Energy Management Systems and Programmes in South Africa

*Industrial Energy Efficiency Project*

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Paris: 11-12 December 2017

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Presentation Points

- Context: Supply and Tariffs
- Policies and Programmes
- IEE Project: Framework and Outcomes

INSTALLLED GENERATION CAPACITY (MW, 2016), TOTAL

50,317

RENEWABLE ELECTRICITY OUTPUT AS % OF TOTAL ELECTRICITY OUTPUT EXCL. HYDRO (2016)

~3

PEAK DEMAND (MW, 2016)

34,481
Electricity Tariffs: Past & Future

Eskom average tariff vs. inflation (CPI)

- **2007 - 2015**: 300.7% increase (excluding additional increase requested)
- **45.1%** inflation
- **2008 electricity crisis**
- Additional 2015 - 2017 increases requested

Price index (2016 = 1.0)
- GDP chain-type price index

- **2016** projections
- History
Supply Decommissioning Schedule

The IRP model fills the supply gap in the least-cost manner, subject to any constraints imposed on the model.
- Electricity Basic Services Support Tariff Policy
- Biofuels Industrial Strategy - 2007
- National Climate Change Response Strategy (NCCRS)
- National Energy Act No. 34 of 2008
- Integrated Resource Plan for Electricity 2010-2030 (IRP2)
- Integrated Energy Plan (IEP) (not yet promulgated)
- Income Tax Act Amendments (12i/k/l…) – Tax incentives for EE savings
- SANS 941 – Energy Efficiency of Electrical and Electronic Apparatus
- Energy Efficient Leadership Network (EELN)
- Carbon Tax

All industrial facilities, mines, commercial & public buildings consuming more than 180 TJ pa shall submit annual energy consumption figures and all consuming >400 TJ pa shall submit a 5 year energy management plan.
Income Tax Act Amendment – 12L

52 PROJECTS

CURRENT PORTFOLIO OF APPROVED PROJECTS IS PROJECTED TO CONTRIBUTE 18.6% IN TERMS OF FIXED INVESTMENT IN THE MANUFACTURING SECTOR IN 2016 (AND 5.5% IN 2015, 5.4% IN 2017 AND 2.3% IN 2018)

R3.31 PRIVATE SECTOR INVESTMENT LEVERAGED FOR EVERY R1.00 TAX ALLOWANCE

1.5TWH PER ANNUM ENERGY SAVINGS TO BE REALISED BY APPROVED PROJECTS

…while improving resource efficiency in the manufacturing sector - enhancing competitiveness
### National Energy Efficiency Strategy

#### NEES 2000 – 2015:

<table>
<thead>
<tr>
<th>Sector</th>
<th>2015 Target (2000 baseline)</th>
<th>Performance to 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy-wide</td>
<td>12%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Industry</td>
<td>15%</td>
<td>34.3%</td>
</tr>
<tr>
<td>Residential</td>
<td>10%</td>
<td>28.2%</td>
</tr>
<tr>
<td>Commercial &amp; Public</td>
<td>15%</td>
<td>0.3% (electricity only, 2003-13)</td>
</tr>
<tr>
<td>Transport</td>
<td>9%</td>
<td>14.1% (reduction in sector-wide energy intensity)</td>
</tr>
<tr>
<td>Power Sector</td>
<td>15%</td>
<td>26% (estimated by Eskom)</td>
</tr>
</tbody>
</table>

#### NEES 2016 – 2030 – Published for public comment
National Drivers of EnMS / ISO 50001

- Insulate against electricity outages
- Mitigate against sharply rising energy costs
- Global trading requirements for exporters
- Alignment with global corporate requirements
- Environmental reputation enhancement

<table>
<thead>
<tr>
<th>ECM Implementation Driver</th>
<th>R²</th>
<th>P-Value</th>
<th>Significance F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (%) annual electricity tariff increase</td>
<td>0.9920</td>
<td>0.0040</td>
<td>0.0040</td>
</tr>
<tr>
<td>No of Companies implementing ECM's</td>
<td>0.9005</td>
<td>0.0511</td>
<td>0.0511</td>
</tr>
<tr>
<td>Electricity tariffs</td>
<td>0.8930</td>
<td>0.0550</td>
<td>0.0550</td>
</tr>
<tr>
<td>Cooling Degree Days</td>
<td>0.7473</td>
<td>0.1356</td>
<td>0.1356</td>
</tr>
<tr>
<td>Heating Degree Days</td>
<td>0.7345</td>
<td>0.1430</td>
<td>0.1430</td>
</tr>
<tr>
<td>IEE Project Team Size</td>
<td>0.6093</td>
<td>0.2194</td>
<td>0.2194</td>
</tr>
<tr>
<td>No of training workshops</td>
<td>0.5049</td>
<td>0.2895</td>
<td>0.2895</td>
</tr>
</tbody>
</table>
Government: Industry Dialogue Forums

- **EIUG**: Energy Intensive User Group
- **NBI**: National Business Initiative
- **EELN**: Energy Efficiency Leadership Network
- **BUSA**: Business Unity South Africa
- **NCPC-SA**: National Cleaner Production Centre
- **SAWEIN**: South African Women in Energy
- **SAATCA**: South African Auditor & Training Certification Authority
- **EWSETA**: Energy & Water Sector Education and Training Authority
- **…**
IEE Project Objective and Framework


Component 1
Support and Guidance in Policy Development

Component 2
Promotion of Energy Management Standards

Component 3
Capacity Building

Component 4
Demonstration Plants and Awareness Raising
Engagement Footprint

By Sector
- Iron and Steel
- Automotive
- Engineering
- Agro Processing
- Chemicals
- Clothing and Textile
- Cement
- Pulp and Paper
- Commercial Bldngs
- Mining

By Energy System
- EnMS 84%
- ESO 16%

By Company Size
- Large
- Medium
- Small
Project Evaluation: 2010-2015

**EnMS Implementation**
- EnMS TA recipient plants: 81
- Successful implementation: 77
- Reporting data to IEE: 25

**ESO Implementation**
- Assessments (incl. host & candidate plants): 185
- Implemented recommendations: 65
- Reporting data to IEE: 20

**Training**
- 3 200 trained (40 Lead Auditors; 156 Experts; 53 National Trainers)

**Case Studies**
- 70 published

**Policy Development**
- 2\textsuperscript{nd} National Energy Efficiency Strategy
- Steel sector energy baseline study

**ISO 50001 Certified Plants**
- 22 Industrial Plants – 18 supported by IEE Project
Project Life Results: 2017

Actual Projects Implemented

<table>
<thead>
<tr>
<th>Energy Saved</th>
<th>Emissions Mitigated</th>
<th>Financial Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8 terawatt hours</td>
<td>3.7 Million tCO2e</td>
<td>3.1 Billion Rands</td>
</tr>
</tbody>
</table>
Qualitative Outcomes

- Fostered growth of a viable energy services sector in South Africa
- Pioneered a focus change from component to system optimisation
- Promoted dialogue within sectors, industrial supply chains and equipment vendors
- Elevated the importance of behaviour change in sustaining gains
- Created conditions for similar inspired programs in the country and the region, eg. PSEE, EEDSM, REEEP. …
Behaviour change can offer unique and hard to replicate competitive advantages and is necessary in a world of ubiquitous technology which can no longer be relied on to maintain a cutting edge.

Industrial Energy Project Manager
Solomon Coatings: The company implemented the IEE Project SME energy assessment findings which turned the company back to profitability. The company saved around R 6,500 per month over a period 10 months in electricity costs with a resultant increase in production output of 40%.

Sockit Manufacturing: The IEE Project identified four energy system optimisation opportunities and a fuel switch, all of which the Company implemented. The Company installed a paraffin boiler which allowed it to increased its machine pool by 30%.

Willard Batteries: By implementing an EnMs, supported by the IEE Project, the Plant has saved over R 3 million between 2012 and 2013. As a result of the energy savings the Plant has been expanded with 20% in production capacity.

ArcelorMittal Saldanha: The IEE Project has directly assisted Mittal Saldanha to improve its energy efficiency and reduce production costs. It has facilitated the company saving approximately R 89 million in 2011 in energy costs, helping them to remain in business.

**Total Direct Jobs retained** = 1 654  
**Total Direct Jobs created** = 90  
**Overall Direct Jobs** = 1 744
Case Study ~ Integrated Steel Mill

ArcelorMittal Saldanha Works
South Africa

- Electricity demand: 160 MW
- Manpower: 548 permanent employees
- Sales output: 1,2 million ton HRC/annum

Energy Efficiency Achievements 2011

<table>
<thead>
<tr>
<th>Energy Management System Implemented</th>
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<tbody>
<tr>
<td>No. of Projects/Measures</td>
<td>11</td>
</tr>
<tr>
<td>Total Capital Investment</td>
<td>€31,250</td>
</tr>
<tr>
<td>2011 Gross Financial Savings</td>
<td>€3.75M</td>
</tr>
<tr>
<td>Overall Payback Period</td>
<td>2.4 months</td>
</tr>
<tr>
<td>2011 Energy Savings</td>
<td>80 GWh</td>
</tr>
<tr>
<td>2011 GHG Reductions (tons CO₂)</td>
<td>77,000</td>
</tr>
<tr>
<td>2016 Cumulative Savings</td>
<td>€17.5M</td>
</tr>
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</table>

- Energy systems optimization, fuel switching, adjustments/optimization of production schedules & process ... triggered and driven by the EnMS!

- Energy Savings in 2012 > 100 GWh

Success Factors

- Plant Director & Energy Manager Leadership
- Training, communication and innovative strategies to secure employees’ commitment
- Collaboration between different departments
Case Study ~ Automotive Assembly

Toyota SA

- 700 000 m²
- 7 500 employees
- 153 000 units / year
- 105 000 MWh / year
- 309 000 GJ (Gas)
- Energy Cost = €122M per annum

Toyota improvements 2010-2013

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<td>Annual Energy Savings (MWh)</td>
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<tr>
<td>2011 GHG Reductions (tons CO₂)</td>
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Toyoda Electricity Consumption vs Volume (kWh vs Units)
Regional Footprint

**SADC Region (2017/18)**
Proposal to domesticate IEE Technologies.

**Ghana (2017/18)**
Steel sector demonstration plant and EnMS / EnPMI training.

**Uganda (2017/18)**
Green Chemistry Project Initiative – Cooperation with Uganda NCPC and over arching measures for establishing the national/regional initiative.

**Mauritius (2016/17)**
IEEP technical evaluation of thermal power plants and EnMS & SSO training

**Namibia (2015/17)**
NCPC-SA IEEP support for Namibian NCPC

**Mozambique (2015/16)**
IEEP EnMS training and conducted ESO assessments.
An IEA analysis has shown that if energy efficiency investments were scaled up in South Africa, it would have the potential to reduce the country’s need for additional electricity generation capacity by 18% in 2030.

Source: IEA