CAPITAL BUDGETING IN ELECTRICITY DISTRIBUTION INDUSTRY IN ESKOM MOVING INTO REGIONAL DISTRIBUTORS

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INTRODUCTION

South Africa is at the cross roads as far as the electricity infrastructure is concerned. It has an ageing electrical network with the demand for electrical power almost exceeding the country’s producing capacity. Some serious investment decisions will have to be made as far as network expansion, maintenance, and refurbishment of the existing infrastructure.

The government being a major stakeholder in the supply of electricity due to its commitment to the inhabitants of South Africa has sought to harmonise the electricity distribution industry by proposing to ring fence the industry. Through the Electricity Distribution Industry (EDI), the government has proposed to reduce the number of electricity distributors from almost four hundred to six regional electricity distributors (REDS).

The Electricity Distribution Industry has five main objectives as set out by the government and these are:

- to provide low cost electricity to all consumers, with equitable tariffs for each customer segment;
- to provide a reliable and high quality supply and service to all customers, in support of the government’s economic and social development plans;
- To meet the country’s electrification targets in the most cost-effective manner, and to ensure that electrification is contributing to social and economic development.
- To meet legitimate employment, economic and social interests of all employees in the sector and to ensure their safety; and
- To operate in a financially sound and efficient manner, in order to provide a reliable and sustainable future for both consumers and employees.

In order for the EDI to fulfil its mandate the REDS will have to be managed in a financially sound and sustainable manner.

Eskom being the largest of the distributors with a significantly larger asset base will have to invest significant amounts of money in infrastructure going into the REDS.

PROJECT EVALUATION

Projects by their very nature involve the use of limited resources. There are usually more projects than available resources. This competition for resources often means that projects need to be evaluated against each other and they must be prioritised using a certain criteria.

The costs of capital and time value of money concepts therefore become fundamental in the evaluation of projects.

Cost of Capital

The undertaking of projects usually imply large capital outlay. The company needs to somehow source this capital from one or more sources at a premium. This premium is referred to as the cost of capital (k1) and is given by equation 2.1 below [1].

\[
k_1 = \left[ \left( 1 + \frac{r}{m} \right)^m - 1 \right] (1 - T) \quad \text{(Equation 2.1)}
\]

Where:
- \( r \) = Annual interest rate
- \( m \) = Number of payment periods per year
- \( T \) = Tax rate

Time Value of Money

The future value (FV) of money is the value in Rands, at some point in the future, of an investment or series of investments and it is given by equation 2.2 [1].

\[
FV = PV(1 + r)
\quad \text{(Equation 2.2)}
\]

Where:
- \( PV \) = Original investment (principal sum)
- \( r \) =Interest rate

If the interest accrued from the initial investment is re-invested rather than being paid-out, then interest is paid on interest. This is referred to as compounded interest and the future value (FV) is then given equation 2.3.

\[
FV = PV(1 + r/m)^n \quad \text{(Equation 2.3)}
\]

Where:
- \( n \) = Number of years.
- \( m \) = Number of times per year that the interest is compounded
Conversely, the present value of a stream of expected future cash flows money can be determined in much the same way as the future value. By adapting equation 2.3, the present value can be determined.

\[ PV = \frac{FV}{(1 + r / m)^m} \quad \text{(Equation 2.4)} \]

The resultant phenomenon is referred to as discounting.

Net present value (NPV)

The net present value method takes into account the projected future cash flows over the life of the asset. These cash flows are discounted at the company’s required rate of return to obtain a present value of each cash flow.

The sum of these present values is then subtracted from the capital cost (cost of the investment) to obtain the net present value. The net present value is obtained by using equation 2.5.

\[ NPV = \sum_{t=1}^{n} \left[ \frac{C_t}{(1 + k)^t} \right] - I \quad \text{(Equation 2.5)} \]

Where:
- \( C_t \) = net cash flow at time \( t \)
- \( I \) = cost of the investment
- \( k \) = cost of capital

Internal rate of returns (IRR)

The internal rate of return (IRR) represents the discount rate at which the net present value (NPV) or net terminal value of all cash flow is zero. It is also the rate that would make the NPV of the project equal zero such that:

\[ \sum_{t=1}^{n} \left[ \frac{C_t}{(1 + r)^t} \right] - I = 0 \quad \text{(Equation 2.6)} \]

Where: \( r \) = internal rate of return

Discounted payback period

The discounted payback period takes into account the time value of money by calculating the period of time it takes for the discounted project cash flows to equal the cost of the investment.

Classification of costs

In order for projects to be evaluated financially, future cash flows need to be projected or estimated. In projecting the cash flows, it is important to know all the costs and benefits that will be experienced throughout the life of the asset.

Costs can be categorised to five different types namely:
- Sunk costs
- First costs (pre-engineering costs)
- Capital costs
- Operating and maintenance costs
- Salvage costs

The combination of the last four is referred to as the Life cycle costs.

When alternatives are compared against each other from a financial analysis point of view, the Least-cost solution that results in the maximum NPV and IRR, and the shortest discounted payback period will be considered to be the superior option.

Benefit-Cost Analysis

This method involves taking all relevant costs in the life of the project comparing them with the benefits that will be accrued from the project over the same period. Where both costs and benefits are discounted using the time value of money concept.

\[ \text{Benefit-Cost Ratio} = \frac{\text{Equivalent Benefits}}{\text{Equivalent Costs}} \quad \text{(Equation 2.7)} \]

Cost-Effectiveness Analysis

In order for cost-effectiveness analysis on options or alternatives to be carried out, three requirements must be fulfilled, and these are; first, there must be alternatives solutions to the problem at hand, the alternatives must have a common goal, and last, the engineering details for each alternative must be available so that cost and effectiveness of each alternative can be determined [2].

There are various ways with which the cost-effectiveness of a project can be determined but there are four most commonly used. These are; profit maximisation, return on investment, levelised costs, and unit costs.

Profit Maximisation. This method of project evaluation is used in some instances as a measure of project attractiveness. The bigger the magnitude of the profit the more attractive the project becomes.

Return on Investment (ROI). The return on investments ratio is defined as the ratio of income before taxes to the previous year’s total asset. It is used to measure the effectiveness with which management is utilising the assets of the company. It is given by equation 2.8
**Expected Value (EV).** The expected value or weighted average \( E \), is a standard measure for assessing the most probable outcome from an event involving risk (risk assignable probabilities). Expected value can be determined by multiplying the possible outcomes of an event by their probabilities [3].
TABLE 1- Investment categorisation framework

<table>
<thead>
<tr>
<th></th>
<th>Strategic Investment</th>
<th>Operational Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary Investment</td>
<td>Greatest contributing net present value, with a low confidence level in probabilities of event occurring</td>
<td>Greatest contributing net present value with a high confidence level in probabilities of events occurring</td>
</tr>
<tr>
<td>Mandatory investment</td>
<td>Least net present value cost alternative</td>
<td>Least net present value cost alternative</td>
</tr>
</tbody>
</table>

Approximately 80% of the capital is spent on only four categories namely, Direct Customer, Strengthening, Refurbishment, and Electrification [5].

**Direct customer category**

The direct customer category is classified as voluntary and operational Investment on the investment categorisation matrix. It focuses on the expansion of networks to supply new or additional load for existing dedicated customers.

This investment is supported by a tariff structure developed to recover both capital and operating expenses. These projects should meet the criteria set for financially viable projects namely; the internal rate of return must exceed the hurdle rate, and the Net present value must be positive.

**Strengthening category**

This category is classified as voluntary and operational investment. It focuses on the expansion and upgrading of the network to supply electricity to customers or groups of customers that are not readily identifiable at the time the investment decision is made.

The criteria applied for the investment decision is that they should have a positive return on investment, the Internal rate of return must exceed the hurdle rate and the Net present value must be positive.

This investment category will involve the identification of least cost options. When evaluating the different technical solutions, a risk analysis of the demand growth profiles for current and future customers must be carried out.

**Refurbishment and normalisation**

This category is classified as voluntary and strategic investment if motivated for Eskom’s benefit. If the motivation is to comply with legislation or influenced from outside of Eskom, the investment is then classified as mandatory and strategic.

Refurbishment involves a re-appraisal of the role of a complete substation or power line in relation to the changes that have taken place to the whole power system since the particular substation or power line were placed into commercial operation.

Matters such as system reliability flexibility of operation, remaining within loading and increasing fault level limits are taken into account.

Refurbishment therefore goes beyond replacement of unacceptable performance plant items and into the re-planning, redesign and partial rebuilding of a complete substation or power line so that it again fully integrates with the evolved power system network.

This category focuses on networks that have a minimum of twenty five years in commercial operation. The investment would not result in an increase in the income stream associated with the project but will ensure that the current income stream can be secured over an extended life span.

Refurbishment Projects must increase the life expectancy of the whole asset. Projects that do not meet the increase in life expectancy will be classified as major maintenance.

**Electrification category**

This category is classified as voluntary and strategic investment. In line with the government’s vision of bettering the lives of South Africans, this category is Socio-Political in nature and it is targeted at electrifying areas that have previously not been electrified [5].

The government’s Department of Minerals and Energy is the source of a large part of the capital for this undertaking with Eskom acting as the service provider. The choice of the project areas is therefore dependent on a separate process by the government over which Eskom has no control but depending on factors such as network capacity has influence.

Eskom Planners will engage and influence the chosen project areas by interacting with the Integrated Development Plans of District Municipalities and Regional Provincial Governments.

As a parastatal, Eskom is however obliged to apply the necessary scrutiny to this category of projects in line with the Public Finance Management Act to ensure that there is no wasteful expenditure of taxpayers’ funds.
CONCLUSION

Even though the investigation has revealed that Eskom Distribution applies capital budgeting techniques in investment decisions, two observations have been made.

Firstly, Risk Analysis is not adequately carried out. This might result in some unforeseen consequences.

In light of the current climate in the South African context, some other factors need to be taken into account when making investment decisions and some of these are:

- Legislative compliance, especially safety and environmental legislation
- Indigenous, tribal and local authorities that might be off the main-stream politics.
- Political pressure to ensure that the country attracts foreign investments
- Social responsibility with a major focus on electrification.
- Company’s and country’s corporate image

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