

GOVERNMENT OF THE REPUBLIC OF NAMIBIA

ELECTRICITY SUPPLY INDUSTRY

**Support Mechanism to Improve the Electrification of
Households in Urban & Rural Namibia**



MINISTRY OF MINES AND ENERGY

**Developed by the Electricity Control Board for the Ministry of Mines and Energy in
consultation with Electricity Supply Industry Stakeholders**

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EXECUTIVE SUMMARY

This document describes a support mechanism to create the framework conditions for a national household electrification programme in peri-urban and rural areas in Namibia.

The support mechanism is to specifically enhance the scope and scale of household electrification efforts in Namibia. It is primarily necessitated by

- the continuing low level of household electrification in the country;
- the absence of a national framework for household electrification that guides Government and licensees; and
- the inability of licensees to obtain the necessary funding to make substantive inroads in the electrification of households in their area of responsibility.

It is generally accepted that the creation of access to electrical energy services generates economic value, for individual beneficiaries, the wider community and the country as a whole. As such, household electrification is a central pillar of national development efforts, and a primary tool to address and alleviate poverty and contribute to individual development aspirations, both in urban as well as the rural areas of the country.

The household electrification support mechanism described in this document has three components, namely:

A National Household Electrification Policy,

which is to define the objectives, approach and targets of the household electrification approach to be undertaken. It is to ensure that existing and future peri-urban households are rapidly connected to electricity distribution infrastructure, and that the approach to electrification of peri-urban and rural locations and household end-users is harmonised.

A Household Electrification Funding Portfolio,

which is to create a common access point and funding platform for utilities embarking on additional household electrification projects. It is to reduce the transaction cost of individual utilities when applying for funding by streamlining the funding and regulatory approach, thus broadening the opportunities of (especially the smaller) distribution entities.

A Household Electrification Master Plan,

which is to create a single national integrated household electrification plan for Namibia, comprising both rural and peri-urban areas, and thus systematically integrate the approach in which rural and peri-urban areas are electrified. It is to ensure that national electrification efforts maximise the impact of public and licensee' expenditure, while minimising potential ambiguities in regard to responsibilities for the country's ongoing electrification.

A key underlying assumption is that electrification of households is ultimately an initiative of Government, in the interest of providing basic services to improve living conditions and foster economic growth. As such, it is expected that the suite of support mechanisms introduced here will also be an initiative of Government, and will be executed under its guidance and control.

A tentative implementation timeline for the development of the requirements to establish the household electrification support mechanism assumes that Cabinet approves the mechanism by July 2015. The timeline envisages the development of the National Household Electrification Policy, which could be finalised by June 2016. Tendering of the Household Electrification Master Plan and Household Electrification Funding Portfolio development is envisaged to take place in the latter part of 2016, and their development is expected to take approximately one year. Allowing for the preparation of licensees during the first part of 2018, the target date for the commencement of the Master Plan's implementation is envisaged to be in July 2018.

An indicative development budget for the support mechanism amounting to N\$ 10.25 million is provided, and should allow for the initiation of the key activities required to establish the National Household Electrification Policy, develop the Household Electrification Funding Portfolio as well as the Household Electrification Master Plan. Actual costs may differ from those included in the indicative budget, as the ultimate scope of work and consultant requirements will influence the final budget.

A comprehensive implementation of the postulated household electrification programme will necessitate capital investments of some N\$ 3.4 billion over ten years, covering only the cost of additional distribution networks and household connections. It would add up to 160 000 households to the grid over ten years, compared to the 220 000 households who are currently served by the country's electricity distribution industry. Adding so many consumers to the network will have a significant impact on the country's transmission system, as well as on national generation capacities, neither of which is included in the budget presented in the present study.

Land planning and the adequate development of land is identified as a pre-requisite for cost effective electrification, and has become a major national issue as a result of backlogs that have built up in many local authority areas. If not addressed at national level, the lack of land may significantly reduce the pace of electrification, and may also introduce higher costs plus the risk of future additional costs when land planning finally catches up with electrification efforts.

The capacity of non-RED licensees to implement a household electrification programme and access the required funding remains a matter of concern. Here, additional assistance may have to be made available to some of these licensees to ensure implementation.

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ACRONYMS AND ABBREVIATIONS

ECB	Electricity Control Board of Namibia
EDI	Electricity Distribution Industry
ESI	Electricity Supply Industry
Government	Government of the Republic of Namibia
MME	Ministry of Mines and Energy
RED	Regional Electricity Distribution Company
REDMP	Rural electricity distribution master plan for Namibia (2010)

1 Introduction

This document introduces a support mechanism for improving electrification of households in peri-urban and rural areas in Namibia.

The present document is based on a study undertaken on behalf of the Electricity Control Board of Namibia (ECB) during 2014 and 2015 which investigated the following:

- international trends in dealing with and supporting household electrification;
- a high level assessment of household electrification needs in Namibia;
- a determination of barriers and constraints affecting electrification in Namibia;
- development and assessment of a long list of potential support options, resulting in a set of three recommended options which form the proposed support mechanism;
- an assessment of likely impacts of the postulated electrification programme and mechanism; and
- the development of an implementation plan for the support mechanism.

The full results of the study are contained in two reports which are available from the ECB.

The remainder of this document covers the following topics:

- Section 2 sets the stage for the support mechanism by providing a summary of the main findings and recommendations contained in the study reports;
- Section 3 introduces the proposed household electrification support mechanism;
- Section 4 summarises the main considerations of importance for the development of the household electrification support mechanism; while
- Section 5 concludes this document.

2 Setting the Stage

2.1 Findings of the Analysis

The analysis that underpinned the development of the electrification support mechanism found that:

- Namibia continues to have low rural electrification rates, and has numerous un-electrified areas in peri-urban and informal settlements close to well-established urban centres. This emphasises that a greater focus must be placed on the systematic electrification of such areas if national development efforts are to reach those that have not yet been effectively coupled into the country's economy.
- from interactions with Namibian Electricity Distribution Industry (EDI) stakeholders it is clear that access to affordable sources of funding is by far the most critical issue that is holding back peri-urban and utility-based electrification, both in rural Namibia as well as in peri-urban and informal areas in and around urban centres. On the other hand, technical capacity to deal with service provision is either available in-house or can be procured from the private sector. In many areas however, a backlog of town planning delays electrification efforts, but this is more the result of a lack of funding than a lack of capacity.
- electrification of low income households is not financially attractive to licensees in the short to medium term due to high capital costs and low initial consumption by beneficiary households. Most licensees are not able to secure sufficient funding to electrify households at a pace that would significantly increase electrification levels;
- in 2014 there were more than 74 000 households in peri-urban areas without access to electricity, of which only 23% are located in areas which have benefitted from town planning. This number is projected to grow by an estimated 5 500 households per year due to migration and population growth.

The findings lead to the conclusion that the electrification of households cannot be left to distribution licensees without providing additional substantive support in the form of a policy, planning and funding framework that specifically focuses on the electrification of households in Namibia.

2.2 A Postulated Household Electrification Programme

For the purposes of the study an electrification programme was postulated which would see the connection of all existing peri-urban households to the national grid within ten years, while keeping up with the connection requirements of newly established households in peri-urban areas, and also keeping up with connecting households in rural localities under the Government's rural electrification programme. The study makes no judgement whether such

a programme would be desirable, fundable or implementable, but instead informs the reader as to the impacts that may be brought about by such a programme.

The postulated household electrification programme would have a profound impact on distribution licensees in Namibia. The high-electrification scenario would add some 160 000 households to the grid over ten years, compared to the existing number of households of some 220 000. For the full programme to be undertaken, a capital investment of some N\$ 3.4 billion is required over ten years. This only covers the cost of the networks and house connections. Adding so many consumers will also have a significant impact on the transmission system, as well as on national generation capacities, neither of which is included in the budget presented in the present study.

As a pre-requisite for the orderly electrification of additional households it will be necessary to make properly planned and surveyed land available. This implies the planning and survey of some 110 000 peri-urban erven over the next ten years, which is a most ambitious target considering the multitude of challenges already faced by local authorities in Namibia. A concerted effort on the part of Government will be needed to address the land issue, and ensure that it does not hamper electrification efforts. It is also noted that unresolved land issues and/or the non-availability of suitable urban land may impose a major constraint on the pace of future electrification efforts.

The postulated electrification programme would increase the national household electrification rate from some 43% in 2015 to some 70% in 2024. If the electrification drive only keeps up with peri-urban household growth and rural electrification, progress would be reduced substantially, resulting in a national rate of only some 57% in 2024. In either case however, rural access would improve from the present estimated 16% to some 29% in 2024.

2.3 Economic Benefits of Household Electrification

Providing access to electrical energy services is expected to generate economic value, for individual beneficiaries, the wider community and the country as a whole. The actual economic value generated per new connection depends critically on whether electricity is used to generate new economic value or is mostly or solely used for consumptive purposes, as well as on how much electricity is consumed per connection.

Whether new electrification infrastructure actually adds economic value is therefore difficult to ascertain, and depends on many non-tangible factors which cannot be quantified readily.

It is instructive to reflect *how* new connections would create the economic value. This question will not be conclusively answered, however, it is worthwhile to identify some key economic factors that would likely change when a previously un-electrified end-user is provided with access to electricity. Amongst others, the key economic value drivers associated with new electricity connections in a developing country such as Namibia are likely to include:

- **enhancing health benefits**, as a result of reducing the use of smoke-inducing thermal energy sources as well as better access to refrigerated food and clean water;

- **improving educational conditions** resulting in enhanced educational outcomes, as a result of using modern and clean sources of lighting and benefitting from the above health effects;
- **increasing the productive and entrepreneurial potentials** of end-users;
- **reducing end-user expenditure for non-electrical energy sources**; and
- **improving the overall well-being and productive abilities of beneficiaries**, as a result of having access to a clean energy form that necessitates little personal effort while enhancing the immediate living environment, including through air conditioning, fans, space heating, access to modern media and other positive factors.

Economic value other than is identified above may also result from new connections. Additional interventions, such as a productive use of electricity program, may further increase the broader economic benefits that can be created by using electricity.

3 The Proposed Household Electrification Support Mechanism

3.1 Introduction

Electrification of households is considered to be ultimately an initiative of Government, in the interest of providing basic services to improve living conditions and foster economic growth. As such, it is expected that the support mechanism introduced here will be a Government initiative, and is to be executed under its guidance and control.

The proposed support mechanism assumes that Government will drive its development and implementation. It is founded on the development of an electrification Policy (which will be an official Government policy), and the development of a funding portfolio (of which Government will be the custodian and most likely be a significant contributor), and is to be guided by a household electrification Master Plan that is to be developed and implemented in close consultation with the country's electricity distribution and supply industry players.

The relationship between the three key pillars of the proposed household electrification support mechanism is illustrated in Figure 1. It shows that a household electrification Policy must be developed first, since it needs to guide the Master Plan as well as the funding portfolio, and is to provide a formal environment in which the second and third activities can be undertaken. The funding portfolio can be developed to some extent in parallel with the early phases of the Master Plan, however noting that the outcomes of the funding portfolio are a required input to the master planning process.



Figure 1: Main components of the household electrification support mechanism

Based on these three legs, electricity distribution licensees are envisaged to deliver the actual electrification projects. They are to be rolled out and funded in accordance with the provisions of the Master Plan, taking into account the funding portfolio. Licensees will be comprehensively supported, through the provisions of a detailed implementation plan, founded on financial realism, and giving access to a funding portfolio which is designed to ensure the viability of the various industry actors. Non-RED distribution licensees may have to be supported to ensure that they can implement the household electrification projects as per the Master Plan.

3.2 The Proposed National Household Electrification Policy

This section provides some high-level pointers to aspects which are considered important when developing the proposed Household Electrification Policy.

3.2.1 Purpose

The purpose of the proposed National Household Electrification Policy is to

1. clarify Government's objectives in terms of access to electricity for households, relating these objectives to at least the issues of poverty alleviation, economic development and national planning targets including Vision 2030;
2. define the basic approach to household electrification, including the general basis for electrification targets (such as keeping up with population growth, eliminating existing backlogs over a given period of time);
3. define the basis for setting electrification targets for individual licensees;
4. elaborate the expected interaction between electrification efforts and the proposed support tariff mechanism and how these are to complement each other;
5. define the responsibilities of those stakeholders that will be responsible for planning electrification;
6. define responsibilities of various stakeholders for funding electrification, including a common approach to funding options and their co-ordination and the basis on which available funding is allocated to projects and/or licensees;
7. define responsibilities of various stakeholders for implementing electrification projects;
8. clarify whether and how electrification roles and responsibilities are to be anchored in electricity distribution license conditions of existing and future licensees;
9. define the basic principles underpinning household electrification, such as
 - a. when and on what basis consumers are charged connection charges (to be harmonised with the connection charge policy),
 - b. what the capacity of a standard electrification connection is,
 - c. how informal areas without town planning are to be dealt with,
 - d. how erven with multiple dwellings are to be dealt with,
 - e. other common aspects and factors that should be standardised between licensees; and
10. develop an official position on cross-subsidisation between customer groups, including an approach how such subsidies can be assessed, managed and administered as effectively and transparently as possible. This position should specifically deal with:
 - a. how transmission customers (including future "contestable/eligible" customer who may purchase directly from the trader) should contribute through tariffs;
 - b. how the impact of self-generation by consumers on licensees' sales and therefore potential cross-subsidy pools is best to be dealt with; and

- c. whether and what limits may be placed on the cross-subsidisation funding burden of specific customers groups, including large commercial and industrial consumers, institutional consumers and high consuming households.

3.2.2 Scope

The to-be-developed National Household Electrification Policy should include

1. a description of the main contextual aspects relating to household electrification;
2. a vision statement that motivates why national household electrification is desirable and what the achievements could contribute to the country's development;
3. a high-level economic assessment supporting the rationale of household electrification being a national priority from a development and social upliftment perspective;
4. a statement of intent in regard to the electrification of households in Namibia, tying in the past National development Plans and Vision 2030, and spelling out key intentions in regard to household electrification;
5. a brief summary of the main issues that have an impact on and have challenged the systematic electrification of households in rural and peri-urban areas in Namibia;
6. the identification of responsible parties and their roles as drivers of the policy;
7. the description of the governance arrangements required to ensure that the policy has the necessary institutional anchoring within and amongst the various actors in the country's electricity sector;
8. the identification of responsibilities relating to the ongoing funding as is required under the policy, including but not limited to mechanisms of funding, the flow of funds, administration of funds, as well as the co-ordination of efforts to acquire, administer and regularly disburse funds;
9. the identification of responsibilities relating to the implementing of the policy as a whole, and specific electrification projects in the country, emphasising the important roles and responsibilities of institutions and actors that are already engaged in providing access to electricity;
10. the description of how local authorities and regional electricity distribution entities will interact, and the roles and responsibilities of other institutional actors as well as private sector participation, engagement and promotion, as well as associated responsibilities such as town and regional planning, standardisation of services, and related topics;
11. a description of the principles that will guide the connection of new households to new and existing electricity distribution infrastructure, including but not limited to the responsibilities of the main parties to ensure that access can and will remain affordable, that least-cost access options will be used, that innovation and competition will be fostered, and how connection charges, tariffs and potential support tariffs will be structured to ensure the sustainable and equitable electrification of households in the country.

3.2.3 Main Issues to be addressed in the Policy

The to-be-developed National Household Electrification Policy should make reference to the following main issues:

1. the backlog of household electrification in Namibia's current electricity distribution industry;
2. the lack of clarity in regard to the reason why national household electrification is economically and socially desirable for Namibia's ongoing development;
3. the importance and mechanisms to anchor such projects through regulatory provisions;
4. the governance arrangements to achieve the necessary institutional anchoring;
5. the importance of securing reliable funding sources and their transparent administration, including Government's commitment to funding both rural and peri-urban electrification in an equitable and economically efficient manner;
6. the roles of local authority, regional electricity distributor and other entities tasked to implement the policy;
7. the importance of properly embedding electrification efforts in the wider development efforts, be it at town planning level, regional planning, housing initiatives and national development planning initiatives; and
8. the importance of a transparent and equitable mechanisms to accelerate access to, affordability and availability of additional household electricity connections that are realised by using innovative least-cost technologies and service delivery practices.

3.3 The Proposed Household Electrification Funding Portfolio

This section provides an overview of the aspects relating to the development of the proposed electrification funding policy.

3.3.1 Purpose

The purpose of the proposed electrification funding portfolio is three-fold, i.e.

1. inform licensees about potential electrification funding options;
2. how such options can be accessed; and
3. the conditions of the respective funding options.

In addition, the portfolio is to include a description of the modalities of doing business with contemporary financiers as well as the ECB's tariff determination methodology and how the cost of servicing loans is to be recovered through electricity tariffs.

The portfolio should include a firm commitment by Government for the funding of rural and peri-urban household electrification. Such a commitment should be commensurate with the

fact that household electrification should primarily be a national priority which is largely not commercially viable for electricity distribution licensees. Government intervention should be guided by the principle that while accelerated household electrification is in the national interest this should not be done to the detriment of raising electricity prices unreasonably or compromising the viability of electricity licensees.

3.3.2 Primary Options

The to-be-developed Household Electrification Funding Portfolio is to include a discussion of the primary funding options, including the following:

3.3.2.1 Annual dedicated capital budget allocations from Government

Government funding derived from annual budget allocations is likely to remain one of the critical pillars of how households are going to be electrified in future. Such annual provisions are best secured by way of annual budget appropriations through the Ministry of Mines and Energy, similar to how the financial allocations for rural electrification are currently made.

The funding portfolio should clarify on what basis Government will undertake to budget for household electrification, how such budgets will be allocated to licensee areas and how recipient licensees are expected to account for funding received.

3.3.2.2 Annual capital budget allocations from licensees

In principle, each distribution licensee is to make available an annual budget allocation that specifically caters for the ongoing electrification of households. Such allocations ought to become a part of the annual tariff application program, whereby the ECB approves tariff levels per licensee based on regulatory requirements including regular electrification activities.

The funding portfolio should clarify expectations placed on licensees in this regard and give guidance on what proportion of available cash generated and loan potential available to the licensee should be allocated to household electrification under various circumstances.

3.3.2.3 Tariff cross-subsidisation within individual licensees

Each licensee has some leeway in introducing cross-subsidies between different electricity consumer groups. In this way, specific consumer groups can benefit from a surplus generated by other consumers within the same distribution area. While there is some limited scope for the introduction and use of cross-subsidisation within individual licensees, care must be taken that price signals are not unduly distorted and that the cost reflectivity of electricity tariffs can be maintained.

The funding portfolio should align with the household electrification policy principles regarding cross-subsidisation to provide guidance to licensees and place obligations on licensees (if appropriate) to assess existing cross-subsidies and determine acceptable levels of cross-subsidies which can then provide an envelope for tariff development by the licensee.

3.3.2.4 Grants from regional and/or international development funding organisations

A variety of regional and international development funding entities exist where specific grant funding and/or concessional loans can be procured. These entities have a multitude of financial vehicles available which could potentially benefit the enhanced electrification of households in Namibia.

As a middle-income country, Namibia no longer benefits from the generous grant allocations that were available shortly after Independence. Today, many of the contemporary grant-funding entities attach stringent conditions to grant funds, including those pertaining to reducing greenhouse gas emissions, levelling the playing field between grid- and off-grid services and/or enhancing the resilience of communities to the effects of a changing climate. Contemporary Namibian utilities are not known for innovation or their efforts to climate-proof the country, which implies that current utility business models will likely have to be updated before considerable grant funding can be accessed for additional household connections.

The funding portfolio is to liaise with potential development funding entities to understand their policies and requirements, informing Government, licensees and other local stakeholders on these requirements and providing guidance on how these requirements might be met by Namibia and Namibian licensees and household electrification projects.

The funding portfolio is also to identify Government intervention required to access development funding and clarify the willingness and commitment of Government to provide such intervention, including allocation of responsibility within Government to implement such interventions.

3.3.2.5 Government supporting specific development activities

It is the prerogative of Government to allocate funding to activities which support specific national or regional development activities. Examples include the Government's mass housing project, or specific financial contributions to NamPower or local authorities. In most cases, financial support by Government would either have to be allocated through appropriations made by the Ministry of Regional Local Government and Housing and Rural Development, and/or the Ministry of Mines and Energy. In this regard, two aspects are of particular importance to secure Government funding for household electrification:

1. provisions that ensure that developments similar to the mass housing project support local authorities or Regional Electricity Distributors to provide for electrification services as part and parcel of making available serviced land; and
2. ensuring that funding allocations are made over a number of years so as to enable the implementing entities to provide well-planned services rather than make ad hoc arrangements when funding is available.

The funding portfolio should seek to secure a commitment from Government to include electricity services and their pre-requisites such as town planning in the Government budget allocation for development projects that require electricity connections, such as housing projects.

3.3.2.6 Government providing loans and loan guarantees to licensees

As is already practiced through specific loans allocated by the NEF, Government could provide licensees with loans and/or loan guarantees. While the granting of Government loans to operating entities could be viewed as direct interference in the near-commercial operations of distribution entities, the reality is that Government would most likely have to intervene in any case if a distributing entity were to become bankrupt.

In practice however, a multitude of issues would have to be addressed before Government could provide loans to licensees. These include, amongst others, the modalities on which loans would be provided, the ranking of the merit of different loan applications, the securitisation of loans, and the repayment criteria.

On the other hand, a less invasive support mechanism could see Government granting loan guarantees to licensees. In this case, the funding modalities would still have to be cleared by Government, but the day-to-day dealings in regard to the drawing and repayment of such loans would be directly between the loan recipient and the provider of such loans.

Government loans and loan guarantees should be aimed at complementing the capacity of licensees to access commercial loans on the strength of their balance sheets and profitability, which is believed to be very limited currently. The level of loans and guarantees made available should take into account licensee capital funding needs outside of household electrification, ensuring that licensees are supported to access sufficient total funding for all their needs to ensure sustainability.

3.3.2.7 Local commercial loans taken up for capital funding

In principle, local commercial funding entities can provide loans for the further electrification of households, and this has been leveraged by some commercialised licensees. In practice however, the funding modalities of local commercial providers of such loan finance are often less geared towards the requirements of local authorities and/or Regional Electricity Distributors. In particular, local interest rates and the stringency of loan repayment conditions render many local loan facilities less attractive to finance low-yielding investments, such as those in additional household electrification.

The funding portfolio should engage local financial institutions to understand their loan requirements and conditions and make this information available to all electricity licensees. The funding portfolio should also strive to better inform financial institutions about the economics and regulation of electricity licensees with a view to possibly negotiate less stringent loan conditions for licensees meeting certain conditions. This facet may require periodic updating of both information from and to financial institutions to align with changes in the electricity industry.

In the event that the remaining REDs are not established in the short term then the funding portfolio should also engage financial institutions specifically on the issue of loans to local authorities and seek to enable electrification related loans to such authorities.

3.3.3 Secondary Options

A number of secondary options exist that should be considered in more detail in the to-be-developed Household Electrification Funding Portfolio. This section provides a brief overview description of such secondary funding options, with the aim to broaden the scope of the funding portfolio.

3.3.3.1 Capital funding (contributions) raised by way of a targeted electrification levy

Capital funding requirements for additional household electrification may benefit from the establishment of a regular levy, similar to the ECB or NEF levies which are charged on electricity sales. Depending on the institutional set-up, this may have to be complemented by an electrification fund, including the requisite legal provisions, whereby a set percentage or fee would be charged on electricity sales.

In this context it is important that such levies, while being attractive funding vehicles, have a number of drawbacks, including their propensity to distort the price signals that tariffs have on end-users. As such, while a targeted electrification levy may seem advantageous, it will have to be ascertained whether additional levies on the existing electricity prices will be accepted by end-users and will not create a too significant distortion of the consumer price signal.

The funding portfolio should review the existing use of the NEF to provide loans and funding to licensees and seek to establish whether and how the NEF (both the fund as well as the NEF levy on electricity) can be more formally leveraged for electrification. Specific consideration should be given to the option of adjusting the NEF levy to specifically cater for electrification funding instead of defining a new additional levy for this purpose. The investigation by the funding portfolio developers should lead towards supporting a decision by Government regarding the use of the NEF for this purpose. Should such a decision be forthcoming and positive then the principles guiding the use of the NEF for household electrification purposes should be developed, including on what basis available funds will be allocated to licensees and/or projects.

3.3.3.2 Raising capital funds by way of a local infrastructure development fund

If additional regular household electrification is recognised as an important driver of Namibia's development, a capital fund which benefits local infrastructure developments may become relevant. Such a funding vehicle could be endowed through direct budget allocations from the Ministry of Finance and/or the National Planning Commission, and specifically make available funds for large long-term infrastructure projects as are regularly required in capital-intensive sectors such as energy and water.

While general infrastructure development funds are often useful to incentivise investments in national projects they also often suffer from a number of drawbacks. These include the competitive nature of the bidding process to obtain specific project funds, which may create unwanted competition between similarly important national priorities and projects. In addition, a dedicated infrastructure development fund may reduce the budget available to line ministries, which may undermine staff morale as it may lead to a reduction of projects undertaken by line ministries.

Despite the above drawbacks and others, a local infrastructure development fund would have a number of advantages, including that it would likely necessitate a debate about national investment priorities between ministries, and would likely lead to a comparison of costs and benefits of public expenditure, which would likely strengthen national project outcomes. In light of these advantages it would be desirable to include such a capital funding vehicle in the to-be-developed Household Electrification Funding Portfolio, for further scrutiny and assessment of its potential funding modalities.

The funding portfolio should investigate the potential for such a development fund, specifically considering whether and how local institutional investors like pension funds and other vehicles could be brought in, offering them a solid local investment opportunity with predictable returns while raising capital funding for the licensees.

3.3.4 International development and/or infrastructure development funding

International development funding and/or infrastructure-specific funding would both likely offer avenues for additional access to capital funding for household electrification. In particular, development-related funding that provide soft loans towards capital costs are considered realistic.

However, as Namibia is a member of the southern African customs union and therefore limited in terms of the timing and volume of foreign currency movements, the Ministry of Finance is likely to have to sanction and support such dealings. Here it is important to note that the risk of exposure to foreign currency changes is one of the primary issues of concern when taking international loans, which implies that some hedging mechanisms may be required to shield the end-user from unexpected currency movements occurring during the term of the loan. Such hedging mechanisms can be both expensive and complex, and may limit the appetite of individual distributors.

However, loans from a national facility that benefits from international development funding and/or infrastructure-specific funding may be a better option for Namibia as it would allow the Government to negotiate the loan conditions and out in place the necessary hedging mechanisms while granting loans to entities wishing to invest in infrastructure-specific projects. In view of the above discussion, it is considered likely that the National Planning Commission is the most natural Government entity to create such a loan facility, and ensure that a proficient loan administrator is appointed for the day-to-day dealings with utilities and other interested parties.

The funding portfolio should liaise with relevant Government ministries and agencies to assess the potential for setting up such a local (Government managed) fund tapping into international development funding. The investigation should assess the benefits and risks associated with such a funding option and come up with a recommendation whether this option is to be further pursued. This recommendation should also be guided by the success in developing the rest of the funding portfolio and the resulting need for additional funding from a more complex and potentially risky source.

3.4 The Proposed Household Electrification Master Plan

This section provides some high-level pointers to aspects which are considered important when developing the proposed Household Electrification Master Plan.

3.4.1 Purpose

The purpose of the proposed Household Electrification Master Plan is to

1. create a single national integrated household electrification plan for Namibia, comprising both rural and peri-urban areas;
2. put forward one consolidated approach that guides the systematic electrification of households in Namibia, including the issue of land planning and delivery;
3. assess the funding needs for eliminating electrification backlogs and keeping up with household growth and relate these to the available funding as defined by the funding portfolio, thereby enabling the setting of achievable household electrification targets;
4. create planning certainty for all affected stakeholders;
5. create the maximum leverage to finance the systematic and comprehensive electrification of Namibian households; and
6. create an input into transmission and generation master planning activities which will need to be adjusted to cater for the electrification plan.

3.4.2 Scope

The scope of the proposed Household Electrification Master Plan is to

1. take into account and seek to implement the national household electrification policy;
2. estimate household electrification needs and capital requirements for peri-urban and rural areas and match these with potential funding sources (as elaborated in the funding portfolio);
3. develop a fundable and technically feasible plan to electrify households for a planning period of at least ten years which takes into consideration the REDMP as well as licensee plans and local authority land development plans;
4. address the issue of land planning and delivery in the context of peri-urban electrification, to ensure that planned land can be availed as and when required for the proposed electrification plan;
5. liaise with NamPower regarding the impacts of the proposed plan on the transmission system and generation sourcing and costs for the country, and integrate the feedback into the plan, if available including in terms of additional investment requirements in transmission and generation;
6. assess the macro-economic impact of the proposed plan, including incremental investments required in transmission and generation facilities;

7. define stakeholder interactions and inputs to ensure that plans take cognisance of local priorities and land development plans and imperatives;
8. assess the amounts and conditions of funding, including an assessment/estimation of existing cross-subsidisation needs;
9. consider technology options including off-grid options in order to maximise value for money;
10. set out electrification targets and plans for each license area and local authority area, including a funding plan, licensee revenue, cost and tariff impact assessment and the requirements of cross-subsidies; and
11. assess and define bulk supply substation constraints for attention in transmission master planning, and assess and define expected impacts of the plan on national electrical energy consumption and peak system demand for attention in national integrated resource planning.

3.4.3 Major Topics and Outputs

Prior to the commissioning of the development of the Household Electrification Master Plan, Terms of Reference that guide the Plan need to be developed. The following topics are to be addressed:

1. a high-level description of the inception and planning phase of the Plan's development, which will be required to initiate the Plan and clarify its scope;
2. a baseline survey, which is to quantify the actual and specific electrification requirements in select rural and peri-urban areas, including a demand forecast (rural areas to align with and rely on the REDMP in its latest updated version, if appropriate the REDMP may have to be updated in synchronisation to provide up-to-date inputs);
3. the development of the Master Plan methodology, including the definition of planning criteria that comprise both rural and urban / peri-urban end-users, the identification of electrification targets, estimation of network extension and strengthening requirements, conceptual designs, development of a phased least-cost network expansion plan, as well as least-cost energy provision options for both rural and peri-urban areas;
4. stakeholder engagement strategy, which defines how and when stakeholders will be consulted to provide inputs to ensure that the Plan is responsive to local priorities and development imperatives;
5. electrification needs assessment per main target area, and associated demand forecast;
6. separate electrification scenarios for a low, medium and high annual electrification targets, whereby a low electrification target could for example be that all normal growth is catered for but that no existing backlog households are electrified, while a high annual electrification plan could result in the complete electrification of backlog plus grown additional households within a period of years determined by available funding;

7. assess land development/delivery constraints and capabilities and recommend means to ensure that land development keeps pace with the planned electrification programme and necessary funding is available;
8. assess the capacity of licensees outside REDs to undertake electrification projects, and include mitigating actions as necessary in the Master Plan to ensure that these areas are not left behind;
9. capital expenditure plan per electrification scenario, and responsibilities vis-à-vis such expenditure for each scenario;
10. operational expenditure plan per electrification scenario, and institutional responsibilities (in case of Government subsidies or similar operational support) per such scenario;
11. funding strategy, based on the funding portfolio, to quantify the timing funding requirements as per the three electrification scenarios, and informed by a tariff impact assessment;
12. recommended electrification plan, based on the optimum scenario and most realistic capital and operational expenditure plan, with specific electrification targets for each license area per year for ten years;
13. impact summary, to illustrate the impact of the electrification plan, both on grid strengthening and supply requirements, as well as on national electrification achievement if the Plan is fully implemented;
14. assessment of the legal and regulatory pre- and co-requisites for the Plan's implementation; and
15. an annual area-specific implementation plan and associated summary of responsibilities.

4 Implementation Considerations and Implementation Plan

The household electrification support mechanism is to improve the electrification of peri-urban and rural areas by assisting licensees when electrifying households in their area of responsibility.

Developing the mechanism implies the implementation of three key projects, namely the development of the required policy, funding and planning frameworks within which licensees can maximise household electrification efforts for the national benefit.

The Policy must be developed first, since it needs to guide the Master Plan as well as the funding portfolio, and is to provide a formal environment in which the second and third activities can be undertaken. The funding portfolio can – to some extent – be developed in parallel with the early phases of the Master Plan, however noting that the outcomes of the funding portfolio are a required input to the master planning process.

The key implementation initiatives are expected to take the form of consultancy contracts put out on public tender.

4.1 Household Electrification Implementation and Monitoring Agent

The proposed household electrification initiative will require an implementing agent. This entity needs to be empowered and resourced to oversee the initial implementation of the three key activities introduced above. Terms of Reference need to be developed for all three projects, and these need to be tendered to appoint suitable consultants to undertake the work. In parallel, budget estimates need to be prepared for the three implementation activities, and funding needs to be secured to undertake them.

The implementing agent should be appointed by the Ministry of Mines and Energy (MME) in its role as policy maker for the electricity industry and custodian of electrification in Namibia. The MME may choose to mandate another entity to undertake all or some of this task on its behalf. In either case, the MME as project custodian, should acquire the required budget allocations for implementing the mechanism development activities.

The monitoring task could well be allocated to the ECB, who already have established mechanisms to collect, validate and use data from licensees. This would avoid the effort and expense to develop new data collection and monitoring mechanisms, and avoid duplicating data submission requirements for licensees. It is also noted that the ECB already has technical inspectors who periodically visit licensees and who could potentially include a review of electrification efforts in the scope of their inspections. This would minimise the cost associated with monitoring implementation of the electrification Master Plan.

4.2 Activities beyond the Key Initiatives

Beyond the above three major initiatives it will be necessary to:

1. Implement all initiatives required to activate the funding portfolio;
2. Formally launch the implementation of the Master Plan by all licensees;

3. Ensure that licensees implementing electrification keep proper records of connections made and capital amounts spent, including details regarding the sources of funding related to the electrification efforts, and that such data is reported to the monitoring agency for progress updating and statistical purposes;
4. Regularly (annually) review progress made on implementing the Master Plan, identifying problem areas and seeking to address these;
5. Periodically (at least every five years) review and update the Master Plan, taking into actual achievements and actual developments in terms of population growth.
6. These activities should be managed by the implementing agent.

It is also recommended that all licensees are to be required to keep detailed records of all households electrified (connected) in order for proper statistics to be collected. Such efforts could start as from the financial year starting 1 July 2015. Where areas with town planning are electrified, the number of new ervens with access to electricity as result of an electrification project should also be recorded, i.e. per electrification project the number of ervens which were given (theoretical) access and the number of houses actually connected should be recorded.

4.3 Indicative Implementation Timeline

An indicative timeline for the implementation of the electrification support mechanism is shown in Figure 2.

Task description	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18		
Approval of support mechanism (Cabinet)	█																																						
Appointment of implementing agent	█																																						
Develop ToR, budget for 3 key initiatives		█																																					
Tender for consultants for policy development			█	█	█																																		
Development of policy						█	█	█	█																														
Approval of policy (Cabinet)											█																												
Tender for consultants for funding portfolio development												█	█	█																									
Tender for consultants for master plan												█	█	█																									
Development of funding portfolio														█	█	█	█	█	█																				
Development of master plan															█	█	█	█	█	█	█	█	█	█	█	█	█	█											
Approval of master plan (Cabinet?)																												█											
Implement funding portfolio																							█	█	█	█	█	█	█										
Licensees prepare for implementation																																							
Master plan implementation starts																																							

Figure 2: Indicative implementation timeline

The implementation timeline is based on the assumption that the present mechanism is approved by Cabinet in July 2015.

The timeline is based on a target date for the commencement of the implementation of the Master Plan, which is July 2018. This implies a three-year development cycle. The above timeline has some slack at the end which will allow for some time overshoot for the three development projects. Implementation of the Plan should ideally coincide with the financial year start of the licensees.

For the consultancy tender processes, three months have been allowed. This would be one month from tender advertisement to bid submission, and two months for tender evaluation and its award. This is a tight timeline and will critically depend on the efficiency of processes used by the implementing agent.

It is assumed that the policy development can be undertaken over a period of four months. If delays are experienced, for example in getting agreed dates for stakeholder workshops (of which likely two are needed), then a period of four months may not be sufficient.

A period of five months has been allowed for the development of the funding portfolio, and twelve months for the development of the Master Plan. The timeframe required to develop the Master Plan will likely be tight, and may need to be extended if any delays in stakeholder interaction or data acquisition are experienced.

The proposed timeline makes provision for the preparation of licensees. It is unlikely that this much time will be needed, however, this allowance can also be available for time overruns on the consultancy projects without the necessity of extending the implementation deadline, which has been set at July 2018.

4.4 Indicative Implementation Budget

An indicative budget estimate for implementing the key initiatives for the proposed support mechanism is shown Table 1.

Description	Amount 2015/16 N\$	Amount 2016/17 N\$	Amount 2017/18 N\$	Total Amount N\$
Implementing agent general costs	500 000	250 000	250 000	1 000 000
Policy development consultancy	750 000			750 000
Funding portfolio consultancy		500 000		500 000
Master plan consultancy		6 000 000	1 500 000	7 500 000
Funding portfolio activation activities			250 000	250 000
Final activation preparation activities			250 000	250 000
Total definitely required	1 250 000	6 750 000	2 250 000	10 250 000

Table 1: Indicative implementation budget

The budget estimate is based on 2015 cost levels, and a very basic assessment of efforts required for the three projects. Actual tendered costs may differ widely from these estimates, depending on the detailed scope of work as well as sourcing of consultants.

The budget for “implementing agent general costs” assumes that the implementing agent is an existing entity such as the MME or ECB, who can largely deploy existing staff. As such, the proposed budget is only intended to cover additional travel, accommodation, workshops and

other operational costs such as short-term consultancies where needed. Should additional full time staff members be needed, a substantially higher budget would likely be necessary.

The policy development consultancy is expected to require more resources than the funding portfolio consultancy, because of the extensive stakeholder consultations that are to be undertaken as part of policy development, and such consultations (for example through workshops) are expensive.

The budget for the Master Plan consultancy is informed by the latest update of the REDMP, and taking wider stakeholder interactions into account, which will be required when dealing with local authorities from across the country. The project may also require aerial photography in some areas where recent photographs are not available.

The final two budget items are intended to cover the direct costs of the implementing agent, possibly complemented by short-term consultancies to activate the funding portfolio and to prepare and guide the preparatory activities to implement the Master Plan at all licensees.

Put into context of an electrification programme potentially worth some N\$ 3.4 billion, a planning and establishment cost of some N\$ 10 million seems reasonable, considering that this will put the entire programme on a well-planned path which is underpinned by a policy and realistic funding model.

4.5 Impact of Land Planning and Delivery on the Implementation

Besides funding, land planning and delivery in peri-urban areas is the most pressing issue that hampers electrification efforts. The present study finds that under current practices, land planning in peri-urban areas is a pre-requisite for orderly and efficient electrification to take place since it is required for the proper permanent planning of a network layout. This issue will have to be addressed in both the household electrification policy as well as the Master Plan to ensure that a) there is a clear directive/view from Government on this issue, and b) that the Master Plan is based on realism in this regard and includes mitigating actions and funding to ensure that the electrification programme is not derailed or otherwise unduly affected by this issue.

Land delivery is a national issue, and is not one that is isolated to some select areas, as has become particularly apparent through recent actions in which local authorities were pressurised with mass applications for land. The matter will thus need a co-ordinated national response, so as to ensure that a) it is addressed equitably across the country, and b) that local authorities are assisted in clearing existing backlogs and keeping up with demand. Playing into this issue are Government's views and plans regarding urbanisation in general, since the accelerated delivery of land in urban areas may significantly increase migration, which introduces many other challenges and is not necessarily desirable. The issue will therefore have to be dealt with by way of national planning efforts.

The implication of this issue on peri-urban electrification is considered most significant: if the land planning issue is not addressed, the pace of electrification will either have to be dramatically reduced and/or electrification will proceed in a non-optimal manner, which in turn may lead to major future costs for relocating network infrastructure when land planning is done in areas that have already been electrified.

4.6 Implementation Capacity in Areas outside the REDs

Stakeholder consultations undertaken as part of an investigation into the completion of the EDI reform process indicated that licensees in areas outside the REDs have little or no access to in-house engineering capacity. While the REDs have such capacity, the non-RED areas would have to rely almost entirely on consultants to plan and supervise electrification projects. This would not derail electrification efforts, as is evidenced by numerous local authorities that have successfully electrified some of their informal areas using such an approach.

What is a greater concern is the limited ability of local government entities to access commercial loan funding due to their legal standing, as well as pervasive weaknesses in management controls. Even if the required engineering and planning capacity can be sourced from the private sector, funding for electrification in such entities would be much more constrained than those of the REDs who have successfully accessed commercial funding.

The challenges experienced in non-RED areas will have the following implications on a household electrification programme:

- Government controlled funds accessible through the funding portfolio may need to be prioritised in favour of local and regional government entities outside RED areas, so as to mitigate their lack of access to commercial funding;
- Additional financial controls may need to be put in place to ensure that Government-sourced funds made available to these areas are properly managed, and exclusively used for their intended purposes. It may be expedient to handle peri-urban electrification in (some of) these areas like rural electrification, where the entire project is managed by the MME and funds are controlled directly by the MME; and
- The proposed household electrification plan may have to include additional financial provisions for engineering services in areas where these are not available in-house. Again, it may be expedient to attach some of these activities to the MME in the same manner as the rural electrification programme which is managed by the MME.

5 Concluding Remarks

The present document elaborates on a proposed support mechanism for improving the electrification of peri-urban and rural households in Namibia. Electrification of households is considered to be ultimately an initiative of Government, in the interest of providing basic services to improve living conditions and foster economic growth, both of which are long-term Government objectives. As such it is expected that the present support mechanism will also be an initiative of Government, and will be executed under its guidance and control.

The nature of the proposed support mechanism rests on the assumption that such an initiative will be owned and undertaken by Government. It is founded on the development of a Household Electrification Policy (which will be an official Government policy) and the development of a Household Electrification Funding Portfolio (of which Government will be the custodian and probably a funding contributor), working hand in hand with a Household Electrification Master Plan that is to be developed and implemented in close consultation with the electricity supply industry.

Based on these three legs, electricity distribution licensees are envisaged to deliver the actual electrification projects. These are to be rolled out in accordance with the Master Plan, and funded in a manner as anticipated by the Master Plan, taking into account the funding portfolio. Licensees will therefore be provided with a comprehensive support package, which makes provision of a detailed implementation plan, founded on financial realism, and giving access to a funding portfolio which is designed to maintain the viability of Namibian industry players. The capacity of non-RED distribution licensees to implement a household electrification programme remains a concern, and it may therefore be necessary to provide support to some of the licensees to ensure that they can cope with implementation.

The support mechanism is expected to be fully developed over a period of three years, and be implemented from July 2018 onwards. The implementation of the support mechanism project will cost an estimated N\$ 10.25 million in 2015 terms, excluding capital and operating costs and support. The cost of the implementation must be seen in the context of the value of the electrification programme as a whole, including the revenues generated from it and the economic value created through it.