6 TECHNOLOGY REVIEW / ALTERNATIVES INVESTIGATED

The IEM Guidelines on Scoping (Department of Environment Affairs and Tourism) state that information on reasonable alternatives should be given during the Scoping Phase. The following alternatives have been considered and are discussed in more detail below:

- Project alternatives;
- Route alternatives;
- Design alternatives; and
- "No-go" alternative.

The 'no-go' alternative is the option of not establishing the new Bravo-Lulamisa power line. As described in detail in the Scoping Report, the electricity demand in South Africa is placing increasing demand on the country's existing power generation capacity. South Africa is expected to require additional baseload generating capacity by 2010 and beyond. The 'no-go' alternative is likely to result in these electricity requirements not being met, with concomitant potentially significant impacts from an economic and social perspective for South Africa. This alternative will not be explicitly assessed in this EIR, but it represents the baseline against which all of the potential impacts are assessed.

6.1 Project Alternatives

Several strategic alternatives were considered at the conceptual phase of the Bravo Power Station EIA. This strategic information was again revisited during the planning phase of the Bravo Integration Project. The following project alternatives were excluded during the planning phase due to the significant cost implications:

1) Two new power lines from Bravo Power Station to Kendal substation and from Bravo to Apollo were replaced with:

    a) A loop in line from Apollo substation to Bravo substation;

    b) A loop in line to Kendal Power Station;

    c) Two new lines from Kendal Power Station to Apollo Substation.

These alternatives were selected as they represent a total cost saving of R30 million.

6.2 Route Alternatives

The various route alternatives were analysed between Bravo Power Station and Lulamisa substation. The following criteria were used to determine appropriate route alternatives: regional environmental information; engineering feasibilities; as well as economic implications. The following three alternatives were identified:

Three alternative routes for the proposed power line have been selected considering existing environmental information, engineering feasibilities as well as existing Eskom power lines.

6.2.1 Alternative Route 1 (The Preferred Route)

Alternative 1 is to construct the proposed 400 kV power line approximately 106.8 km along a north alignment. Alternative 1 will run furthest to the north. This alternative is the longest alternative, and follows an existing servitude.

6.2.2 Alternative Route 2

Alternative 2 is to construct the proposed 400 kV power line approximately 102.3 km along a central alignment. The alternative will lead to the shortest power line length, which runs primarily outside Eskom's property. Alternative 2 is currently the preferred alternative by Eskom.

6.2.3 Alternative Route 3

Alternative 3 is to construct the proposed 400 kV power line approximately 102.7 km along a southern alignment. Alternative 3 will be shorter than Alternative 1 but longer than Alternative 2.This route follows an existing servitude partially and to place the route primarily on Eskom property. This route is least favourable.

For the locality of the alternative sites refer to Figure 4.

6.2.4 Route Evaluation

Alternative 1 is the preferred alternative as it intersects the least sensitive environments such as wetlands, ridges etc.

6.3 Design Alternatives

The primary motivating factors behind the selection of below ground power lines include the following:

1) Areas prone to significant infrastructure damage due to extreme weather conditions, on an annual basis, usually consider underground power lines. The cost of power line replacement over the life of the infrastructure is usually more cost effective in such areas;

2) The visual impact of underground power lines is much less than those of overhead power lines, and are usually considered in highly sensitive visual landscapes, such as wide open wilderness spaces and tourism facilities e.g. game farms and nature reserves.

The primary motivating factors behind the selection of overhead power lines include the following:

1) The cost of overhead lines is between 250% and 400% less. Eskom have a responsibility to provide cost effective and reliable energy resources;

2) Overhead circuits can often be worked on while they are still energized. Nearly all work on underground circuits is performed while things are de-energized and grounded.

3) Underground cables need a larger conductor to handle the same amperage as a smaller overhead conductor. This is due to the difficulty of dissipating heat to the earth. Larger conductors means higher cost.

4) Overhead distribution circuits are much easier to modify to serve customers or make other changes. A simple set of fuses on an overhead circuit might cost ~R2 000.00, yet the underground equivalent costs over ~R10 000.00.

5) An overhead line can generally span and not disturb sensitive features such as cultural resources sites, streams, most wetlands, isolated steep slopes, or a sensitive species location to mention a few. Underground lines however require the construction of a trench and results in a disturbed area of approximately 15m in width for the entire length of the line.

As none of the areas affected by the proposed Bravo Integration Project are annually affected by extremely damaging environmental events, or fall within highly sensitive visual environments it was decided to implement the more cost effective overhead power line alternative.

OVERHEAD POWER LINE

UNDERGROUND POWER LINE

FIGURE 5: OVERHEAD VERSUS UNDERGROUND POWER LINES.

6.3.1 Tower Designs

The following types of towers may be used on this project:

- Cross rope suspension tower;
- Compact cross rope suspension tower;

- Guyed-V suspension tower;
- Self-supporting suspension tower; and
- Self-supporting strain tower.

Different towers may be used along different sections of the routes to comply with local conditions. The following will be taken into consideration during the tower selection process.

- Environmental Issues;
- Visual Impacts; and
- Financial Implications.

6.4 The No-Go Alternative

The No-Go alternative was considered. If the new proposed 400 kV power line is not constructed, the new Bravo Power Station will not be able to be integrated into the existing Eskom infrastructure grid. The existing Eskom infrastructure grid will thus not benefit from the construction of the new Bravo Power Station

6.4.1 The Applicant

Should the construction and operation of the proposed project not take place it is definite that the electricity from the new Bravo Power Station will not be able to be integrated into the Eskom infrastructure grid.

6.4.2 The Community

Should the construction and operation of the proposed project not take place the community will not have sufficient electricity in the near future.

6.4.3 The Local Economy

Should the construction and operation of the proposed project not take place; the economy of the country at large will be negatively affected, resulting in the decrease of low-cost options for electricity. The capital investment and employment opportunities will also not be realised and the potential multiplier effect on the local economy will be lost.

6.4.4 The Environment

Should the construction and operation of the proposed project not take place; the local environment will not be impacted upon. The Bravo Power Station has however impacted upon a large section of the local environment, and these impacts will persist.