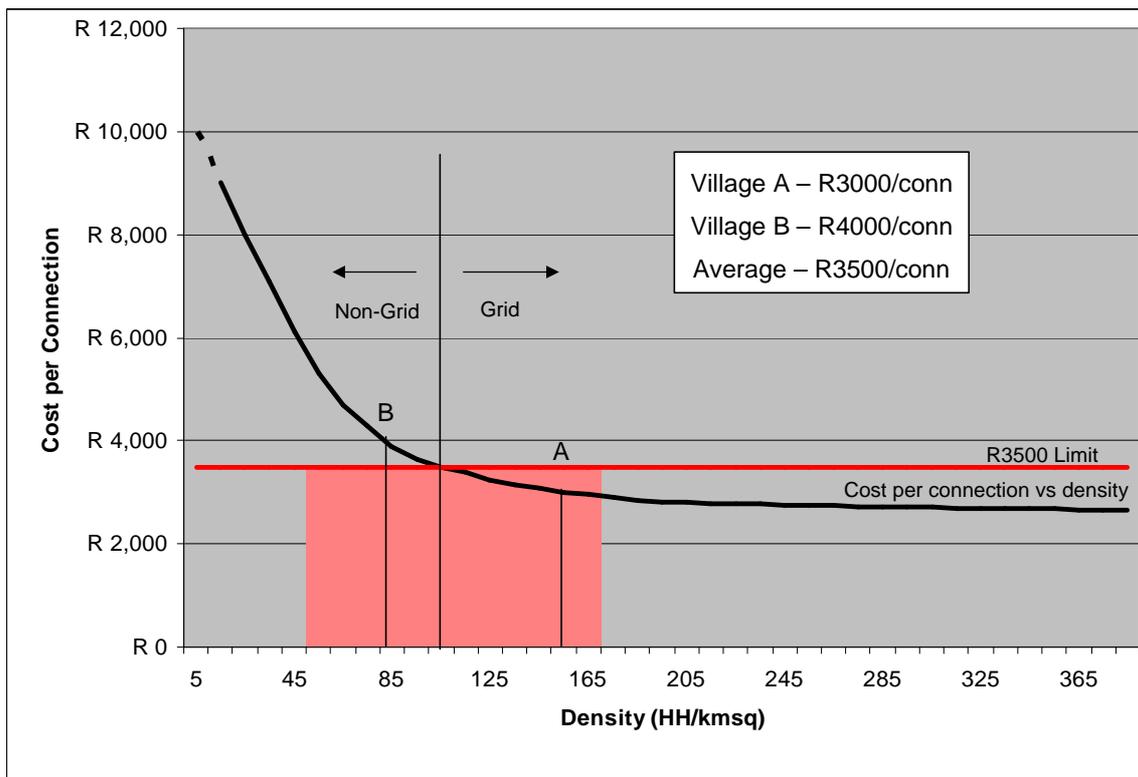


Figure 4: Illustration of cross-subsidization between settlements

Another approach to leverage available funding is to establish backbone network and bulk infrastructure through funding available for other service sectors and priority areas such as schools, clinics, commercial loads and others. For this reason it is also important to regularly update regional electrification plans also taking into consideration other network expansion as the impact on the viability of marginal settlements can be dramatic.

5.3 Prioritisation between grid and non-grid technologies

By modelling feasible network expansion over a number of years, areas not suitable for grid-electrification under the current funding regimen can clearly be defined. The identification of these areas enable non-grid concessionaires to plan for integrated energy solutions comprising renewable and non-grid technologies supplemented by other fuel sources.

6 ESDP funding and resources

ESDP's should be established at District Municipality level. Establishing ESDP's at Local Municipality level will create too many linkage points with the national program and create an unnecessarily complicated structure which would probably fail.

The District Municipality should take responsibility for the ESDP and ensure that participation is carried out to the lowest level as practically possible beyond the level of Local Municipality. The District Municipality should also be the linkage point between all stakeholders.

Funding for ESDP's is currently problematical as District Municipality budgets are generally under pressure and this work falls outside the scope of most funding institutions. As the availability of locally integrated electrification plans is critical to the successful implementation of the INEP and optimal application of funds, the logical conclusion is that DME should make such funding available to District Municipalities out of the national electrification budget. The amount could be based on a percentage of the estimated value of electrification backlog in the order of 0.5 - 1% of this amount.

The national electrification program will probably be completed within the next 10 years (assuming the current rate of progress) with the bulk of the planning to be done within the first years. Also taking into consideration anticipated developments within the EDI it would probably not be practical for District Municipalities to staff up for the compilation of ESDP's. The private sector, particularly locally based consultants active in the power sector, are ideally suited to be engaged to carry out this work as they would be familiar with the requirements of the regional stakeholders.

These plans should be reviewed at least every 5 years along with the IDP. However due to the dynamic nature of electrification and the ever changing need and priorities, reviews should be at shorter intervals i.e. 2-3 years.

ESDP's must be prepared in electronic format to make the updating process easy and cost effective.

7 Conclusion

Two ESDP's have already been established for nodal areas in KwaZulu-Natal and the third is currently underway. These plans have been well received by stakeholders.

Non-Grid electrification adds a further dimension to micro planning in that all SHS installations must be supplemented with cooking and space heating energy sources such as LPG and paraffin. These energy sources must be distributed through energy centres located within the communities they serve. Taking this factor into account the micro planning process proposed in this paper should be taken to the next level and expanded into a "Energy Sector Development Plan" which also plans for all the energy requirements of the community.

In closing, it is important to note the following:

- Development of the energy sector is a pre-requisite for growth in all other sectors;
- Access to electricity is important not only as a medium for delivering energy but also a medium to access the digital and communication world.

If we are serious about improving the lives and opportunities of our people in the rural areas we must strive to maximise access to clean and safe sources of energy through a well coordinated and detailed planning process.