



ELECTRICAL WORKS



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OUR ORGANIZATION

E-Square Engineering (Pty) Ltd, incorporated in 2003, is a company that provides quality and expert knowledge in Engineering professional services that satisfies the needs of our clients. E-square Engineering has carved its own niche in the field of Civil, Structural and Electrical Engineering and Project Management disciplines.

Through the expertise of its technical staff and experience gained over two decades, E-Square Engineering has built a formidable engineering firm which offers quality services to a variety of clients which include: National and Local Government, State Owned Companies such as Eskom, Broadband Infracore, PikiTup, Transnet and City Power, Mines as well as clients in the Private and Public Sector.

E-Square Engineering has leveraged on the socio-economic and environmental challenges to offer adaptable engineering solutions which unlock potential within the communities we serve.

Integrity, reliability, and community are the cornerstones that define our business conduct

As the company celebrates over two decades of existence, E-square Engineering is proud to have achieved ISO 9001 certifications in 2013.

This enhances the company's objective of:

- Maintaining and Improving its technical and business excellence in the services supplied to its clients.
- Satisfying clients through effective application of the quality systems.
- Executing work efficiently and timeously, as well as consistently supplying services that meet applicable statutory, regulatory, and client requirements.
- Ensuring business processes are controlled, measured and monitored, analysed and continually improved by implementing processes that prevent nonconformity.



OUR VISION

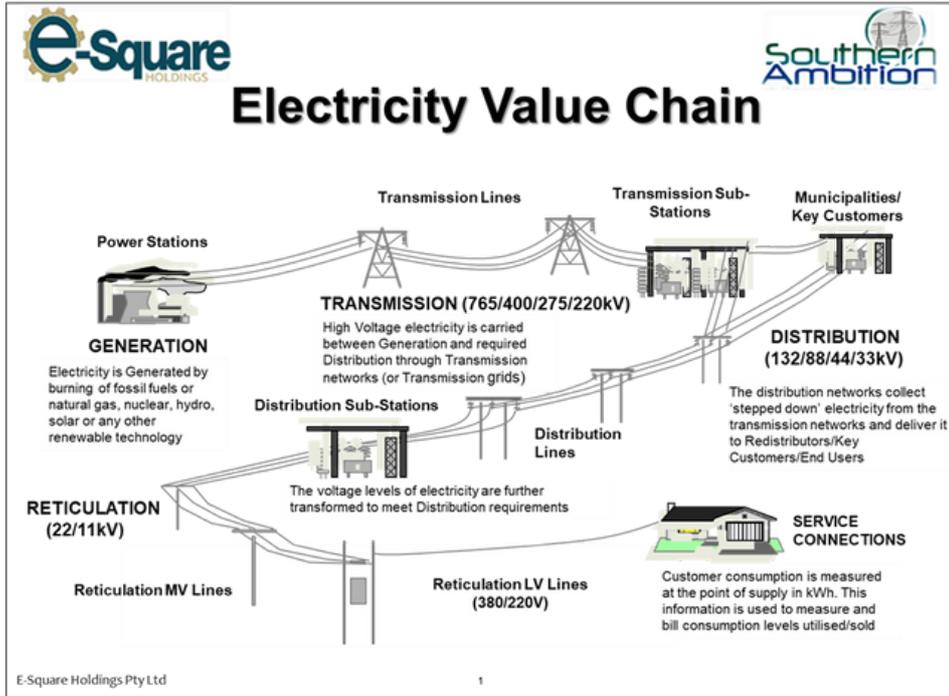
E-Square Engineering's vision is to become a prominent Engineering House, through technological innovations, differentiation and engineering that unlocks value in the field.

QUALITY MANAGEMENT

E-Square prides itself on delivering high quality projects underpinned by an independently certified ISO 9001 quality system since 2013 ensuring that E-Square's quality is of the highest standards and are consistent throughout service delivery to clients. E-Square commits itself to comply with the requirements and the implementation of a Quality Management System (QMS).

The QMS will be reviewed and implemented to continually improve efficiency and effectiveness of the organisation.

E-Square Engineering (Pty) Ltd has the expertise to offer customised solutions to a wide range of engineering projects from feasibility, conceptual phase, planning, surveys, design and construction supervision, and if required operation and maintenance.



Electricity Value Chain Specialised Services

Power Distribution and Reticulation Live Line Maintenance



Live line maintenance on power substations and power lines without service interruptions

- Live line maintenance on distribution networks (>33 kV up to and including 132 kV), and
- Live line maintenance on reticulation networks (up to and including 33 kV)

Operating and Maintenance



- Electrical network operating and maintenance (inspections, operational checks, testing of systems and full routine maintenance and unplanned maintenance) for both overhead lines and substations for voltages up to and including 132 kV

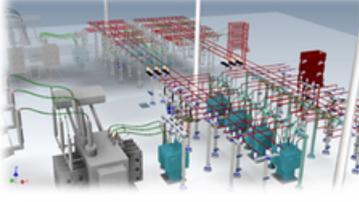


Electricity Value Chain

Normal Services

Expertise in electrical engineering gained over the years through its association and working on Utility and other related Client projects. Services offered include (11 kV to 400 kV)

- Transmission and distribution network planning;
- Power systems network planning;
- Electrical network integration and optimization;
- Power system and load flow analysis and forecasting;
- Primary and secondary plant designs;
- Electrification designs;
- Electrical designs, i.e. specify all equipment and its rating, creepage distances, basic insulation levels, earthing, lighting, lightning and fire protection requirements;
- Engineering survey, statutory approvals and mapping;



- Power line design and profiling;
- Supporting structure design;
- Insulation and hardware design;
- Foundation and earthing design;
- Soil resistivity tests and substation earth mat design;
- Steel design for equipment support;
- Materials handling and plant layout designs;

- Produce protection designs, drawings and settings for protection equipment;
- Line route optimisation i.e. survey, etc. and tower spotting;
- Conductor and ground wire optimization;
- Environmental analysis i.e. weather data, line route, protected flora and fauna, etc.;
- Optimisation of site selections;
- Environmental impact assessment and environmental impact management plan;
- Produce construction drawings, and
- Commissioning, integration and configuration.

Electricity Value Chain

Normal Services (Cont.)

Provides Telecommunication solutions in the form of engineering, project management, commissioning and integration. In this space, we have done work for various telecommunication companies as well as Utility Telecoms and Utility Transmission/Distribution. Services offered include:

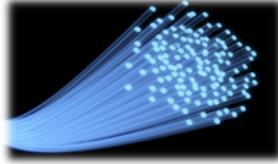
- Telecoms network planning;
- Data network planning;
- ADSS and OPGW fibre optic designs;
- Microwave point to point link designs;
- Fibre optic links;
- Microwave radio links, and
- Troubleshooting of equipment, e.g. SDH, DWDM, etc. and LAN's and WAN's.



Electricity Value Chain Normal Services (Cont.)



Optic Fibre (OPGW and ADSS)



- Transmission overhead line installation;
- Distribution overhead line installation, and
- Underground installation

Power Distribution and Reticulation Overhead Lines



- Building new and refurbishing and strengthening of high voltage overhead transmission lines
- Up to and including 132 kV

Electrification



- Construction of medium voltage electrical infrastructure including transformers, low voltage infrastructure (ABC bundle or others), house connections as well as circuit breakers, meters and ready boards

Electricity Value Chain Normal Services (Cont.)



Power Distribution Substation Construction



- Building new, refurbishing and strengthening of high voltage distribution substations
- >33 kV up to and including 132 kV

Power Reticulation Substation Construction



- Building new, refurbishing and strengthening of high voltage reticulation substations
- Up to and including 33 kV

Renewable Solar



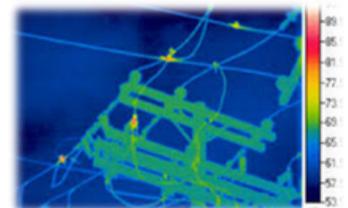
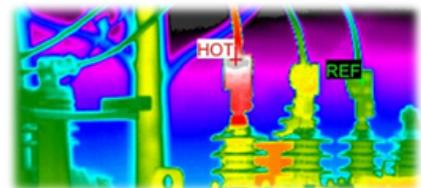
- Construction, operating and maintenance of small to medium photovoltaic solar infrastructure:
- Supply of all related; equipment and materials;
- Construction & commissioning, and
- Operating and maintenance.



Electricity Value Chain Specialised Services (Cont.)

Infra-Red Thermographics

- Specialized applied science of locating and analysing power losses throughout the electrical power system, using specialized infra-red equipment combined with sophisticated interpretation computer software
- Infra-Red Thermography detects simmering electrical equipment failures in installations in their incipient stages, which cannot be seen by the naked eye
- Identification of faulty components and equipment throughout the power system, using non-destructive and non-invasive techniques, in-situ, and without service interruptions



EXPERIENCE

E-Square have worked closely with governments, private sectors, Non-Governmental Organisations (NGOs) and national organisations around the world on a wide range of infrastructure projects. Our experience of different contexts with different challenges, resources and objectives gives us a rich source of information about what works and what doesn't work in different situations and circumstances.

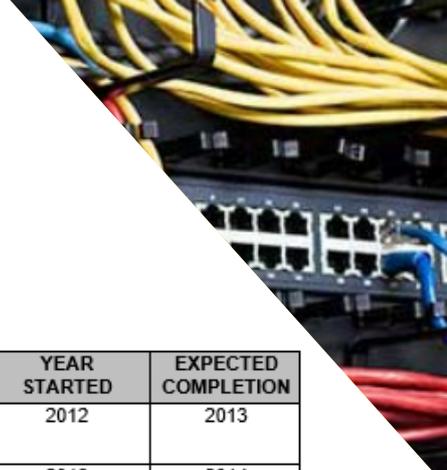
Combined, we have a long history of conducting preconstruction and supervision work, in numerous countries such as Zambia, Malawi, South Africa, Ghana, Liberia, Botswana and Zimbabwe. The projects that we have successfully completed are today being used by our clients with pride. Throughout all our work, we actively develop capacity and local knowledge so that change is sustainable for the long term.

This experience, gained over many years working with clients in different contexts and on different types of engagements, informs our key principles.



Below is a list of projects done by E-Square Engineering:

PROJECT CATEGORY	PROJECT NAME	PROJECT VALUE (US\$)	YEAR STARTED	EXPECTED COMPLETION
Powerlines	Alaska-Karoi Power Transmission Reinforcement Project	\$183,283.78	2021	Current
Civil & Structural - Condition Assessment	Camden PowerStation - Provision of Civil Structure Assessment over 5 years	\$434,527.03	2017	2022
Civil & Structural - Condition Assessment	Foskor 275/132kV Substation	\$97,650.74	2016	2019
PowerStation	Matla Unit 4 PowerStation	\$4,902,792.70	Jul-22	Dec-22
Substations and Powerlines	Management Contract (EPCM)	\$7.90 Million	2014	2016
Transmission Lines	Design of 132kV Transmission infrastructure	\$0.25 Million	2015	2016
Transmission Lines	Masterplans and network development plans for the Northern and Central regions in the ESKOM Distribution Group to look at network strengthening and electrification requirements over a 20-year horizon.	\$1.5 Million	2015	2016
Land Surveying and Environmental	Land Surveys and Environmental Impact Assessments - Detail land surveys for three potential pumped storage sites, with limited site drilling and geotechnical surveys was contracted to TSI. Detailed Environmental impact assessments and preliminary designs are also part of the assignment	\$0.45 Million	2014	2014
Substations and Powerlines	Power quality improvements	\$0.12 Million	2014	2016
Substations and Powerlines	Cardel 132 kV Sub-Transmission Line - Eskom	\$1 224 000	2021	2023
Substations and Powerlines	Development of a 132kV powerline from the existing Taunus substation to the existing Diepkloof substation and two new substations - Eskom	\$600 000	2021	2023
Substations and Powerlines	Alaska-Karoi 132kV Power Transmission Rehabilitation Project (AKTP) in Zimbabwe	\$9 451 000	2021	Current
Electrification Projects [MV, LV and House Connections]	Leeuefontein Electrification Project Management	\$1,216,216.22	2013	2013
Substations and Powerlines	Klipkop Jachtfontein Refurbishment Design	\$1,013,513.51	2012	2013
Substations and Powerlines	Mahwelereng New 1 x 20MVA Substation Upgrade	\$945,945.95	2005	2006
Electrification Projects [MV, LV and House Connections]	Dinga Electrification	\$810,810.81	Jul-05	2014
Substations and Powerlines	IMPALA shaft 17 Mines Key Customer Supply and Strengthening 2 x 40MVA SS Project Management	\$4,391,891.89	2008	2011
Substations and Powerlines	IFM – Excarbo Key Customer Supply - New 2 x 20MVA Substation and 132kV Lines.	\$3,040,540.54	2005	2006
Substations and Powerlines	Machadodorp Substation - Design - Additional 2 x 10MVA Trfrs Design	\$2,364,864.86	2008	2011
Substations and Powerlines	Vlei Putco Refurbishment Design	\$2,027,027.03	2012	2013
Substations and Powerlines	Phokeng Substation – Royal Bafokeng World Cup Project - Substation refurbishment and Strengthening - Design and Project Management	\$1,621,621.62	2008	2010
Electrification	Electrification of Mogwase RDP 573 connections	\$328,571.43	2012	2013
Substations and Powerlines	Sublime Substation Key Customer Project, 2 x 40MVA Substation New Supply.	\$1,486,486.49	2005	2006
Overhead work- Major Reticulation	Meadow Ngwaneso Strengthening Project	\$86,125.72	2017	2017
Cable work-Major Reticulation	Sandpit 11kV Domino Feeder Install 5.8km of 185mm ² Copper Cable Feeder, RMU, and PMB.	\$135,714.29	2013	2014
Electrification	Electrification of Lerome Ward 16	\$135,714.29	2012	2013
Electrification	Electrification of Imperial Reserve 279 connections	\$128,571.43	2013	2013
Electrification	Mathibestad Electrification	\$92,857.14	2013	2014
Electrification	Electrification of Kruisrivier and Driefontein	\$314,285.71	2013	2014
Electrification	Electrification of Ga-Moeka Village	\$78,571.43	2012	2013



Below is a list of projects done by E-Square Engineering:

PROJECT CATEGORY	PROJECT NAME	PROJECT VALUE (US\$)	YEAR STARTED	EXPECTED COMPLETION
Electrification	Electrification of Various Villages – Infills (Rustenburg and Mafikeng)	\$71,428.57	2012	2013
Electrification	Electrification of Lossmycherie RDP 180 connections	\$57,142.86	2013	2014
Electrification Projects [MV, LV and House Connections]	Mafikeng Ext 39 Electrification - Design and Project Management (2553 stands)	\$ 1,270,270.27	2008	2009
Geotechnical	Oranjemund Transmission Line Project	\$2,364,864.86	2005	2006
Geotechnical	Etna (Gauteng, Lenasia) Sub-Station	\$2,027,027.03	2008	2011
Geotechnical	Gromis Sub-Station	\$1,621,621.62	2012	2013
Substations and Powerlines	Norplats	\$70 000	2001	2001

Below is a list of projects done by our Founder while at Eskom:

Client	Description	Value of Services (US\$)	Completed
NAMPOWER	Professional services for the design of electrical transmission lines and substations in Namibia. Trans-Africa Projects (a subsidiary of TSI) was responsible for the complete engineering and design of a new 400kV Transmission system linking Namibia and South Africa, strengthening the existing NamPower / Eskom Transmission Grid. Work comprises two 400kV Transmission Lines approximately 700km in length with major extensions at Kokerboom Substation close to Keetmanshoop and a new Greenfields substation (Auas) near Windhoek.	\$0.80 million	31/10/2000
MOTRACO	The management contract (EPCM) on a US\$ 130 million project aimed at providing power to a new aluminium smelter in Maputo, the capital of Mozambique, has been awarded to Trans-Africa Projects (a subsidiary of TSI). The award includes two Greenfield Substations in Mozambique and Swaziland respectively, as well as two new 400kV transmission lines from South Africa to Mozambique. Billiton formally gave their approval in April 1998 for Mozal 245 000 ton-a-year aluminium smelter to be built at Maputo. The bulk usage of electricity by the smelter will entail that the electricity required to operate the plant, will be supplied from South Africa. A joint venture company, MOTRACO, was formed with the shareholders being the electrical utilities of Mozambique, South Africa and Swaziland. MOTRACO will own and operate the line supplying the aluminium smelter and will also supply electricity to the countries of Mozambique and Swaziland. The MOTRACO HV Transmission System consists of two 400kV transmission lines to be built from South Africa to Maputo, one via Swaziland, a 400kV substation in Maputo, a 400kV busbar in Swaziland, and two 400kV line bays in South Africa.	\$7.90 million	01/07/2000
Swaziland Electricity Board (SEB)	The 400kV Busbar of the Edwaleni II substation will be established in Swaziland as part of the Motraco 400kV system. This 400kV scheme will replace the proposed 275kV interconnecting feeders between the Eskom and SEB grids. The substation, situated south of the Matshapha airport close to the existing Edwaleni Power Station will consist of the 400kV busbar with two infeeds (Motraco asset) and 400/132kV transformation with associated plant as well as 132kV feeders feeding the SEB network (SEB asset). The substation will feed the SEB network at 132kV via three 132kV line bays and transformation will comprise two 250MVA 400/132kV Transformers, installed initially so as to fully utilise the single contingency capability of the two 400kV lines and the 132kV integration. The scope of this bid is for the design, procurement, construction / project management, construction supervision, commissioning, and hand over to SEB of the 400/132kV transformation and the 132kV feeders, inclusive of common areas such as roads, fences, control buildings etc.	\$1.30 million	01/07/2000
Mauritius Central Electricity Board	Design consultation services for the establishment of a new 132kV transmission infrastructure. Trans-Africa Projects (a subsidiary of TSI) is providing consulting services to the Mauritius Central Electricity Board which comprises design services, contract and tender preparation, and tender evaluations. The services also include continuous project life cycle support, training, and commissioning.	\$0.25 million	01/12/2000
	400/132kV Double circuit Transmission line from Ariadne to Eros substations (116km).		

Client	Description	Value of Services (US\$)	Completed
Eskom Transmission Group	<ol style="list-style-type: none"> Pre-Investment and Planning Studies <ul style="list-style-type: none"> Need Identification (E.g., Thermal and voltage problems) Load Flow, Reliability and Fault Analysis Cost Estimation for various Options Analysis of Investment Options using Scenario Planning and load forecast information Net Present Value Analysis over life cycle Selection of Best Option Formulation of Business Case Project Timing and Approval for release of funds Preliminary and detailed line design & optimisation <ul style="list-style-type: none"> Conductor selection. Structure analysis. Civil design. Earthing considerations. Insulation co-ordination. Hardware selection. Tender evaluation & Adjudication. Project Management <ul style="list-style-type: none"> Planning and co-ordination. Environmental co-ordination. Financial management. Quality management. Project administration. Construction administration. Contract management during construction. Site management. Commissioning and hand-over. 	\$0.78 million	01/05/1998
SAPPI	Voltage dips affect sensitive customer plant and cause significant production losses. Voltage dips are caused by transient faults on the interconnected power system and are a normal Power Quality (PQ) phenomenon. SAPPI produces fine paper and tissue from bagasse at their Stanger Mill in Kwa-Zulu Natal. The fine paper machine is a complex multi-drive AC fed machine with a load of 1MW. Sugar cane flashover and sea mist pollution together with the usual range of faults on the supply to SAPPI mill cause voltage dips which can cause paper breaks and actual tripping	\$0.12 million	20/10/1998
	of the drive as well as the rupturing of expensive semiconductor fuses. Power Quality Technology (PQT), a division of Eskom Enterprises, commissioned a Superconducting Storage Device (SSD) employing a refrigerator cooled liquid helium system April 1997. After a successful 12-month operation and demonstration period it was decided to replace the cryostat with a new technology High Efficiency Cryostat (HEC) employing high temperature superconductor current leads and simplified refrigeration equipment to reduce maintenance costs. The SSD works by storing 3MJ of energy in the magnetic field of a superconducting magnet. When a voltage dip occurs the magnet energy is available to be injected as real power in series with the incoming supply from the utility to boost the deficient voltages back to the correct values in amplitude and phase. The Stanger installation is specified to correct single, two or three phase dips of up to 70% magnitude for one-second duration, with a load of 1MW. The SSD in its first year of operation exceeded all three parameters with 100% successful carry-overs.		
Eskom Generation Group	The construction of a Pilot Scale Combustion Test facility. The client is the custodian of Eskom's Generating plant with a total generating capacity of approximately 39 000MW i.e., all the power stations. The construction of a pilot scale test facility for the evaluation of various types of coal under pulverized fuel firing conditions. The facility is 1MW in size, incorporates air and water reticulation systems, both oil and pulverised fuels burners, as well as its own coal handling and processing plant. A facility of this nature makes the study of the combustion performance of fuels logistically feasible and cost effective, when compared to commercial scale testing. The facility is the first of its kind in Africa and has been customised for Southern African low-grade coals. The Ethernet based field bus communication offers state of the art control and data capture. The facility integrates into the existing combustion research and investigation facilities and services offered by TSI and has been designed with capabilities including the evaluation of slagging and fouling (deposition) propensities, erosion and corrosion tendencies, flame stability and carbon utilisation. The facility will also be used to evaluate gaseous emissions reduction techniques, and to evaluate the performance of burner hardware. The engineering, procurement and construction was performed by TSI, including detailed design of the coal handling, electrical and civil works, and complete process control function. TSI's projects department provided the project management services.	\$3.25 million	01/04/1999
Eskom Generation Group	Feasibility studies for Hydro power plants. Engineering, Procurement and Construction Contractor (EPC) for the 6 x 686MW units of Kendal Power Station was contracted to TSI. Kendal utilises the largest dry-cooling power generating related facility in the world. All aspects from user requirement specification, detail design review, procurement, construction and overall project management, commissioning and testing as well as optimisation of the power plant was part of the assignment. The final project closure, after certain modifications, was also handled.	\$0.45 million	12/01/1999
Eskom Generation Group	Detail land surveys for three potential pumped storage sites, with limited site drilling and geotechnical surveys was contracted to TSI. Detailed Environmental impact assessments and preliminary designs are also part of the assignment.	\$0.45 million	01/02/2001
ESKOM Distribution Group	Masterplans and network development plans for the Northern and Central regions in the ESKOM Distribution Group to look at network strengthening and electrification requirements over a 20-year horizon.	\$1.5 million	Completed and ongoing

GET IN TOUCH

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