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 Kendal - Zeus power lines. 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 alternative corridors of approximately 5 km were analysed and will be assessed during this EIA. These three alternative corridors have been selected considering existing environmental information; engineering feasibilities as well as existing Eskom servitudes power lines.

The following 3 alternatives were identified (Figure 4). The 3 alternative routes merge into 2 corridors 30 km from the Zeus Substation, since there is and existing 400 kV Eskom servitude present.

6.2.1 Alternative Route 1

Alternative 1 is to construct the two proposed 400 kV power lines, running parallel, approximately 76 km from Zeus Substation to Kendal Power Station. This proposed line will run furthest to the west as illustrated in Figure 4. This alternative is the longest alternative, and will be along an existing power line servitude.

6.2.2 Alternative Route 2

Alternative 2 is to construct the two proposed 400 kV power lines, running parallel, approximately 70 km from Zeus Substation to Kendal Power Station. The line will follow the same corridor as alternative 1 for the first 60 km's and later divert south before heading east towards the Zeus Substation for 30 kms.

6.2.3 Alternative Route 3 (The Preferred Route)

Alternative 3 is to construct the two proposed 400 kV power lines, running parallel, approximately 63 km from Zeus Substation to Kendal Power Station. This alternative will lead to a shorter power line length and is the alternative furthest to the east of the area as illustrated in Figure 4. This alternative is currently the preferred alternative.

6.2.4 Route Evaluation

Alternative 1 is the shortest alternative however it intersects the least sensitive environments such as wetlands, ridges etc. In conclusion Alternative 3 is the preferred route alternative.

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.

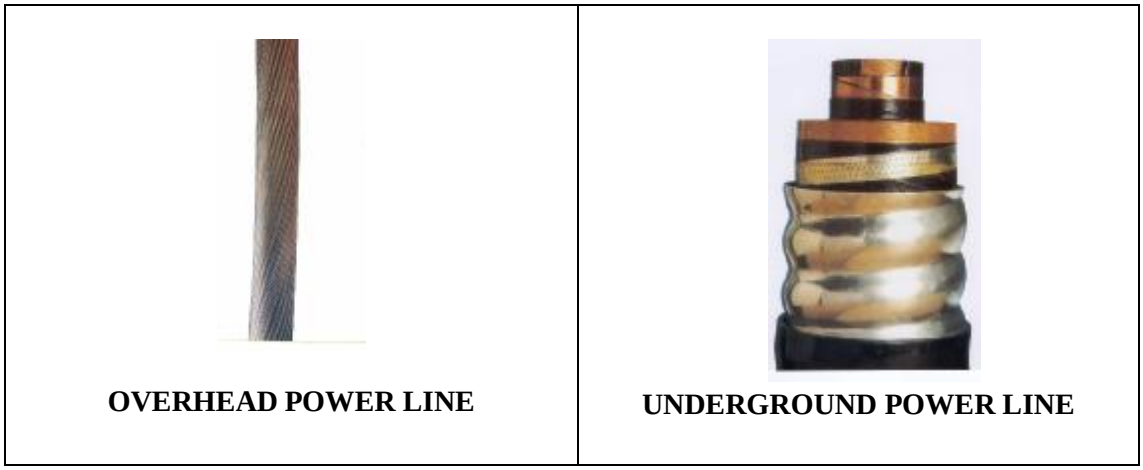

FIGURE 5: OVERHEAD VERSUS UNDERGROUND POWER LINES.

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 the 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. In the case that none of the three alternatives is suitable for the proposed power lines, the recommendation would be that the proposed power line not be constructed and further alternative alignments, or project solutions be generated.

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.