Innovation in Capital Power Projects Development

By: Danie Du Plooy

Date 29 May 2013

Powering your world
Electricity in South Africa – A brief overview of the early years
Electricity in SA – The early years

• The Diamond City, Kimberley, switched on electric streetlights in 1882 making it the first city in Africa to be illuminated in this manner. At this time, London still relied on gas lamps for street lighting.

• The General Electric Power Company Ltd commissioned a power station at Driehoek (near Germiston) that first supplied power in 1898.

• The photo on the left hand side depicts a view of two 500 kW generators at Driehoek. The field magnets formed part of the flywheel, which was 20 feet in diameter. (Photo: SA Mining Journal, Mar 1898, p.517).

Information courtesy of the Eskom Heritage website -http://intranet.eskom.co.za/heritage/indexNHR.htm
Early Years - Brakpan power station built by the Victoria Falls Power Company (the VFP) commissioned in September 1908

<table>
<thead>
<tr>
<th>Generators</th>
<th>One at 3 MW, two at 12.5 MW and one at 20 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boilers</td>
<td>Eight at 28 000 lb/h, ten at 45 000 lb/h and one at 70 000 lb/h</td>
</tr>
<tr>
<td>Compressors</td>
<td>Three at 800 hp (driven by piston steam engines)</td>
</tr>
<tr>
<td></td>
<td>One at 2 550 hp (driven by a steam turbine)</td>
</tr>
<tr>
<td></td>
<td>One at 2 650 hp (driven by a steam turbine)</td>
</tr>
</tbody>
</table>

Completed station with the spray pond in operation

Information courtesy of the Eskom Heritage website - [http://intranet.eskom.co.za/heritage/indexNHR.htm](http://intranet.eskom.co.za/heritage/indexNHR.htm)
By 1915, four VFP thermal power stations Brakpan, Simmerpan, Rosherville and Vereeniging, collectively had a total installed capacity of more than 160 megawatts.

The following power stations were built during this period:
- Rosherville
- Vereeniging

The Simmerpan Control Centre was also built during this period.
1923 to 1929 – The Early years of establishment

- The Government Gazette of 6 March 1923 announced the establishment of The Electricity Supply Commission (Escom), effective from 1 March 1923.

- The Commission was made responsible for establishing and maintaining electricity supply undertakings on a regional basis.

- Electricity was to be supplied efficiently, cheaply and abundantly to government departments, railways and harbours, local authorities and industry.

The Electricity Supply Commission (Escom) Logo

Information courtesy of the Eskom Heritage website - http://intranet.eskom.co.za/heritage/indexNHR.htm
1923 to 1929 - The early years of establishment

- The following power stations were built during this period:
  - Witbank
  - Salt River
  - Congella
  - Colenso
  - Sabie River Gorge
1930 to 1939 – Roots were established

Escom House, the headquarters of the Electricity Supply Commission from 1937

Klip power station – the first generator was started in 1936

Information courtesy of the Eskom Heritage website -http://intranet.eskom.co.za/heritage/indexNHR.htm
1940 to 1949 – The years of suffering

- Vaal power Station was the first Escom station to be built in the Orange Free State.

- The station had been planned to have 108 MW of generating plant installed initially, scheduled to be in operation in 1941, and to be extended later to 400 MW, if necessary.

- However, delivery of equipment was delayed and the construction programme seriously delayed by difficulties arising out of World War II (1939-1945).

- When finally completed in 1953, Vaal had 318MW of generating plant installed.
1950 to 1959 – The years of growth

- Soaring demand for power challenged Escom in the post-war period. This demand came from industrial growth in the Vaal Triangle (Vereeniging / Vanderbijlpark / Sasolburg) area, on the Witwatersrand, in the big cities and the Northern Transvaal (now known as Northern Province).

- The following power stations were built during this period:
  - Vierfontein
  - Umgeni
  - Hex River
  - Highveld
  - Taalbos
  - Salt river 2
  - Wilge
  - Komati
  - Ingagane
  - West bank

Information courtesy of the Eskom Heritage website - http://intranet.eskom.co.za/heritage/indexNHR.htm
1960 to 1969 – The years of blossoming…

- More coal-fired power station giants, to be erected in the Eastern Transvaal, were announced in the 1960s.

- The following power stations were built during this period:
  - Camden
  - Hendrina
  - Arnot
  - Kriel
  - Grootvlei
  - Cahora Bassa

Information courtesy of the Eskom Heritage website - http://intranet.eskom.co.za/heritage/indexNHR.htm
1970 to 1979 – The years of consolidation

- The following power stations were built during this period:
  - Van Der Kloof
  - Gariep
  - Matla
  - Duvha
  - Koeberg
  - Drakensberg

Van Der Kloof power station
Koeberg power station
Gariep power station

Information courtesy of the Eskom Heritage website - http://intranet.eskom.co.za/heritage/indexNHR.htm
1980 to 1989 – The years of expansion & change

- The following power stations were built during this period:
  - Tutuka
  - Lethabo
  - Majuba
  - Matimba
  - Kendal
  - Palmiet

Information courtesy of the Eskom Heritage website - http://intranet.eskom.co.za/heritage/indexNHR.htm
1990 to 1999 – African Renaissance

- Efforts were directed **to bring electricity for all**. By 1992, almost one million more people were receiving an electricity supply and 260 electrification projects were underway.

- The **National Electricity Regulator** was established in 1994 to ensure orderly, effective generation and distribution of electricity throughout SA.

- Technology and management agreements where established with **Electricité de France** and **East Midlands Electricity (UK)** to ensure long-term improvements in the quality of supply.

- **Eskom Enterprises** was formed in 1999 to focus on non-regulated business activities in SA and became involved in energy and related services business internationally. This was done on the spirit of **President Thabo Mbeki’s** vision of an **African Renaissance**.

- **Eskom Development Foundation** was launched in 1999 which undertook initiatives such as small business development, community development, electrification of schools and clinics.

Jeff Radebe, Minister of Public Enterprises, switches on the power in the Mashigo household in Elandsfontein, Mpumalanga to celebrate the 1,75 millionth connection.

Information courtesy of the Eskom Heritage website -http://intranet.eskom.co.za/heritage/indexNHR.htm
• In 2001, Eskom was presented with the award for the **Power Company of the Year** at the Global Energy Awards ceremony.

• In 2002, the **Eskom Conversion Act** was signed converting Eskom from a public enterprise into a public company having share capital. The Minister of Public Enterprises, Mr Jeff Radebe, announced the appointment of a Board of Directors for Eskom.

• In 2004, Markinor Sunday Times Top Brands survey identified Eskom as South Africa's most admired brand.

• Higher energy demand caused power outages in 2006/7. The generation capacity reserve margin shrunk between 8% and 10%. President Thabo Mbeki made a public apology in 2007 for government not accepting Eskom's timeous recommendation to build more generating plant to match the country's growth rate.

• **Gourikwa** and **Ankerlig**, open-cycle gas turbine stations, were ready to supply power for the winter of 2007.
To sustain growth and prosperity, South Africa urgently needs a vast expansion in power generation capacity.

South Africa 1994-2008 growth

<table>
<thead>
<tr>
<th>Real GDP</th>
<th>Power capacity (~5 000 MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64%</td>
<td>14%</td>
</tr>
</tbody>
</table>

SOURCE: STATS-SA, Eskom website
The Eskom value chain and plant mix
### Existing plant mix

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Nominal capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-fired</td>
<td>13 stations</td>
<td>37 715 MW</td>
</tr>
<tr>
<td>Gas/liquid fuel turbine</td>
<td>4 stations</td>
<td>2 426 MW</td>
</tr>
<tr>
<td>Hydroelectric</td>
<td>6 stations</td>
<td>661 MW</td>
</tr>
<tr>
<td>Pumped storage</td>
<td>2 stations</td>
<td>1 400 MW</td>
</tr>
<tr>
<td>Nuclear</td>
<td>1 station</td>
<td>1 910 MW</td>
</tr>
<tr>
<td>Wind energy</td>
<td>1 station</td>
<td>3 MW</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>27 stations</strong></td>
<td><strong>44 115MW</strong></td>
</tr>
</tbody>
</table>
**New generation capacity and transmission networks 2005–2018**

### Return-to-service (RTS)
- None

### Base load
- Nuclear–site development and front end planning
- Biomass
- Primary Energy projects (Road & Rail)

### Peaking & renewables
- Sere (100MW)
- Pilot Concentrated Solar Power (100MW)
- Photovoltaic (Own use*)

### Mpumalanga refurbishment
- Refurbishment and air quality projects

### Transmission
- 60 Grid strengthening projects

<table>
<thead>
<tr>
<th><strong>Return-to-service (RTS)</strong></th>
<th><strong>Base load</strong></th>
<th><strong>Peaking &amp; renewables</strong></th>
<th><strong>Mpumalanga refurbishment</strong></th>
<th><strong>Transmission</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Commissions of new stations

<table>
<thead>
<tr>
<th></th>
<th>First unit</th>
<th>Last unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medupi</td>
<td>2013</td>
<td>2017</td>
</tr>
<tr>
<td>Kusile</td>
<td>2014</td>
<td>2018</td>
</tr>
<tr>
<td>Ingula</td>
<td>2014</td>
<td>2014</td>
</tr>
</tbody>
</table>

- ~ 17 082MW of new capacity (5 756MW installed and commissioned)
- ~ 4 700km of required transmission network (3 899.3km installed)
- 20 600MVA planned (20 195MVA installed)

**Note:**
* Solar PV Plants at Lethabo (0.575MW) & Kendal (0.620MW) are in operation phase

**Medupi is the first coal-generating plant in Africa to use supercritical power generation technology**

(1) Includes 1.62 MW for Solar PV (MWP, Lethabo & Kendal) Source: Eskom Group Capital Division (Construction Management)
Current planned capital expansion plan

<table>
<thead>
<tr>
<th>Project</th>
<th>Year to 31 March 2013</th>
<th>Year to 31 March 2014</th>
<th>Year to 31 March 2015</th>
<th>Year to 31 March 2016</th>
<th>Year to 31 March 2017</th>
<th>Year to 31 March 2018</th>
<th>Year to 31 March 2019</th>
<th>Total (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grootvlei (return to service)</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Komati (return to service)</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Camden (return to service)</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Medupi (coal fired)</td>
<td></td>
<td>794</td>
<td>794</td>
<td>1 588</td>
<td>794</td>
<td>794</td>
<td></td>
<td>4 764</td>
</tr>
<tr>
<td>Kusile (coal fired)</td>
<td></td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1 600</td>
<td></td>
<td>4 800</td>
</tr>
<tr>
<td>Ingula (pumped storage)</td>
<td></td>
<td>1 332</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 332</td>
</tr>
<tr>
<td>Sere wind farm (renewable)</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>260</strong></td>
<td><strong>894</strong></td>
<td><strong>2 926</strong></td>
<td><strong>2 388</strong></td>
<td><strong>1 594</strong></td>
<td><strong>1 594</strong></td>
<td><strong>1 600</strong></td>
<td><strong>11 256</strong></td>
</tr>
</tbody>
</table>

In addition, Eskom has commenced the development of a 100MW CSP plant.
Kusile and Medupi will be the third and fourth largest coal-fired power plant in the world, respectively...

Coal-fired power plants (MW)
1. Taichung (Taiwan, 7 100)
2. Waigaoqiao (China, 5 000)
3. Kusile (South Africa, 4 800)
4. Medupi (South Africa, 4 764)
5. Zouxian (China, 4 540)
6. Kendal (South Africa, 4 374)
7. ...
8. ...

Higher than Sandton City Towers

4x more investment than Gautrain

1 = 5 500 existing + 1 600 planned
…requiring considerable amounts of materials and large transport effort in their construction

Characteristics of Medupi/ Kusile

Concrete…

- …to build 4 Greenpoint stadiums will be used per plant

Parts and cement…

- …weighing the same as 14 super tankers will be transported over land

Steel…

- …to build one of the world’s tallest buildings (The Burj Khalifa) will be used

Transport…

- …of materials to site is equivalent to at least 40 times around the world

SOURCE: Eskom Build Programme
The operation of the plant will demand large amounts of coal and water on a daily basis.

**Coal**
- ~40 Olympic pools of coal will be consumed per day at Medupi/Kusile

**Water**
- ~30 Olympic pools will be used for the plant operation on a daily basis
The programme will fuel demand for relevant graduates and artisans and will grow the wide required skill base.

Medupi would...

... consume **43%** of a year’s relevant **university graduation** (engineering, project planning, etc.)

... deploy **48%** of a year’s output of **artisans**

... rapidly grow South Africa’s **supply** of engineers, artisans, R&D and project management experts

... develop a **wide range of additional skills** through ASGI-SA commitments

SOURCE: Eskom Enterprises division and Medupi project
Across Medupi, Kusile, and Ingula new employment opportunities will touch the lives of ~160,000 people

<table>
<thead>
<tr>
<th></th>
<th>Medupi</th>
<th>Kusile</th>
<th>Ingula</th>
</tr>
</thead>
<tbody>
<tr>
<td>On site construction</td>
<td>8,300</td>
<td>7,200</td>
<td>4,100</td>
</tr>
<tr>
<td>Supporting project staff</td>
<td>2,200</td>
<td>2,000</td>
<td>300</td>
</tr>
<tr>
<td>Coal mine expansion</td>
<td>2,100</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Transmission expansion</td>
<td>2,700</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Crocodile River expansion</td>
<td>3,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing operations</td>
<td>700</td>
<td>600</td>
<td>100</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>~19,000</td>
<td>~12,000</td>
<td>~4,500</td>
</tr>
</tbody>
</table>

**INDIRECT**

<table>
<thead>
<tr>
<th></th>
<th>Medupi</th>
<th>Kusile</th>
<th>Ingula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social services + local business</td>
<td>1,700</td>
<td>1,700</td>
<td>1,100</td>
</tr>
<tr>
<td><strong>Total employed</strong></td>
<td>20,700</td>
<td>13,700</td>
<td>5,600</td>
</tr>
<tr>
<td>x family multiplier (4/family)</td>
<td>x 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

People directly impacted by Medupi, Kusile & Ingula: ~160,000

Other projects such as 765kV and RTS provide ~11,000 direct employment opportunities during construction and a further ~1,700 during operation.

**SOURCE**: Eskom Enterprises division and Medupi project
Internal assessment capability framework

<table>
<thead>
<tr>
<th>Capability</th>
<th>Eskom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Direction</td>
<td></td>
</tr>
<tr>
<td>Governance and Assurance</td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td></td>
</tr>
<tr>
<td>Methodology and Frameworks (repeatability and consistency)</td>
<td></td>
</tr>
<tr>
<td>Programme and Project Delivery</td>
<td></td>
</tr>
</tbody>
</table>

Assessment Framework

Assessment Parameters
- Desktop analysis
- Subjective review
- Conservative score
- Reasonable level of confidence
- High level of consensus

Narrow representation

High level of consensus
Were we missing the obvious?

- KFC witness
- protection program
Maturity level of the six organisational capabilities

Realising Eskom is still in the process of fully developing all the required supporting capability elements, and building the management experience and competencies essential for effective project development and execution from a low base.
• Organisational Effectiveness Assessment
  • The purpose of the Organisational Effectiveness Benchmarking study was to assess Eskom’s organisational effectiveness to manage its capital projects compared to Industry and Best Practice.

• Capital Project System Benchmarking
  • IPA measured the effectiveness of project delivery systems presently used within Eskom by benchmarking a sample of 11 projects conducted by Eskom.
Organisational effectiveness

Elements of Organizational Effectiveness

**Organizational Structure**
- Degree of centralization
- Hierarchy
- PM role and authority
- Career path
- Training

**Work Process**
- Work process experience
- Work process compliance
- Gatekeeping
- Recycle/cancellation rates at gates

**People**
- Number of FTEs
- Competencies to retain in-house
- Experience
- Project manager selection criteria

**Organizational Effectiveness**
Houston we have a problem
We had two choices: pretend everything is ok
Let us move the boundaries
What is the vision for Eskom Project Management?

To lead Eskom to become a top performing Project Management Organisation by 2015.


To define standardised policies, processes, procedures & guides.

To provide strategic direction for Project Management.

To mature the organisation’s project management practices.

Establish and implement an effective Knowledge Management Strategy.
Elements of Capital Effectiveness

Key Leading Indicators

1. Alignment of Functions
2. Front-End Loading
3. Use of Value Improving Practices
4. Leading Technology

Key Performance Indicators

1. Discipline & Continuity
2. Optimal Scope for Business Needs
3. Executed With Minimum Change
4. Timely Involvement of Contractors/Vendors

Objectives

- Low Cost
- Fast Cycle Time
- Excellent Operability
- SAFETY
- BETTER IRR
# CII Project Life Cycle Matrix

<table>
<thead>
<tr>
<th>Phase</th>
<th>Perform Business Planning</th>
<th>Perform Pre-Project Planning</th>
<th>Execute Project</th>
<th>Operate Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge Area</strong></td>
<td>Determine Resources and Sources</td>
<td>Identify Corporate Objectives and Develop Project Concept</td>
<td>Organize Pre-Project Planning</td>
<td>Select Project Alternatives</td>
</tr>
<tr>
<td>01 Project Planning</td>
<td>BP</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>01.01 Front End Planning</td>
<td>BP</td>
<td>-</td>
<td>BP</td>
<td>-</td>
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<tr>
<td>01.02 Alignment</td>
<td>BP</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>02 Design Optimization</td>
<td>BP</td>
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</tr>
<tr>
<td>03 Procurement and Materials Management</td>
<td>BP</td>
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<tr>
<td>04 Construction - Other</td>
<td>BP</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>05 Facility Startup and Operations</td>
<td>BP</td>
<td>-</td>
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<tr>
<td>06 Human Resources Management</td>
<td>BP</td>
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<tr>
<td>07 Project Organization and Management</td>
<td>BP</td>
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<tr>
<td>07.01 Team Building</td>
<td>BP</td>
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</tr>
<tr>
<td>07.02 Partnering</td>
<td>BP</td>
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<tr>
<td>08 Business and Project Processes</td>
<td>BP</td>
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<td>08.01 Quality Management</td>
<td>BP</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>08.02 Implementation of CII Research</td>
<td>BP</td>
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<td>BP</td>
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<tr>
<td>08.03 Lessons Learned</td>
<td>BP</td>
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<td>08.05 Benchmarking Metrics</td>
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<tr>
<td>08.09 Change Management</td>
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</tr>
<tr>
<td>09 Project Controls</td>
<td>BP</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>10 Risk Management</td>
<td>BP</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.01 Disputes Prevention &amp; Resolution</td>
<td>BP</td>
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<tr>
<td>10.06 Project Risk Assessment</td>
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<tr>
<td>11 Safety, Health, and Environment</td>
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<tr>
<td>12 Information Management and Technology Systems</td>
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<tr>
<td>13 Globalization Issues</td>
<td>BP</td>
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<tr>
<td>14 Security</td>
<td>BP</td>
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</tbody>
</table>
Eskom is implementing the PDRA to improve project scope definition and the probability for project success

What is the PDRA

The PDRA is a ‘best practice’ procedure and toolset designed to increase the probability of project success, by improving the completeness of the project scope definition, identifying and rectifying deficiencies early on.

The project definition readiness assessment utilises the project definition rating index (PDRI) tools developed by the Construction Industry Institute (CII), based in the University of Texas, in the USA.

Why use the PDRA

Research by the CII has clearly shown improved levels of front end planning effort result in significant cost and schedule savings.[1]

Comparison of projects with PDRA scores above and below 200 points

<table>
<thead>
<tr>
<th>Performance</th>
<th>PDRA Score</th>
<th>&lt; 200</th>
<th>&gt; 200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cost</td>
<td>Schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5% below budget</td>
<td>25% over budget</td>
</tr>
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<td>13% behind schedule</td>
<td>30% behind schedule</td>
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<td></td>
<td>3% of budget</td>
<td>10% of budget</td>
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</table>


Steps to improve Eskom project success

Implement the Project Definition Readiness Assessment (PDRA) and Team Alignment tools.

Train people to apply the project definition readiness assessment procedure and tools.

Develop and embed the project definition readiness procedure and toolset solution.

Facilitate project readiness assessments on all capital (construction and engineering) projects.

Develop and tailor an Eskom aligned toolset.

Build a project readiness core competence and skills base in Eskom.
The Project Definition Readiness Assessment assess the readiness of a project to proceed to the next phase.

**Evaluations Managed Internally by Group Capital**

<table>
<thead>
<tr>
<th>Phase Gates</th>
<th>Pre-Project Planning</th>
<th>Concept</th>
<th>Definition</th>
<th>Execution</th>
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<tbody>
<tr>
<td>1st</td>
<td>Project Readiness Evaluation</td>
<td>CRA</td>
<td>DRA</td>
<td>ERA</td>
</tr>
<tr>
<td>2nd</td>
<td>FEL 1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3rd</td>
<td>FEL 2</td>
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<tr>
<td>4th</td>
<td>FEL 3</td>
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</tbody>
</table>

**Project Readiness assessment methodology and tool applied by the GCD PMCoE**
The PMCoE is the Custodian of the PDRA and will schedule and facilitate the 4 PDRA sessions. This will ensure the outcome remains independent.

On selected projects, the IPA will administer an independent front end loading project evaluation.

This will provide an independent ‘qualified’ assurance evaluation to funders and other stakeholders.

**Independent Project Analysis (IPA) project evaluation**

**Examples of projects which the IPA will be requested to evaluate:**

- Projects involving multiple Divisions.
- Projects involving more than 1 Region.
- Projects identified as particularly complex, and/or strategic.
Application of PKHI Assessment Tool

External IPA Independent Project Readiness Assessment

1st Project Readiness Assessment
2nd Project Readiness Assessment
3rd Project Readiness Assessment
4th Project Readiness Assessment
1st Project Key Health Indicator (PKHI) Assessment

Project Readiness assessment methodology and tool applied by the GCD PMCoE

CRA
DRA
BP
ERA
PEP

Evaluations managed internally by Group Capital

5 Project Health Outcomes
- Cost
- Schedule
- Quality/Operability
- Safety
- Stakeholder Satisfaction

8 Project Practices
- Alignment
- Change Management
- Constructability
- Contracting
- Quality Management
- Safety Practices
- Project Control
- Team Building

43 Leading Indicators
(Some Examples below)
- Project Team’s role
- Project Milestones
- Scope Definition
- Supplier Involvement
- Quality Plan
- Safety Standards
- Design Reviews
- People Management matters
- Technology standards
- Key Project Stakeholders
- Organisational Involvement
# Project Life Cycle Model (PLCM) & Benefit Realisation Management (BRM)

## Strawman - Draft Details

<table>
<thead>
<tr>
<th>Phases</th>
<th>Outline Project Definition</th>
<th>Develop Alternatives</th>
<th>Develop Solution</th>
<th>Execute</th>
<th>Project Close</th>
<th>Operate</th>
<th>Operate</th>
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<tbody>
<tr>
<td>Stages</td>
<td>Define need</td>
<td>Identify Alternatives</td>
<td>Select single</td>
<td>Implement</td>
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<td>Project Close</td>
<td>Realise Benefits</td>
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## Value Management

- **Benefits Strategy**
- **Benefits Statement**
- **Benefits Mng Plan**
- **Benefits Realisation Plan**
- **Measure Benefits Measurables**
- **Identify Benefits realised @ Project Execution**
- **Remediation efforts identify & implement**

## Achievements:

- **Benefits Realization was updated on:**
  - Portfolio and Programme PCM's.
  - PLCM Policy.
  - Project Delivery Policy.
  - Programme management procedure.

## Next Steps / Way forward:

- PLCM Rev.10 to be completed by Dec 2013.
- Value management framework to be confirmed end Oct 2012.
- Benefits Realisation Procedure to be completed end Oct 2012.
- Value management & benefits realization artifacts to be confirmed as per the PLCM (post Oct 2012).
Integration with other “Worlds” in the Organisation

Strategic Intent

Artefact Sanitisation

Integration Required

Project Capabilities
- Project Management
- Contracting & Procurement
- Cost Management
- Planning & Schedule Management
- Programme Management
- Project Management
- Reporting & Monitoring
-Commissioning
- Construction Management
- Engineering & Design Management
- Financial Management
- Integrated Resource Management
- Quality Management
- Risk Management
- Safety & Health Management
- Configuration & Deployment Management
- Site Management
- Environment Management
- Project Integration Management
- Regulatory & Permitting Management
- Stakeholder & Comm Management
- Knowledge Management

Master List of PM related Artefacts
- 600+ documents
- 300+ documents
- Optimised List
- 128x documents

End State

Detailed Plan

Integration to other “worlds”
Business PCM’s → PPM & Oracle Centric PCM’s

**Business PCM’s**

1.1. Determine the Electricity Need and Supply Options
1.2. Identify the Capital Expansion Opportunities
1.3. Select the Required Capital Expansion Opportunity
1.4. Develop the Capital Expansion Project

2.1. Establish the Project Execution Organisation
2.2. Ensure Site Readiness for Construction to Commence
2.3. Execute Detail Planning and Design
2.4. Procure the Required Products and Services for Construction
2.5. Construct the Plant
2.6. Commission and Handover the Plant
2.7. Determine the Success of the Project Execution

3.1. Enable the Operations and Maintenance Startup
3.2. Manage Defects, Liabilities, and Warranty Period
3.3. Close-out All the Contracts
3.4. Close Out the Project

4.1. Plan the Post-Project Evaluation
4.2. Execute the Post-Project Evaluation
5.1. Enable the Capital Expansion Project (HR, Finance, Eng, etc)

**SAP PPM System Centric sub-PCM’s**

- Pre Plan Long and Medium Term Plan
- Align and Consolidate Plan
- Optimize investments
- Develop long- and medium term plan
- Evaluate potential opportunities
- Perform risk assessment
- Work bundling
- Project initiation and scoping
- Commit to annual work program
- Manage work closure and information capture
- Manage contract delivery
- Program management

**Oracle System Centric sub-PCM’s**

- Plan the project (scheduling)
- Close the project
- Post-project evaluation
- Communicate to project stakeholders
- Finance the project
- Manage project cost
- Manage change
- Manage risk
- Manage contracts
- Measure project performance

The focus of these sub-PCM’s will be for the support of the switch-on functionality for the 1 Oct 2011 PPM Solution

sub-processes were identified by the Business and rolled-up for the Oracle POC

Business PCM’s → identified from the Capital Expansion Value Chain
How does this support project management maturity?

**Project Management Maturity Levels**

**LEVEL 5  OPTIMISING**
- PM Methodology operates routinely
- Projects meet schedule, cost and quality requirements
- There are organisational objectives for improvement in PM
- Common causes of PM problems are tracked, documented, prioritised & systematically eliminated
- There is participation in benchmarking forums

**LEVEL 4  COMPREHENSIVE**
- There is a structured PM approach
- A basic PM discipline is established
- A PM methodology is adopted consisting of processes, standards, tools, templates, training and management support
- Some form of a project support office is established
- However, underlying principles are not well understood or consistently followed

**LEVEL 3  INTEGRATED**
- PM processes are implemented throughout the organisation
- There is an organisation wide information integration & advanced technique development
- PM processes re documented, standardised and integrated
- There is an effective Project Support Office
- Certification of PM takes place
- There is a centralised PM entity and well defined performance management policies

**LEVEL 2  CONSISTENT**
- No formal PM Methodology
- Inconsistently performed processes
- No unified approach to projects
- Training is not provided or is haphazard

**LEVEL 1  ADHOC**
Project sizing and classification provides a structured approach to determine the governance class of project.

**Step 1:** What Type of Project?

- Business Projects
- Innovation Projects
- Build Projects
- Refurbishment Projects
- Outage Cycle Projects
- Routine Projects
- Decommission Projects

**Step 2:** Which Function Manages?

- PLCM Framework

**Step 3:** ‘Sizing’ Classification

- Decision Tree
- Classification Criteria
  - Strategic
  - Interdependency
  - Complexity
  - Resource Intensity
  - Technology
  - Risk / Uncertainty
- Group Capital Division or Proposing Division
- Class of project
  - A. Mega
  - B. Very Large
  - C. Large
  - D. Medium
  - E. Small
  - F. Bulk

**Step 4:** Determine the level of project classification and appropriate level of governance and control

- Motivation Appraisal
- Governance Approvals
- Tools / Systems
- Reporting, Monitoring & Oversight

**Outcome:**
- Project assigned to the right portfolio
- Dept that will manage & execute established
- Project correctly classified i.t.o. size

Correct determination of:
- PLCM to be used, Level of Governance;
- Enabling processes & systems, organisation Required to manage the project.
The “Franschise” deliverable is depicted in our project framework called the Eskom Project Management System (E-PMS).
The Eskom Project Management System (E-PMS) was created using HPUM, PLCM and existing capabilities and processes.
Systems selected and implemented
Continuous improvement roadmap principles

- Inter-depandant business elements with underlying Eskom values make up organisational effectiveness in line with IPA framework and findings:
  - Organisational Structure, people & governance
  - Processes and Systems
Eskom’s Approach aligns to international best practices and standards

The ‘Eskom Way’
The Next Generation Project Leadership

• People are the driving force for a successful business/project and we therefore need to invest in the enhancement of their capabilities.

• A top performing business calls for a ‘next generation’ project leader/team that not only delivers on tangible results (safety, cost, time, quality, etc) but also possess the required ‘soft skills’.

• These interpersonal and behavioural ‘soft skills’ include:
  - Managing stakeholders and human resources effectively.
  - Effectively managing Change and Communication.
  - Continuously enhancing team effectiveness.
  - Resolving conflict quickly and effectively.
  - Having the ability to oversee, negotiate, assign, influence, delegate, coach and mentor.

• The ‘next generation’ project leader/team will successfully deliver our programmes and do so with a strong focus on effective leadership, safety and environmental management.

• The next generation project leader will effectively deliver through skills such as systems thinking, adaptability to change, learning agility and dealing with paradox and ambiguity.
“Our commitment is to develop a Project Management Community to deliver on the project execution plan which will make Eskom a world-class organisation.”
Eskom’s Vision: To be one of the World’s Top 5 Performing Utilities

To be recognised globally as a top performing organisation, our project delivery capability should be at the top quintile of performance and recognised as such globally.

...How do we get there?
Thank you