Strategic Integrated Projects (SIPs)

Needs analysis of infrastructure to support economic development and trade whilst simultaneously addressing the needs of the poor.

- Needs analysis
  - Indicated possible bulk infrastructure requirements – electricity, water, transport, town planning, ports etc.

Population
- Limited Utility Services
- Generation (wind, Solar)
- Water
Three energy related SIPS

SIP 8: Green energy in support of the South African economy
• Roll out of the Integrated Resource Plan (IRP2010)

SIP 9: Electricity generation to support socioeconomic development
• Accelerated construction of new electricity generation capacity

SIP 10: Electricity transmission & distribution
• Expand the transmission and distribution network
Electrical Grid Infrastructure SEA Project Team

**Project Coordinator: DEA**
- Dee Fischer: Project Coordinator
- Surprise Zwane: Project Manager

**Project Partner: Eskom**
- Ronald Marais: Head of Strategic Transmission Planning
- Kevin Leask: Chief Transmission Engineer

**Environmental Consultants: CSIR**
- Paul Lochner: SEA Project Leader
- Marshall Mabin: EGI SEA Project Manager

**Joint Service Provider: South African National Biodiversity Institute**
- Jeffrey Manuel and Fahiema Daniels
Vision and Objectives of SEA

**Vision for the SEA:** Strategic Electrical Grid Infrastructure (EGI) is expanded in an environmentally **responsible** and **efficient** manner that responds **effectively** to the country’s economic and social development needs.

**Objectives of the SEA:**

- Identify strategic corridors which support electricity transmission needs up to 2040.
- Refine the corridors based on **high level suitability** from an environmental, economic and social perspective.
- Facilitate **streamlined environmental authorisation** for transmission infrastructure development within the corridors.
- Promote **collaborative governance** between authorising authorities.
- Develop a **site specific development protocol**.
- Enable Eskom **greater flexibility** when undertaking land negotiation.
- Support upfront **strategic investment**
Identifying Strategic Corridors for EGI

• Eskom Strategic Grid Plan Study: Formulates long term strategic transmission corridor requirements for South Africa
• 20 year horizon, extended to 30 years for purposes of this study
• Based on range of generation scenarios, and associated strategic network analysis
• Three future scenarios considered:
  – **The IRP 2010 base Scenario**
    • Extended to 2040
  – **Increased Renewable Scenario**
    • Replace nuclear component with RE base generation equivalent
  – ** Increased Import Scenario**
    • Double imported power by 2030
• Energy power demand and supply deficit and excesses was assessed for each scenario
• Assessed per Province and within Provinces
• Results identify potential grid expansion requirements
Phase I (Jan-Aug 14)

- Environmental Constraints Map
- Eskom Preliminary Corridors

Phase II (Aug – Feb 15)

- Final Corridors
- Specialist Studies
- Demand Map

Phase III (Mar-Dec 15)

- Final Corridors
- Environmental Sensitivity Map
- Development Protocol

EGI SEA APPROACH

Participation
Environmental Constraints Map

- Impact of ‘Transmission Infrastructure on the Environment’
- A GIS based spatial mapping exercise to determine very high sensitive environmental features within and in proximity to the preliminary Eskom corridors;
- Broad range of environmental features considered as part of the sensitivity assessment, including:

  - **Biophysical:**
    - Conservation areas
    - Endangered and sensitive habitats
    - IBAs

  - **Cultural**
    - Archaeological sites
    - Proclaimed natural heritage sites

  - **Socio Economic**
    - Square Kilometre Array
    - Runway restrictions
    - Tourist routes
    - Game farms and hunting areas

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Impact of ‘Environment on Transmission Infrastructure’

‘A feature (natural or unnatural) which represents a significant cost to Eskom when developing or operating transmission line infrastructure on or in proximity to that feature’.

Baseline Cost Index (BCI) or ‘X’: represents optimal development/operating conditions i.e. best case cost scenario

‘Lifetime cost associated with the development and operation of 1km of 400kV line over a 20 year period assuming optimal development and operating conditions’

Types of engineering constraints include:

- Urban areas
- Intensive agricultures
- Coast
- Mining areas
- Slope
- Dolomite
Constraints Categories and Draft Mapping Outputs

### Engineering Constraints Categories

<table>
<thead>
<tr>
<th>Level of Constraint</th>
<th>Description</th>
<th>BCI Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>The lifetime cost associated with development in this area is &gt;150% the BCI.</td>
<td>&gt;1.5X</td>
</tr>
<tr>
<td>High</td>
<td>The lifetime cost associated with development in this area is between 120% and 150% the BCI.</td>
<td>&gt;1.2X&lt;1.5X</td>
</tr>
<tr>
<td>Medium</td>
<td>The lifetime cost associated with development in this area is between 100% and 120% the BCI.</td>
<td>&gt;1X&lt;1.2X</td>
</tr>
<tr>
<td>Low</td>
<td>Baseline Cost Index (BCI)</td>
<td>1X</td>
</tr>
</tbody>
</table>

### Environmental Constraints Categories

<table>
<thead>
<tr>
<th>Level of Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>The area is rated as extremely sensitive to the negative impact of development. As a result the area will either have very high conservation value, very high existing/potential socio-economic value or hold legal protection status.</td>
</tr>
<tr>
<td>High</td>
<td>The area is rated as being of high sensitivity to the negative impact of development. As a result the area will either have high conservation value and or existing/potential socio-economic value.</td>
</tr>
<tr>
<td>Medium</td>
<td>The area is rated as being of medium sensitivity to the negative impact of development. As a result the area will either have medium levels of conservation value and or medium levels of existing/potential socio-economic value.</td>
</tr>
<tr>
<td>Low</td>
<td>Area is considered to have low levels of sensitivity in the context of electricity grid infrastructure development.</td>
</tr>
</tbody>
</table>
Demand Mapping Process

Demand (Positive) Mapping

- Determining where the electricity (or the evacuation thereof) is needed;
- Information gathering will comprise:
  - Desktop review of local government and provincial planning documentation;
  - Industry bulk energy user/producer workshop and exercise;
  - Consultation with local government;
  - Engagement with national departments;
- Information to be digitised into GIS format.
Corridor Refinement Process

1. Demand Layer
2. Engineering Constraints Layer
3. Environmental Constraints Layer

Optimal Corridor Positioning
Phase III

- **Specialist Studies**
  - Undertake scoping level assessment of area within the corridors;
    - Ecological Assessment
    - Bird Assessment
    - Heritage Assessment
    - Visual Impact Assessment
  - Create sensitivity map for each assessment type in each of the corridors
  - Assist in the creation of the development protocol
    - Specifies minimum assessment requirements
    - Proposed mitigation measures

[Map Image]
Cabinet Approval Process

- Stakeholder Engagement
- SEAs Recommendations and Development Protocol
- PICC (MANCOM) MinMec Consensus (Environmental Authorities)
- Ministers
- Cabinet Approval

- Gazetted Corridors
- Environmental Sensitivity Map
- Development Protocol

www.csir.co.za
DEA National Electricity Grid Infrastructure SEA to facilitate the efficient and effective expansion of key strategic transmission infrastructure in South Africa

Webpage: https://egi.csir.co.za/

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Thank you for your attention