Maintaining the Power Grid for 2010 Soccer World Cup

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Overview

- FIFA 2010 World Cup in South Africa
- Status of Power Grid in South Africa
- Uprating and Conductor Analysis
- Energized Solution to Uprate 88 kV System
- Emergency Support during World Cup
- Status of Uprating Project
FIFA World Cup 2010
Status of Power Grid in South Africa

- Installed Capacity - 45 GW with Reserve Margin < 10%
- Johannesburg Old 88kV Network (1950 vintage)
- Last few years had rolling Blackouts
- Existing electrical transmission and distribution infrastructure have no or limited N-1 reliability
- System can't support an outage nor alternative route is available
- Restricted ROWs
Energized Solution to Uprate 88 kV System

- Re-conductor the City Power 88kV system:
  - Upgrade to High Temperature ACSS conductors
  - Increase individual circuit capacity – 100% target.
  - Mechanically harden transmission system, extend life.
  - Enhance system economic performance and end-customer satisfaction

- Energized Techniques and Robotic Technology:
  - Safe and economic solution to a complex operation.
  - Shorter project timeline
  - Securely holding energized lines/equipment intact during upgrades
  - Increasing personnel safety
  - Increasing utilization of existing transmission assets
  - Safely reconductoring, rebuilding and replacing/adding lines and equipment while not taking system out of service
  - Better asset maintenance and upgrade in restricted right-of-ways
Uprating and Conductor Selection

- Require 50-100% power increase on 88kV system
- Provides power throughput from 100 MW to 200 MVA
- Select High Temperature ACCC Conductors
- Replaced UPAS and WOLF conductors with the ACCC Lisbon and ACCC Copenhagen conductors
  - 28% More Aluminum
  - Greater Strength
  - Lower Coefficient of Thermal Expansion
  - Less Sag at Higher Temp.

ACCC uses a carbon fiber core that is 25% stronger and 60% lighter than a traditional steel core
Conductor Thermal Rating Comparison

Solar Radiation Constant: 1.0
Emissivity Coefficient: 1.0
Wind Speed: 0.5 m/s
Ambient Temp: 30°C
Intensity of Solar Radiation: 990 W/m²
Line Voltage: 88 kV

- ACSR Wolf
- AAAC Upas
- ACSR Goat
- ZTACIR AS 265
- ACCC Copenhagen
- ACCC Lisbon
- 500 Amps
- 150 MVA Rating
- 200 MVA Rating
Approximate Sag for Spans of 200m - ACCC vs. ZTACIR
Kelvin – Cydna

Kelvin – Cydna: 16.8 km, 88kV, 100MVA to 150/200MVA
Kelvin – Cydna

Kelvin – Cydna: 16.8 km, 88kV, 100MVA to 150/200MVA
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Kelvin – Cydna: 16.8 km, 88kV, 100MVA to 150/200MVA
Quanta Energized Services Team
South Africa - Re-conductoring

88 kV Energized Uprating using LineMaster™ with an additional delta circuit
South Africa - Re-conductoring

- Equipotential string technique used in South Africa to increase efficiency – necessary safety measures in place
Emergency Support During World Cup

- Support was provided during the World-cup
- Emergency repairs and standby
- Quick response to break downs
  - Prospect - Robertsham (stabilize tower)
  - Orlando - Fordsburg (conductor down)
- Live-Line inspections / Audits
- Section of Kelvin – Delta upgraded

<table>
<thead>
<tr>
<th>Distance</th>
<th>Cond. Type</th>
<th>Voltage</th>
<th>New Cond.</th>
<th>SOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Str 1-52</td>
<td>Upas</td>
<td>88kV</td>
<td>Lisbon</td>
<td>Line Reconductor</td>
</tr>
</tbody>
</table>
Phase II - Delta – Rosebank

Delta – Rosebank: 1.3km, 88kV, 60MVA to 150/200MVA
Phase II - Kelvin – Sandringham

Kelvin – Sandringham: 8.6km, 88kV, 100MVA to 150/200MVA
Phase II - Kelvin – Greswold

Kelvin – Greswold: 11.4km, 88kV, 100MVA to 150/200MVA
Thank You – Questions?

For more information about our services please contact:

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