AN ASSESSMENT OF THE SOUTH AFRICAN UTILITY POLE MARKET

Final Report – November 2001 **by Rob White**

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EXECUTIVE SUMMARY

Considerable effort is being carried out worldwide in promoting the use of galvanized steel utility poles. The major thrust is in substitution of wood and to a lesser extent concrete. In South Africa the intensity of use of steel tube in mechanical and structural applications (as a percentage of steel tube sales) is less than half of that of Western Europe. This appears to be irrespective of application. Therefore, opportunities exist not only to increase the intensity of use to that of developed nations but to also participate in the thrust of material replacement and substitution of alternative pole products with galvanized steel.

The major market sectors under development worldwide are:

- Agricultural posts
- Lighting poles
- Street furniture
- The security market
- Electricity distribution
- Telecommunications

An analysis shows that the agricultural market is rather dispersed; the lighting pole and street furniture markets already provide an opportunity for steel. These markets require promotion of galvanized as the preferred method of corrosion protection. The security market is well represented in South Africa with galvanized steel being well represented. This market is not represented by an industry association and is difficult to reach by mass promotion.

The electricity and telecommunications markets offer an opportunity for galvanized steel poles due to the monopolistic structure of the industries and new developments in their buying behaviour. In the electricity distribution market an opportunity is identified. Recent centralized design, regulation and environmental pressures favour the use of galvanized steel poles. Although pricing is an issue, project pricing could make steel competitive compared to wood and guarantee a business return for the supplier. By working with a single integrated supplier company an opportunity to provide 17 000 tonnes of steel poles (representing 1200 tonnes of zinc) has been identified. If managed correctly, a greater opportunity could be taken into the export market by partnering with Eskom Enterprizes into the rest of Africa.

Whilst other opportunities exist, particularly in specific sub-sectors within the agricultural industry, considerably more understanding is required to make this market reachable in terms of the scarce resource available to promote product generically. It is, therefore, recommended that a major focus be made to realize the potential of the electricity distribution market in South Africa and, with Eskom Enterprizes, in sub-Saharan Africa.

1 INTRODUCTION

For a number of years there has been an attempt to increase the market for steel poles by substituting current wooden applications. In North America a tonnage target has been set at 100 000 tonnes of steel poles by 2003. Current (1999) consumption is 75 000 poles representing 22 000 tonnes of steel and 1500 tonnes of zinc. Since 1997 the tonnage of steel utility poles has doubled every year.

Consumption of steel pipe in structural applications was determined in the cluster study carried out by the Association of steel tube and pipe manufacturers released in 1996 as part of the Department of Trade and Industry (DTI) initiative to identify downstream steel development potential. This information is summarised below in Table 1

Table 1. Consumption rates of steel tube in structural applications

Country/Region	Structural, tpa*1	Mechanical, tpa*2
Europe	595 000 (8% of total)	1 113 000 (15% of total)
Sub-Saharan Africa (exc. SA)	17 000 (3% of total)	33 000 (6% of total)
South Africa	11 000 (3% of total)	25 000 (6% of total)

*1 load bearing high risk in failure
*2 load bearing low risk of failure

It can be assumed that the low risk in failure would encompass street furniture (traffic lights, lighting poles, etc) with high risk areas would be building structural uses and Telkom/Eskom poles.

Constraints on development in South Africa were identified as:

- Customers – decision-makers architects, managers and engineers with decisions based upon aesthetics, erection simplicity and performance. With small projects material moves via distributors. This makes customer contact difficult.
- Price – often secondary consideration but competition prevents premium pricing
- Competing solutions – concrete, solid sections and timber. In SA timber has a higher market share as in the US when compared to Europe.
- Quality – graded steel used due to consequences of failure. In low risk applications CQ used.

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What is clear, however, from Table 1 is that steel tube utilisation in South Africa is below par on a European basis irrespective of the effects of competitive materials. Indeed verbal communication with overseas bodies and recent visitors to Europe indicates that there is an abundant use of wooden poles there. Therefore, it is clear that steel tubing is under utilised in South Africa. In South Africa, infrastructural development is such that a considerable tonnage of steel poles could be used instead of wood.

2. POTENTIAL/EXISTING MARKETS

As much of the comparative information is derived from the current international ILZRO study on international poles, this will be used to classify the current local market use.

The following target markets (accessible, large and reachable) have been identified and input obtained from the local market:

2.1 Agricultural posts.

This is considered to be a substantial market. Distribution is via distributors and co-operatives. However, the market is extremely price sensitive and it is possible that a radical change in product type (which will be discussed below) would be required to gain significant market share from wood. This could well be a market where a combined effort with the wire manufacturers could be beneficial. However, the wide geographical spread of the market requires further study to determine how a focused promotion effort could work.

2.2 Lighting poles.

The current market estimate for this is 4000 tpa. However, there is substantial (>10% per year) growth in this market (mainly infrastructural (township) development and replacement – accidents, corrosion, etc). The competitor materials are wood, concrete and fibreglass. Over 70% of the steel poles are of standard length. Market control is via the tender system with 90% of the municipalities specifying steel. Most steel poles are hot dip galvanized and then powder-coated at the coast. Current specification control is either local municipality or SABS 0225. For the total market it is estimated that steel represents 64%, concrete 18% (see comments why below), fibreglass 18%. More information is available from the Institute of Lighting Engineers. Discussions with specifiers/users and fabricators indicated that the following material issues were important.

2.2.1 Wood

- Municipalities only really use wood if they have a lot of it currently in stock.
- Wood has to be treated and bitumen is applied at the base.
- Problem with cable access (need to cut a groove or strap a conduit)
- Need to cut a housing
- Life considered good
- Good structural reliability (often reused)
- Slightly cheaper than steel
- Easy to transport, but heavier than steel
- Problems are with attachments (outreach arms, etc), which tend to be of steel.

2.2.2 Fibreglass

- Initially had problems
- Have a niche (where no maintenance needed).
- Problems when cutting grass (exposure of fibres at base).
- Fire problem
- Still get a lot of cracking
- Access doors need substantial reinforcement.
- Easily vandalised
- Designed for actual loading only (additional attachments later, and use of ladders is a problem)
- Only real advantage is low weight.
- Above a certain height need to hinge (complicated and prone to failure) – therefore tend to limit height to 6m.

2.2.3 Concrete

- Use to be used
- JHB not bought for 15 years.
- In Cape Town they are cheaper up to 9m. Outreach arms are HDG
- Inferior to steel.
- Used in low cost housing areas where multiple use important (high V, low V, lighting).
- Limited lengths and suppliers.
- Still used in Alberton, PE, Durban and areas where soil considered too corrosive.
- Heavy (break if dropped)
- Limited to size of cables that can be used (often need outside junction box).
- Generally use steel outreaches so what is the point in using concrete.
- Earthing problems (lightening can split the poles)
- Safety issues (car impact)
- Acid rain.
- Long lead times
- Size of access hole fixed by moulds available.

2.2.4 Steel

- Flexible lengths and standard sizes.
- Greater than 12m look at telescoped structure (Intermediate Height Mast).
- Competitive pricing (enough manufacturers)
- Can be galvanized
- Dog sleeves used by JHB (steel cylinder 4-6mm).
- Can be transported in bundles.
- Easier to fabricate attachments.
- Can be tailor designed for strength and height.

- Vandal resistant.
- Not much scrap utility (not stolen in Africa, cf. Al).
- Safety (car impact) although not considered in Cape Town.
- Can be easily coloured.
- Soils not considered an issue in Cape Town (South Easter an issue)
- Access hole and door adequate.
- Easy to earth.

Comments were nevertheless made concerning the proliferation of specifications. Municipalities tend to have their own specifications (maybe needs simplifying). In Cape Town local spec requires HDG. Third party inspection becoming prevalent as contractors cheating (poor material, etc). Need to look at decay characteristics of materials. However, it is clear that this market only requires input in the form of continued promotion to maintain market penetration.

2.3 Street Furniture

This market encompasses traffic signals, general signage and other street structures. Specifications tend to be wide and each municipality does its own thing. Steel is the preferred choice but corrosion protection is not the major consideration. Aesthetics and colour (marking) are important. This is a very difficult market to quantify in terms of tonnes. Information regarding opportunities, especially in the area of manufactured goods (bins, etc) would be best obtained from individual suppliers. This market is best described as fragmented and would be difficult to target other than through individual municipalities.

2.4 Security Market

This market is characterised by a lack of structure and fragmentation. Over the years there has been a significant effort made by the Hot Dip Galvanizers Association to influence specifiers towards the use of hot dip galvanizing for protection. This has been successful in the coastal areas where it can be stated that the majority of fencing is galvanized. This success alone counters the often-heard argument about the corrosion of HDG at the ground-line. Clearly, HDG would not have been so successful had this been an issue. A comment made in Cape Town was that the soils were not corrosive but the wind and atmosphere represented the biggest challenge to corrosion protection. A recent 700 tonne HDG fence order for the Presidential residence highlights the success of HDG in this market. Despite numerous efforts, no specific media could be identified to highlight the success of HDG in these applications and further convince specifiers.

Some 35 000 tonnes of tube in the 80 mm outer diameter and <2.5mm thickness are sold into this market. However, with coastal sales representing 36% and 80% market share this represents 10 000 tonnes of galvanized tubing currently galvanized as a matter of course. The cost-effectiveness of HDG in inland areas is not an issue. The choice of corrosion protection is unfortunately left to a fragmented, first-cost conscious industry.

2.5 Electricity Distribution Market

The major local electrification program is already in place.

There are three groups of lines demarcated by the voltage level:
Transmission - > 275 kV
Sub-transmission – 44 kV to 132 kV
Reticulation – 1 to 33 kV

Transmission lines (275 to 765kV) are centrally designed (now by Eskom Enterprises); re design and mainly of conventional hot rolled sections. Wire diameters of 1 to 1.5 inches are used for these voltages. Therefore the load capacity of the structure is important.

Both sub-transmission and reticulation lines are the responsibility of the Eskom Distribution Group.

Sub-transmission lines (<132kV) use steel (conventional sections, fabricated tubulars, and conventional tubulars), concrete (pre-stressed) and timber. However, there is a move to single pole structures as a result of pressure from landowners insisting upon a smaller footprint. Although wood is still used in some regions on the sub-transmission lines there is a move away from wood. Wood was traditionally used due to wood availability and cost advantage, and additionally on reticulation lines, due to the insulation properties of wood. In the high lightening density in South Africa, a Basic Insulation Level (BIL) of 300kV needs to be achieved on reticulation lines. This is achieved with wooden pole structures by having (gap) a length of 500mm of wood (150kV) arranged in series with insulators (170kV) between live conductor and earth. Installations are governed by the SABS 0324 Code of Practice, which requires regular inspection for conformity to safety regulations. Much work has recently been carried out at Eskom Distribution in developing the Pole Management Plan to ensure legal compliance in terms of safety. This involved an expenditure of R110 per installed pole. Classification has been done in terms of-

- Fix immediately,
- Fix in 2 years time
- Treat pole for restoration
- Pole OK

Material costs per pole are –

• 11m 160mm dia	R349.24
• 11m 180mm dia*	R413.97
• Post insulator x 3 =	R192.21
• Spindles x 3	R36.00
• Bonding clips, etc.	R100.00
• Site Ties	R45.00
TOTAL	**R787.18**
Pole* percentage of cost	**52%**

In design, 55MPa is taken as the strength, and a life of 25 years is required (or expected). Currently, there are 3 local manufacturers of insulators, Hardware Assemblies and Bateman McWade producing vertical strain insulators and Cullinan producing post insulators. There are some imports from India but these are not really up to standard. Up until May 2001 for this year some 27 000 (mainly 11m) wooden poles were consumed by Eskom Distribution with 6000 being taken in Gauteng. It is estimated that 20% are for refurbishment the remainder for new works. In this area there has been an interesting development in that Telkom and Eskom are beginning to share facilities. Therefore, whoever, provide the services first provides the pole infrastructure for the other. It appears as if Eskom are ahead and therefore essentially control this market. Although possibly larger, the current conventional steel tubular market size is only 750Tpa. This market is regionalised in that there is no central control. However, the Work Group – Sub-transmission is becoming more active and standardization is beginning to take effect. Initially the Work Group standardized insulators, etc. but is moving to standardize design. It is envisaged that within the next year Eskom Distribution may be merged with the municipalities as part of the restructuring of the Electricity Supply Industry initiative. There will be 6 Regional Electricity Distribution operations (REDS). However, their standardization program has been implemented by Eskom Enterprises in their move into Africa. Therefore, the opportunities for steel could be raised by intervention and the moves by the utility in Sub-Sahara Africa to form a regional grid.

In municipalities wood is considered cheaper for transmission. The new proposed structure that the municipalities absorb "Distribution" requires that urgent attention be made to target this market prior to this occurring.

The following issues were raised in discussion.

2.5.1 Timber

- Advantages – small capital outlay and not conductive
- Disadvantages – poor quality of poles, high maintenance (rot, bugs, etc), dangerous to repair, large movement, limited length.
- 80% of purchases are 9m and 11m and 75% of this are 9m. They currently buy 150 000 9m units per annum.
- Current pricing is R413.97 per 11m pole – 180 diameter (SA Pine Grade 9)
- Eskom as policy does not use CCA treated wood.

2.5.2 Concrete

- Advantages – cheap for length up to 18m, higher strength material
- Disadvantages – limited mould shapes, attachments difficult, heavy (transport, erection, handling), curing needed, QA critical

2.5.3 Steel

- Advantages – flexible in design, attachments easy, no cracking, light (transport, handling), consistent material.
- Disadvantages – high cost for short poles.
- They have defined design guidelines, which are mainly based upon specific loading requirements (stress not an issue whereas deflection is - 6kN horizontal force at the top).
- Steel requires double insulation strength isolators (not double the number of isolators). This is an issue at conflict with international information.

To use 11m steel single pole would require a 219mm diameter, 6mm-wall thickness pole. This comes in at R1 665 per pole (346kg per pole x R4 500 per tonne x R1 300 per tonne galv). Their quoted cost is R414 per pole. The life expectancy is perhaps 2/3 times maximum. Therefore, based upon cost only galvanized steel will not work. However, there is little doubt that there is renewed interest and this should be pursued. The pricing system quoted above is purely current pricing and does not reflect any project pricing arrangements. This could no doubt reduce the galvanized steel pole cost significantly.

Options looked at so far (9m) are:

1. Composite steel (180 dia – 1.2m of 6mm, 1.2m of 4.5mm, 3.5m of 3.5mm and 3mm to top) comes in at steel cost plus/minus R735. Also, welding is cheaper than swaging.
2. Aerated concrete (150 x 4.5mm square – 2 cubes at R100, R1050 for pole = R1 150. Using different thicknesses could come down to R915).
3. Looking at others, e.g. water filled – 165x2.5mm comes to R525)

2.6 Telecommunications Market

The major cell mast rollout has been completed. Telkom is currently on a network build programme, which is envisaged to end after the IPO. Most of the current installations are done on a sub-contracted basis. However, the recent announcement that there will be an alternative fixed line operator available from May 2002 offers opportunities. The design criteria for poles are based upon SABS 754/3, which defines poles as heavy (75MPa) and light (55MPa) duty. They also work on a top load of 4 to 8kN, versus Eskom exact 6kN. Clearly, standardisation here would assist in market development.

Telkom operate on a tender system (for contract terms). Indications from Telkom are that one off prices for wood is R300 per 11m pole. This appears to be close to the actual prices paid when looking at the wooden pole industry surveys (see below). The AISI information on steel poles was viewed for comment. It was felt that it was overly advertorial.

As mentioned above, Telkom is focusing on delivery rollout at present. However, their experience with the Steel Towers has been commercially disastrous. As a result this

program has been abandoned. They appear, rather, to be willing to piggyback on the Eskom rollout. Therefore, the use of multiple use poles will increase. Eskom, therefore, has to provide the headroom to accommodate Telkom. This provides an opportunity for steel.

Current wood material issues include:

2.6.1 Wood

- Prefer creosote to copper chromium arsenic salts for preservation.
- Perceive wood in SA to be cheap as a result of rapid growth
- Prefer SA Pine to Gum which tends to crack allowing termites entry
- Problems with wooden poles have been discussed in the Electrical Industry Magazine.
- Specification control via SABS 754/3

3. MARKET ANALYSIS

3.1 Introduction

It is clear from the discussion above that the size of the wooden pole market in South Africa defines much of the opportunity available. Concrete poles are supplied via two sources (Cape Concrete and Rocla), which limits availability to a large degree (units are heavy to transport and sizes are prescribed). Fibreglass although gaining popularity overseas is still viewed with suspicion in the South African market and is extremely expensive.

3.2 SA Wooden pole market

3.2.1 General information

Wooden pole usage is quoted in cubes (m^3). Discussions with various parties has indicated that usage can be split into three categories:

Large (transmission) +/- 11m	2-3 poles/cube
Medium (telephone poles) +/- 6-7m	7-10 poles/cube
Small (agricultural, etc) 2-4m	80-100 poles/cube

Treatment is primarily by creosote 45%. Export of gum transmission poles has grown considerably over the past few years.

3.2.2 Sales figures

The sales figures for the last 5 years are shown in Table 2.

Table 2. Sales figures for treated wooden poles 1996-2000

Year	Sales, Rm.	Sales, m^3	Average R/m^3	% R.m^3 yoy
1996	294	476	618	15
1997	306	482	634	3
1998	300	465	645	2
1999	336	526	639	-1
2000	318	467	682	7

3.2.3 Market sector consumption

The estimated market split of sales, in cubes, of treated timber for 1999/2000 is shown below in Table 3.

Table 3. Market sector consumption – wooden poles

Year	Total	Transmission	Telephone	Other
1999	526 000	128 000	58 000	340 000
2000	467 000	126 000	49 000	292 000

3.2.4 Estimated price per pole

Table 4. Estimated price per pole (contract price)

Year	Transmission (11m)	Telephone (7m)	Other (3m)
1999	R213-R320	R64-R92	R6-R8
2000	R228-R341	R68-R98	R6-R9

4. KEY ISSUES

4.1 Local situation

A summary analysis of the potential and existing markets is supplied below.

Table 5. Summary analysis of markets for steel poles

Target market	Market Penetration	Key Drivers	Major Competitor
Agricultural posts	Est (<10%)	Cost Availability Fire Mass dispersed market	Wood
Lighting poles	64%	Ease of installation Transport Vandalism/Fire Multiple specs	Concrete Fibreglass
Street Furniture	Est (<20%)	Aesthetics/colour Cost Individual players	Steel (painted) Concrete Fibreglass

			Stainless steel
Security	30-40%	Cost Dispersed mass market Individual players	Steel (painted)
Electricity Transmission	0.05% (based upon 750 t 219mm, 6mm,11m =2250 poles)	Cost Quality Longevity Availability Centralised market	Steel (conventional sections) Wood Concrete
Telecommunications	10% (based upon Telkom input)	Cost Quality Longevity Availability Centralised market	Wood

4.2 Overseas situation

It is difficult to compare prices between countries directly. However, relative comparisons between wood and galvanized steel are possible. The specification for transmission poles in Australia requires 8kN resistance (compared to the 6kN in South Africa). Data on the requirements for Canada are unknown at this point.

Table 6. Relative transmission pole cost comparisons for Australia, Canada and South Africa

Country	Galv steel pole	Wooden pole	Ratio galv/wood
Australia	A$800	A$237 (hardwood AS2209)	3.4
Canada	C$574	C$ 400 (pine) C$ 600 (cedarwood)	1.43 1
South Africa	R1665 Composite R750 (9m)	R414 (SA pine Gde 9) R300 (SA pine Gde 9, 9m)	4 2.5

Market issues raised internationally were:

1. Concrete tends to be hollow filled and there are dramas re structural properties. Because of road salting failures can occur as soon as 3 years, although poor cover is also an issue here.
2. Steel is often tapered polygonal and galvanized.
3. The lightweight of steel is a plus and they are easily installed. However, some training is needed for installation.

4. All steel poles are self-grounding – this is an important issue in areas such as Florida where every 4th needs to be grounded if wood is used.
5. In Australia hardwood is used exclusively for power transmission and as in South Africa treated timber is a must due to infestation problems.
6. Concrete is seen as the biggest competitor to wood in Australia.
7. Guarantees are being offered by the galvanized steel pole suppliers (50 years+) in order to change usage patterns. It is felt that competition based upon actual product cost rather than installation, longevity, etc. does not work in changing users to galvanized steel.

4.3 Local/overseas comparisons

It is clear from the above analysis that markets which are actionable (based upon market share) include agricultural and electricity distribution. However, what is also clear is that there are some fundamental anomalies when comparing overseas pricing structures to those prevailing locally. In Canada timber costs and galvanized steel costs appear to be comparable. In Australia and South Africa a galvanized steel pole is considerably more expensive than the equivalent timber product. Direct comparison between the two countries is difficult, however, due to the preference for pine in South Africa rather than hardwood in Australia. Notwithstanding this, the Australian market is moving towards galvanized steel, albeit with the assistance of the environmental lobby and general limited availability of timber.

5. CONCLUSIONS AND RECOMMENDATIONS

The study highlights two issues to be addressed in respect of market development in South Africa, viz. that steel pole use (and therefore that of galvanized steel poles) should be increased to that of world norms and that there opportunities to replace wood in two market segments. Two constraints have been identified, viz. cost and availability (at point of sale, and in the size required).

More information is required on the agricultural market to obtain more detail on the key drivers. However, there may be an opportunity to develop the pre-galv product (similar to that produced by the House of Irrigation). This is clearly a development project for Iscor and the astpm (Association of Steel Tube and Pipe Manufacturers). Possibly this market requires further study beyond the current scope of this study.

In the area of Eskom poles it is clear that an installed price be obtained for direct comparison with steel. Eskom potential lies primarily in the 44 - 132kV ranges. Clearly, final product pricing must become competitive. A 3x price is considered competitive based upon the best information to date. Therefore, for 11m transmission poles a HDG steel pole price target would be R800-R1200. This is achievable and was not shown by initial cursory studies.

The Telkom pole market appears to be attractive provided that pricing issues can be addressed. However, the move towards multiple use poles in new delivery requires that

focus should be discussions with Eskom to obtain their approval. The replacement market is considerable should the galvanized steel pole become price competitive.