



- Tower design, placement on the right---of---way and minimization of high cost dead---end and heavy angle tower types
- Predicted electrical loads over the life of the line
- Environmental and reliability limits.
- Joint optimization of all line cost variables can reduce the cost well below the cost of lines designed by traditional methods.

## From Ring Bus to Double Bus schemes

The technical evolution from Ring Bus, to Breaker--- and---a--- half, to Double Breaker and to Double Bus schemes, generally represents a progression in increased reliability and cost.

### Transmission lines reliability

In developing countries, the cost savings with ring bus schemes may be more important than the reduced reliability.

Reliability & economics evaluation, particularly important for developing countries, is analyzed by ELC Engineers with the aid of substation reliability software.

Bus current rating should generally be coordinated with the highest future current level.

The severe consequences of bus faults make careful mechanical design of high voltage bus---bar extremely important for ELC Engineers.

### Technological issues

Growth of High Voltage Direct Current: over the past two decades, has seen widespread successful application of HVDC .

When & where HVDC is convenient: the adoption of HVDC lines becomes justified on the basis of one or more of the following elements.

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