



Electricity supply challenges and lessons learnt from the 2010 Soccer World Cup

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1. Introduction

In June and July 2010 South Africa hosted a world class FIFA Soccer World Cup, with 32 teams competing in 64 games without any supply interruptions to key sites during critical times. This paper summarizes the activities of the South African electricity supply industry to coordinate preparations and ensure that the event was supplied with reliable high quality power.

2. Background

The 2010 Soccer World Cup was broadcast to billions of fans across the world and was dependent on the supply of reliable high quality electrical power, which South Africa committed to supply. The main electrical loads associated with the 2010 tournament included:

- The 10 stadiums in 9 Host Cities at which the matches were played.
- Each of the 32 teams had a “base camp” in South Africa for the duration of the tournament.
- Training venues located within the Host Cities.
- FIFA fan parks located in the Host Cities.
- Non-FIFA accredited public viewing venues that are set up by municipalities and private enterprise.
- Hotels at which FIFA established their local offices and command centre.
- Journalists hosted at the International Broadcast Centre which formed the hub for broadcasting and reporting.
- The accommodation, tourism and transport needs of visitors.

In relation to the South African peak demand, the magnitude of the additional electrical load due to the tournament was relatively small. Certain loads, such as stadium lighting and broadcasting, had onerous power quality requirements. A momentary

power interruption or voltage dip could disrupt televised broadcast of the games.

The majority of these loads fell within the electrical supply areas of the Host Cities. Eskom was responsible for the supply of bulk electrical power to the Host Cities, but the networks between the Eskom bulk supplies and the venues (e.g. stadiums) were the responsibility of the Host City municipal electrical sections. Furthermore the venues themselves had their own internal electricity distribution networks.

A problem in the supply chain (Eskom, Host City distribution or venue distribution) would reflect poorly on the entire Electricity Supply Industry (ESI), South Africa and Africa. As such it was critical that all role players in the South African ESI worked together to minimise risks and optimise approaches to ensure that the lights kept burning. Role players included Host Cities and municipalities, Eskom, owners of the 2010 event venues, 2010 Local Organising Committee (LOC), Association of Municipal Electrical Undertakings (AMEU), Department of Energy (DoE), National Energy Regulator of South Africa (NERSA), South African Local Government Association (SALGA), National Treasury and EDI Holdings.

3. 2010 ESI forum

The inter-connected nature of the South African electricity network resulted in Eskom and The Association of Municipal Electricity Undertakings (AMEU) establishing the 2010 Electricity Supply Industry Forum (2010 ESI) which first met in August 2006. This voluntary forum met quarterly and enjoyed representation from all of the above mentioned stakeholders, with the objective of raising awareness of issues related to the provision of adequate electricity supplies during the 2010 World Cup tournament. Amongst others, matters

such as readiness, project progress, supply reliability, incident reports, emergency response etc were discussed in detail at the forum sessions and guidance provided to ensure a smooth delivery of the World Cup event from an electricity supply perspective.

The 2010 ESI coordinated national electrical preparations for the tournament via establishing close working relationships with the interested and effected parties. The games and associated activities occurred in the Host Cities and as such many of the preparations focused in those specific geographic areas. This necessitated the creation of Regional Task Teams (RTTs) per Host City consisting of Host City municipal and Eskom electrical representatives. The RTTs were the “engine rooms” for tournament electricity supply preparations and RTT feedback to the 2010 ESI enabled preparation to be tracked and understood. The activities of the RTTs to ensure adequate supply throughout the tournament included:

- Identification and assessment of the condition of the electrical infrastructure that supplied stadiums, training venues and other key loads in their area of responsibility.
- Upgrading, refurbishment and maintenance of these networks.
- The requirement and availability of strategic spares for these critical networks were evaluated and deficiencies addressed.
- Critical loads were removed from automatic load shedding relays, and manual load shedding schedules were updated to minimise the impact on the tournament. It must be noted that no load shedding was anticipated during the period of the World Cup, and the revision of schedules was a purely precautionary activity.
- Contingency plans for supplies to the critical loads were prepared and extensively tested.
- The availability of critical staff was ensured via proactive leave planning and standby rosters.
- Deployment of operational teams at critical substations and sites (e.g. fan parks) during event days, including contractors being on standby e.g. cable jointing.
- Restrictions on capital works and excavations near key networks to minimize the risk of cable damage.
- Enhanced security at critical substations with manned security personnel during event days. In cases helicopters were utilised to patrol overhead lines.
- The establishment of clear communication channels utilising existing operational structures (Eskom and municipal network control centres) supplemented to ensure integration with

Provincial JOC, City JOC, VOCs and the Eskom Regional Situation Awareness Centres (RSACs). This included sharing of communication mechanisms such as radio networks.

The 2010 ESI preparations implemented via the regionally focused RTTs complemented Eskom’s own 2010 World Cup project and associated preparations thereby securing the entire supply chain.

4. Highlights

The highlights of the 2010 ESI forum included the following:

- The additional loads expected due to the World Cup were forecasted and the ability to reliably supply this load was assessed across the entire supply chain. Capital projects (Eskom and municipal) were identified, and funding requirements were raised with stakeholders.
- Capital projects were initiated and progress tracked to ensure delivery before the start of the tournament.
- Detailed specifications on supply requirements for key venues such as stadiums were either not available or inadequate and, where appropriate, the forum provided recommendations for supply.
- The activities of the forum were communicated to non-Host City municipalities via the regular AMEU email news bulletin, and papers providing feedback from the forum and raising awareness on key issues were presented at the annual AMEU Conventions in 2007 and 2009.
- Linkages were established with other structures (such as the LOC Power Forum) to minimise duplication of effort and ensure that activities were coordinated. The forum also provided a mechanism to channel communication on issues of national importance to stakeholders such as the National Electricity Response Task Team (NERT).
- International contacts were established with entities involved in hosting similar events (2006 World Cup Germany, 2008 Beijing Olympic Games, EURO 2008) and their preparation activities, results and recommendations were shared with the forum.
- Host City and Eskom response teams were deployed at all critical areas and in time, according to each Host City Operational Plan.
- Although on a much smaller scale, the 2009 Confederations Cup was used to successfully test preparedness and operational plans.

5. Lowlights

Lowlights reported by the Host City focused RTTs included the following:

- Although there were no major supply problems to critical sites on event days, minor faults such as MV cable and mini-substation faults and street lighting problems did occur, including supply problems at some PVAs. These faults are to be expected, and the enhanced operational focus ensured that faults were attended to promptly.
- In cases, the locations of fan parks and PVAs were only finalised shortly before the event which did not allow sufficient time to ensure adequate electrical supplies.
- Accreditation of staff members took too long and delayed urgent work in the restricted areas around the stadiums and precincts.
- In cases, lighting levels at certain locations (such as park and ride sites) could have been improved. The use of hot re-strike lamps at one stadium resulted in unexpected harmonic distortion necessitating the installation of filters.
- Illegal connections caused overloading on certain MV feeders and mini-substations. There were also instances of conductor theft, although levels were significantly reduced due to the additional security deployed during the event.
- Despite efforts to manage the risk, HV and MV cables were damaged by contractors and other service providers during mechanical excavations.
- The stadium overlay power magnitudes were overstated and the network to supply the overlay could have been rationalised.

6. Key lessons learnt

Key lessons learnt for the hosting of similar events in the future include:

- The use of independent operators at the stadiums, fan parks and PVAs worked well and relieved pressure from the Host City and Eskom officials.
- Bans on construction works prior to the event helped to secure cables and other utilities and also enhanced the beautification of the Host Cities.
- Formal effective communication channels and protocols between all parties are essential. The use of alternative communication systems is necessary to minimise any dependency on cellular phone communication.

- The support and commitment of top management is essential, as is team work and training.
- Cooperation between the Host Cities and Eskom is critical, and can be effectively achieved via regionally focused task teams supported by a national structure such as the 2010 ESI forum.
- Despite test runs prior to the event, the accreditation of operational staff and contractors (required to be on site for the final testing & commissioning work) did not live up to expectations. The time and process to perform accreditation should not be underestimated.
- FIFA electrical requirements for the precincts and stadiums were finalised very late and resulted in short notice changes to infrastructure already installed. Requirements need to be presented well in advance with a design-stop early enough to allow time for the utilities to meet the required power supply deadlines. The locations of key sites such as fan parks must be finalised as soon as possible to allow for electrical infrastructure planning, design and installation lead times. Supply requirements should not be unreasonably overstated.
- Provision must be made to accommodate unforeseen last minute eventualities.
- Proper planned maintenance significantly reduces the number of unplanned outages.
- Event preparations can minimise but not completely eliminate network faults. Strategies are required to ensure that faults can be identified, located and repaired in the shortest time possible. Technologies such as fault indicators can assist in this regard.

7. 2010 legacy

Host City and Eskom representatives reported a number of legacy issues arising from the work necessary for the tournament including:

- Significant additions to, and upgrading of, sections of the electrical distribution network.
- Upgrading of street lighting leading to the improvement of safety and beautification of some areas and the raising of living standards in others that would not have received this lighting under normal circumstances.
- Successful introduction of new technologies and systems such as the Tetra communication system for the City of Johannesburg.
- The successful testing of operational capacity and experience in dealing with international organisations and major events.

- Skills development and job creation.
- Improved cooperation with Eskom and government entities.

8. Conclusions

When the 2010 ESI forum was started in 2006 there were well over 1000 days to kick off. The timely creation of the 2010 ESI and the associated RTTs directly supported efforts to ensure that the country was ready to welcome the world to South Africa in June 2010.

The 2010 ESI was a voluntary gathering of industry professionals committed to ensuring that the games and associated activities were powered. It was the only body looking at the broader power supply requirements covering all aspects of hosting a successful tournament, which extended well beyond the stadiums and included a number of other loads as mentioned earlier in this paper.

In recent years, generation capacity constraints, tariff increases and proposed industry restructuring tested the resolve and relationships of role players such as Eskom and the Host City municipalities. It was extremely gratifying to see the members of the 2010 ESI forum treat the World Cup preparations as business un-usual. They focused on the tasks at hand, putting aside issues that in the normal course of business may have shifted focus from these key activities. Preparations were approached from the perspective that success would only be achieved if all role players were successful. This spirit of cooperation was clearly evident and demonstrated in the offer of support provided at the April 2010 ESI forum meeting whereby Eskom and the Host Cities undertook to provide assistance to one another in the unlikely event that a major disaster should occur. Fortunately there were no disasters, largely attributed to the extensive preparations as coordinated via the 2010 ESI forum.

The 2010 World Cup was hosted without any serious supply interruptions, and all stakeholders can be understandably proud of this major achievement.

9. References

2010 ESI debrief reports:

City of Cape Town, H Boshoff
Rustenburg Local Municipality, RC Du Preez
eThekweni Electricity, J Kalichuran
Nelson Mandela Bay Municipality, C Hempel
Polokwane, D Potgieter
City of Johannesburg, D Zondi, S. Xulu, X. Lembede and A. Milne
City of Tshwane, G Booysen, PM Tlabela, JF Fourie, P Sivhada, K Leepile, M Rasetlola, B Tumagole
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