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The Australian Electrical and Electronic Manufacturers' Association

4 February 2002

Mr Michael Seery
Program Manager Electricity
Independent Pricing and Regulatory Tribunal
Level 2, 44 Market Street
SYDNEY NSW 2000

Dear Mr Seery

Attached please find AEEMA's submission to the Review of the Costs, Benefits and Funding for Undergrounding Electricity Cables in NSW.

AEEMA is keen to contribute further to the Review in any manner considered appropriate by IPART. In particular, we would welcome the opportunity to participate in the public workshop scheduled for April.

Yours sincerely

Bryan Douglas
DEPUTY CHIEF EXECUTIVE

SUBMISSION TO

THE INDEPENDENT PRICING AND REGULATORY TRIBUNAL (IPART)

by the

AUSTRALIAN ELECTRICAL AND ELECTRONIC MANUFACTURERS' ASSOCIATION LTD (AEEMA)

REVIEW OF THE COSTS, BENEFITS AND FUNDING FOR UNDERGROUNDING ELECTRICITY CABLES

4 February 2002

INTRODUCTION

The Australian Electrical and Electronic Manufacturers' Association Ltd (AEEMA) is the peak industry body representing some 400 infrastructure providers for Australia's information and communication technologies (ICT), electronics, and electrical manufacturing industries. AEEMA represents a number of industry sectors directly involved in undergrounding of cable. These are suppliers of electrical capital equipment (including cables, power and distribution transformers, switchgear and line equipment), telecommunications systems and road lighting.

AEEMA strongly supports the proposal by the NSW Government to place distribution cables underground and offers its assistance in providing specialist technical information and expertise to the Review. AEEMA contributed to the 1998 Commonwealth review titled *"Putting Cables Underground."*

This submission outlines a number of important reasons for the project to proceed, including productivity gains, considerable societal benefits, opportunity to install broadband communications etc and the opportunity to install a new generation of energy efficient street lighting, all of which are driven by recent technological changes. AEEMA believes that a window of opportunity now exists to take maximum advantage of these developments by investing in this infrastructure enhancement project.

The short timeframe for submissions, combined with the holiday period, has militated against preparation of a detailed submission. In particular AEEMA has been unable to detail much of the newly identified information sources from overseas, as there simply has been insufficient time to follow up with the agencies and individuals concerned. In addition, many of the key local industry contributors have been on annual leave during this period. For this reason AEEMA is keen to remain involved in ongoing consultation with IPART during the course of the Review. The Association would particularly welcome the opportunity to contribute to the public workshop scheduled for April.

This submission is structured to address the terms of reference of the IPART review. In addition AEEMA has included a statement about the capacity of Australian industry to undertake large-scale undergrounding of cabling.

1. LEVEL OF CAPITAL EQUIPMENT REQUIRED FOR PUTTING ELECTRICITY CABLES UNDERGROUND

There has been insufficient time available to provide any detailed indicative costings. However, the following factors, which are important in considering the cost benefits of the proposal, need to be considered:

- The 1998 report prepared by the Commonwealth Department of Communications, Information Technology and the Arts titled "Putting Cables Underground' undertook an extensive analysis of the costing issues. However, it is submitted that these costings must be reviewed and revised having regard to:
  - ⇒ Technological advances and reductions in costs of the development of capital equipment such as transformers, switchgear, metering, cabling and ducting since 1998.
  - ⇒ Technological advances and reductions in the costs of trenchless and trenching applications in Australia and overseas since 1998.
  - ⇒ The need to incorporate the installation of new generation, energy efficient street lighting.
  - ⇒ Actual current-day operational experience of large-scale underground installation overseas and in other parts of Australia (e.g. Perth).

- It is suggested that the cost estimate of $5,516 per household in the Commonwealth report is exaggerated. The Australian Local Government Association in 1998 considered that $3,000 per property was achievable in Australia. It is noted that Western Power, with considerable experience of undergrounding in Perth, operates on the basis of $4,000 per lot.

- The 1998 study did not fully review the joint installation of underground power and telecommunications cabling.

2. FEASIBILITY OF UNDERGROUNDING ELECTRICITY CABLES WITH OTHER UTILITY SERVICES

- **Power Communications**

Electricity supply utilities have a need for a communications system for activities associated with meter reading, load control, quality of supply monitoring etc. There will also be an increasing need to assist residential consumers with demand side energy management, not only to allow the network to operate more efficiently, but also to reduce costs and improve the environmental impact of power generation. While utilities have this communication need the amount of data transmitted is small and telecommunication carriers have shown little interest in supporting such a small volume of business. It is therefore preferable for the utilities to have control over their own system. Undergrounding provides the ideal opportunity for including a fibre optic cable or equivalent and satisfying this need for communication.

Interval (half-hour) metering has been linked to realising the full potential of the National Electricity Market. While these meters can be read manually, there is a significant advantage in reading the meters remotely; however with present technology there is an unacceptable cost involved. The inclusion of a dedicated communication channel would eliminate this unnecessary cost and allow the full benefits of the deregulated national market to be achieved in NSW.

- **Broadband**

The undergrounding of power lines provides an excellent opportunity for Australia to establish an open access broadband communications infrastructure, which will have a significant positive impact on the nation's future. Many see an analogy between broadband communications networks and the railway networks of the early 20th century in that they have the ability to significantly improve productivity and quality of life. Some countries, such as South Korea, are aggressively investing public funds into the development of broadband communications infrastructure. In the USA, there are now calls for a federally funded broadband communications fund, similar to the Universal Telephone Service fund that was established 100 years ago there. Obviously, there are significant multiplier effects to the overall economy in the form of additional jobs and a boost to the high technology communication research and manufacturing industry associated with such national initiatives.

There exists a fundamental problem in the current broadband communications networks and that is the bandwidth bottleneck in the local access network. There has been significant investment (some say over capitalisation) in the backbone network which links cities and major communications centres (such as Telstra exchanges) within these cities. This backbone infrastructure is greatly under utilised, however, because there has been limited investment in a broadband access network infrastructure. The reason for this is now becoming clear to many nations. Despite the introduction of competition in this sector of the industry based on a number of new telecommunications technologies, such as wireless and ADSL line carrier alternatives, the incumbent carrier's copper network remains the only connection to most homes and businesses. The lack of investment in broadband infrastructure is a result of two major factors. One is the realisation that the so-called 'last mile' business, much like our local access water and electricity network, is a natural monopoly. The other is that the incumbent carrier does not seem to have financial or regulatory incentives to invest in a new technology which will make their current copper network obsolete.

It is understood that the current cost of a broadband fibre connection to a home or business is approximately $4,000 in suburban and urban areas for a carrier which has a monopoly and is building to every home and business in the area. Of this total cost, approximately $2,500 per home or business is required for the physical placement of the fibre cable. In a competitive environment, where one carrier might expect to achieve only 50% market share, the cost for the physical placement of the fibre cable would double to $5,000 per home or business and the total cost would increase to $6,500 per customer site. The issue is the high fixed costs of establishing a fibre broadband network and the need to share those fixed costs with every home and business in the area in order to make the investment economically viable. In addition, the cost of capital in a competitive market is much higher that the cost of capital in a monopoly market (i.e. Municipal Bonds) because of the risk involved. This is another reason why a single open access broadband fibre local access network may be the only way to justify investment in such a network.

The undergrounding of overhead power lines presents an excellent opportunity to establish an open access broadband local access network because the incremental cost of placing a plastic duct for fibre cable in the trench alongside the power lines is approximately $1,000 per home or business passed. This reduces the total cost of broadband connectivity to $2,500 per home or business in a monopoly environment. It is understood that most financial analysts believe that this is the sort of cost which must be achieved for broadband local access network investment to move forward aggressively.

It should be noted that the Telstra/Foxtel consortium has substantial operational experience in the installation of some of their cable broadband network in several Australian cities.

- **Street Lighting**

Street lighting is generally provided by mounting luminaires on power poles or a combination of power poles and dedicated lighting poles. As street lighting is only an ancillary function, power pole locations are determined by the requirements of electricity cables and results in the following problems:

- Minor road lighting (local residential roads) in many areas is insufficient and does not comply with the requirements of the Australian Standard.
- Major road lighting (arterial and principal roads) is inefficient, as luminaire positions are not optimised.
- Trees casting shadows due to luminaires placed in inappropriate locations.

Undergrounding of electricity cables will enable streetlights to be mounted on dedicated lighting columns positioned in accordance with lighting requirements and will provide the following benefits:

- Minor road lighting and uniformity levels increased to meet current Australian Standard requirements.

- A reduction in greenhouse gases by positioning luminaires to optimise performance, and replacing existing luminaires equipped with mercury vapour or fluorescent lamps with more efficient luminaires equipped with high pressure sodium lamps or metal halide lamps.

- An opportunity to enhance the streetscape with decorative luminaires and lighting columns.

- Streetlight columns positioned further away from kerbs, reducing traffic hazards.

- A reduction in shadowing of streetlights in tree lined streets by appropriate positioning of luminaires via strategic placement of lighting columns or the use of a catenary system.

3. COSTS OF MAINTAINING THE CURRENT NETWORK COMPARED TO UNDERGROUNDING

- AEEMA submits that there have been developments in undergrounding technology in recent years that have served to reduce costs. Directional drilling is one such development which provides the following benefits:

  ⇒ least environmental impact,

  ⇒ no financial impact on increasing depth (up to 2m) should circumstances demand,

  ⇒ enables both in-duct and direct burial of cable,

  ⇒ eliminates the need for sand or graded backfill, and

  ⇒ enables installation of spare ducts for future expansion.

  In addition recent developments in cable technology can lead to the following cost savings and efficiencies:

  ⇒ reduced trench dimensions,

  ⇒ no requirement for sand or graded backfill,

  ⇒ current rating of cable may be increased with elimination of sand as backfill,

  ⇒ excavated soil may be re-used,

  ⇒ reduced labour costs, and

  ⇒ installation time can be reduced substantially (up to 250%).

- **Indicative trenchless technology costs** of projects in the USA are included in Appendix 1.

- **The latest developments in trenchless technologies (since 1997)** are listed in Appendix 2.

- **Cost issues relating to transformers and undergrounding** are included in Appendix 3.

- A relevant detailed methodology for analysing the costs of cable installation can be found on reference to the following report:

STATE OF MINNESOTA- OFFICE OF ADMINISTRATIVE HEARINGS - FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION: In the Matter of a Generic Investigation of U S West Communications, Inc.'s Cost of Providing Interconnection and Unbundled Network Elements (REPORT OF THE ADMINISTRATIVE LAW JUDGE) November 17, 1998.

www.oah.state.mn.us/cases/250010956.rp.html

(U S WEST generic cost report)

- AEEMA submits that any cost comparison should also take account of the following factors.

  ⇒ Energy efficiency savings arising from the installation of new generation, energy efficient lighting.

  ⇒ Productive savings to industry and commerce produced by a reduction in power outages.

  ⇒ Reduced maintenance costs.

4. TYPES OF COSTS WHICH ARE AVOIDED AS A RESULT OF UNDERGROUNDING

Undergrounding can result in substantial savings. Some of these savings are quantifiable, others are not. Examples include the following.

- Reduced maintenance costs of the electricity distribution network as a consequence of elimination of damage to poles and wires during storm activity.

- A substantial reduction in, or elimination of, the cost of tree pruning. Energy Australia alone spends $10 million a year on this activity.

- Opportunity to install energy efficient, low maintenance street lighting (for example the new luminaires in Anzac Parade, Canberra produce twice the light levels of the originals and consume 40% less energy; they have a maintenance free operating life of 15 years, with estimated labour savings in lamp replacement of $1,200 - $2,000 per luminaire).

- Environmental savings in reducing the number of trees harvested for poles and the concomitant reduction in toxic pole treatment processes.

- Environmental savings in the containment of oil spills from pole top transformers (underground systems use padmounted transformers which contain spills).

- Reduced motor vehicle accidents caused by collisions with poles.

- Reduced economic losses associated with power outages.

- Reduced losses from bushfires (the NSW Rural Fire Service reportedly attributes an average of 320 bushfires each year in the state to overhead power lines).

- Reduced disruption to city traffic from fallen overhead power lines.

5. DISTRIBUTION AND TIMING OF BENEFITS – OVERALL BENEFIT TO THE WIDER COMMUNITY

It is important that the benefits of undergrounding are well understood. AEEMA recommends that IPART thoroughly investigates all the benefits as part of the Review process. The 1998 Commonwealth report was largely deficient in this area.

The following is a contribution to the discussion on benefits. However, it is stressed that a full cost-benefit analysis of these benefits should be undertaken in order to compare the costs of undergrounding with the costs of maintaining and extending the current utility distribution infrastructure regime. AEEMA can assist in this regard.

- **Societal Benefits**

⇒ **Fewer power outages**

The Australian community is becoming less tolerant of power outages. This in part reflects the significant increase in household electrical appliances and other products, such as personal computers, which rely on mains-powered electric energy. Apart from the denial of use during power outages, some of these devices contain sensitive electronics that can be damaged during outages. The resultant loss of valuable data and break in connections to the Internet are key concerns. A reliable power supply is also inextricably linked to small business enterprise productivity. Interruptions to power supply lead to a loss of productivity and over extended periods to a loss of competitiveness.

In recent years, the Productivity Commission has assessed the impact of IT on productivity changes in the Australian economy, and it is submitted that IPART should also focus on this consideration as part of broader deliberations.

Underground cables lead to fewer power outages, simply because they are less susceptible to storm damage. This is significant in coastal regions of NSW where storm activity is high. There is also evidence to suggest that storm activity in Sydney is increasing, leading to increased frequency of blackouts and brownouts.

Similarly, the recent major bushfires in Sydney resulted in major disruptions to power supplies as a consequence of the destruction by fire of surface cabling infrastructure.

It should also be noted that changes in the electricity supply industry have resulted in less capacity to respond to outages. The numbers of line workers employed by electricity utilities over the past decade have reduced significantly – in some cases by more than 50% - and there is simply less capacity to deal with widespread overhead powerline failures that occurred, for example, in Sydney in 1991.

⇒ **Economic Multipliers**

A commitment to a long-term infrastructure programme such as underground cabling will generate ongoing economic multipliers through the domestic economy. AEEMA recommends that IPART review available economic information from the recent Sydney Olympics construction programme (as a recent reference point) to gain some appreciation of the additional value of the economic activity likely to be gained over the term of the project.

⇒ **Less environmental damage**

Vegetation removal to protect overhead power lines has been and is likely to be an increasingly contentious issue in the community. Undergrounding will largely remove the problem of tree clearing and pruning associated with electricity distribution.

⇒ **Fewer bushfires**

Overhead powerlines can and do start fires, from a variety of causes.

⇒ **Reduced risk of electrical injuries/electrocutions**

Undergrounding reduces the risk of electrocutions to both utility line workers repairing damaged cables and to the public coming into contact with overhead cables, or live cables felled during storms etc.

The undergrounding of electrical cabling removes public concerns about the fear of health risks linked to overhead power distribution.

⇒ **Fewer traffic accidents**

Power poles are responsible for a significant number of road traffic accidents. Their removal would reduce the number and severity of such accidents. It is understood that the annual cost of such accidents in Queensland alone is $50 million; in 1993 in Perth, Western Australia, six fatalities were associated with about 700 accidents involving vehicles hitting power poles (reference: NSW Legislative Assembly Hansard of Thursday, 25 September 1997).

⇒ **Improved amenity**

Removing unsightly overhead cables enhances the appearance of urban and suburban streetscapes. Contributing to this improved appearance are trees that do not have to be pruned, and additional tree plantings made possible by the removal of poles and wires. Improved amenity is demonstrated by an increase in real estate values in areas of Perth where undergrounding has already taken place.

It should be noted that as more property owners connect to overhead broadband communications cabling, streetscapes will become more degraded.

AEEMA recommends that IPART review the cost benefit of undergrounding from the perspective of the cost of undergrounding to individual land holders offset by the increase in land value resulting from improved amenity. For example, in the 'garden suburbs' of Sydney, it is recognised in the real estate market that a well-designed and maintained garden can add 10% to the value of a residential home. If, as a result of placing overhead cables underground, a modest 5% increase in value can be achieved on a home of median value of say $500,000, a 'one off' asset increase of $25,000 could be achieved. In this context, a one-off cost for undergrounding to the landholder in the range of $3-5,500 would seem a worthwhile investment; the imposition of an annual levy over an agreed payback period to achieve the same objective would seem to be even more attractive.

⇒ **Other**

Undergrounding provides the opportunity to significantly upgrade telecommunications and power utility services.

Finally, undergrounding may facilitate future expansion of utility networks if spare cable ducts are installed.

- **Life Cycle Benefits**

⇒ **Reduced maintenance times and costs**

Contrary to information contained within the 1998 Commonwealth report, power outages in suburban areas are shorter in an underground system. It is understood that the international electricity transmission learned society, CIGRE, has published statistics indicating that outages associated with overhead cables average 80 to 120 minutes, whereas outages on an underground system last on average only 20 minutes.

Maintenance costs of an underground network are lower than that of an overhead system. These lower maintenance costs need to be taken into account when assessing the overall costs of undergrounding.

- **Institutional Benefits**

The commitment to a full-scale undergrounding of cabling will provide the opportunity to more efficiently plan and map public easements containing a wide range of underground utilities, including water and gas services. This can lead to the development of codes and protocols for the sequenced lay out of underground infrastructure; such a structured regime operates in Perth and provides major benefits and cost savings to both utilities and contractors accessing this public underground space.

A less cluttered surface environment will provide opportunities for urban planners to create for enhancements to streetscapes and other public spaces.

6. OPTIONS FOR FUNDING UNDERGROUNDING PROJECTS

AEEMA recommends that the costs of undergrounding be distributed amongst

- the NSW State Government
- local government
- electricity distributor
- property owners/electricity consumers

It is suggested that private funding for this project could be secured and repaid by property owners/electricity consumers through a levy to electricity accounts paid over a three to five year period. Should it also be decided to adopt a regime that provides ducting to carry future broadband cabling, it seems reasonable to put in place a financial mechanism that would require a carrier to provide rebates to the other parties.

Sharing the burden of costs among the above stakeholders and beneficiaries will facilitate undergrounding. It is worth noting that in Perth costs are shared between the State Government (25%), Western Power (25%) and property owners (50%). The system works well, particularly as the WA Government Office of Energy surveys areas targeted by local government for undergrounding to ensure that there is general support in the community.

It should be noted that because of reduced costs associated with new technologies, and rising property costs in Sydney in particular, the costs of undergrounding stated as a proportion of property values has decreased in recent years. In this regard, AEEMA recommends that the 1998 Commonwealth Government study be used as a benchmark report with additional work focused on determining the extent to which this ratio has reduced since the data was originally collected, and the extent to which the ratio will continue to decline with time.

There is also an opportunity cost to be considered. Broadband communication take-up appears to have reached a plateau at present, however this situation is likely to change over the next few years. One of the likely outcomes is that the density of overhead cabling may increase substantially – resulting in further public concern at a time when the carriers could be expected to be less willing to dismantle recently installed overhead cabling and to be forced to incur additional costs to go underground.

AEEMA recommends that undergrounding commence in the areas of Sydney most affected by storm damage. The high-risk areas seem to be the northern, southern, northwestern and eastern suburbs. These areas contain suburbs with higher than median land values, with property owners better able to absorb the costs of undergrounding. However, given the overall benefit to the community generally, AEEMA recognises that where any suburban community, irrespective of its location, wishes to proceed with undergrounding of electricity distribution cabling, government and the utilities servicing those areas will need to respond accordingly.

CAPACITY OF AUSTRALIAN INDUSTRY TO UNDERTAKE UNDERGROUNDING OF CABLING

Australian industry is well equipped to undertake undergrounding of cables on a large scale. There is now considerable experience in undergrounding. Many new subdivisions around the country locate cables underground. This is in addition to considerable undergrounding in established suburbs in Perth, Southeast Queensland, Adelaide and in some parts of Sydney.

As well as availability of technical expertise, Australia also possesses the industrial capacity to undertake a major undergrounding infrastructure project. There are two major cable manufacturers capable of producing all cable requirements. Australia also has substantial manufacturing capability in distribution transformers. Some switchgear is currently imported, and suppliers would need to make an assessment of the viability of manufacturing switchgear in Australia should the project proceed. AEEMA and the Industrial Supplies Office (ISO) can provide information about Australian capability in this area.

Australian construction companies have demonstrated their expertise in undertaking large scale cabling rollout e.g. the Optus/Leighton strategic alliance. It is understood that the securement of major undergrounding contracts would provide the means of bringing to Australia (under negotiated licensing agreements) new trenchless technology practices which are commonplace in the USA and are not used here in Australia to date.

APPENDIX 1

Indicative costs of trenchless projects (North America)

Method	**Cost per Inch Diameter/ Foot ($US)**	*Type of Installation*
Sliplining	$4 - $6	Rehab
Cured-In-Place Pipe	$5 - $7	Rehab
Pipe Bursting	$7 - $9	Rehab
Trenching	$10 - $12	Rehab or New
Horizontal Directional Drilling	$10 - $25	New
Auger Boring	$12 - $14	New
Pipe Ramming	$13 - $15	New
Pipe Jacking	$15 - $17	New
Microtunneling	$17 - $24	New

Source: Boyce, G., 1998. "Social Cost Accounting for Trenchless Projects," *Proc. of North American NO-DIG'98*, Albuquerque, New Mexico, **April 5-8, 1998**, NASTT , Chicago, IL, pp.2-12

APPENDIX 2

Latest Developments in Trenchless Technology (Post 1997)

The following is a list of identified new trenchless technologies provided by the Trenchless Technology Centre, Louisiana, USA.

www.ca-botics.com

CA-BOTICS transforms the sewer network into a wide-band telecommunications network. The method uses a robotic machine - the CLR, or Cable Laying Robot - which remotely installs optical fibre cable into inaccessible sewer pipes.

http://www.tttechnologies.com

Grundosteer is a guided mole for gas and water service line installations in difficult areas where directional drill rigs are cost prohibitive and impractical.

http://www.vermeer.com/equipment/pneumatic_piercing

Vermeer HAMMERHEAD MOLE® with Active Head™.

http://www.vermeer.com/about/press/rotary_impactor.htm

Rotary Impactor designed for use with Vermeer® D24x40A and D33x44 NAVIGATOR™ HDD, combines pipe bursting and directional drilling technology and makes the process of replacing mainline sewer just another drill job.

http://www.vulcanpub.com/hen/article.asp?article_id=59298

Compact Ditch Witch HDD Unit is all terrain horizontal directional drilling system that permits effective drilling and steering in extreme conditions such as solid and broken rock, cobble and gravel. The unit can make installations of 650 feet at a lower cost than larger, more expensive models.

http://www.underspace.com/ex/trnchles.htm

Regway Systems, Inc. has applied for a patent on its Controlled Line and Grade (CLG) system. CLG enables trenchless replacement of sewers on-line, on-grade regardless of sags, humps and misalignments in the original pipeline.

www.intedyne.com
BoreMaker™ is a complete series of Low Flow horizontal directional drilling motors for the utility industry. These positive displacement motors produce double the operating torque at 1/3 the flow rate of typical drilling motors.

http://www.hddp.net/pages/navset.html
STORM 500 by Halco Group is a new product for directionally drilling of hard rock. The system drills and steers in the toughest rock conditions 3 times faster than a mud motor.

www.blackhawk-pas.com
Sewer Scanning Evaluation Technology (SSET) for assessment of sewer pipes.

Sten S., 2000. "New Australian Developed and Patented Trenchless Pipe Lining Technology for Water, Waste Water and Gas Pipelines," Proc. of 18th Intl. Conference ISTT No-Dig 2000, Perth, Australia, October 15-19, 2000, ASTT, Perth, Australia, pp.311-317
New pipe lining technology ShieldLiner under development by SORD Technologies Ltd.

APPENDIX 3

Issues Associated with Transformers and Undergrounding

1. Pole mounted transformers are usually small, ranging in size from 16kVA to 500kVA. Integral Energy has recently increased the kVA/house it uses to plan its network up to 9kVA. This means that even the largest unit can only service 55 homes. This increases the number of transformers mounted on poles (and hence the installation cost).

2. Padmounted transformers are used in association with underground systems. These can be as large as 2000kVA but typically the largest used domestically is 1000kVA. The number of houses serviced by each unit is increased proportionally.

3. Padmounted transformers are typically fitted with HV switchgear that provides substantial operational flexibility. It is possible to isolate a fault in a line so that it can be repaired without interrupting supply to customers. With the addition of HV switchgear in padmounted substations, switchgear is available with remote control facilities that reduce outage times even further.

4. The cost/kVA for transformers reduces with kVA rating. The cost per kVA of a 1000kVA pad is comparable to that of a 315kVA pole mounted product.

5. The price of a 500kVA pad is approximately 1.8 times that of a 500kVA pole transformer.

6. The price of a 315kVA pad is approximately 2.5 times that of a 315kVA pole transformer.