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Energy Management Systems and Programmes in South Africa

Industrial Energy Efficiency Project

IEA Workshop
Paris: 11-12 December 2017

Alfred Hartzenburg

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Swiss Confederation
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Presentation Points

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

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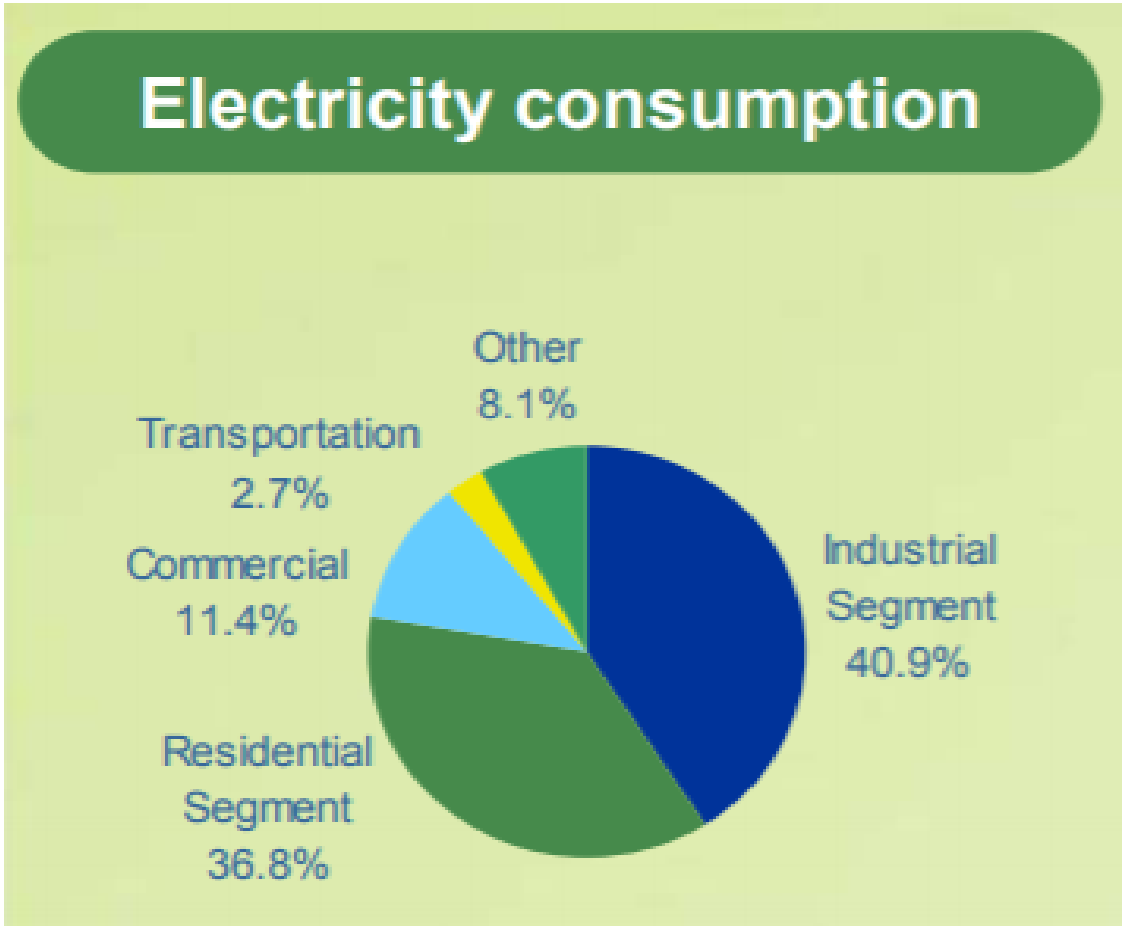
South African Energy Statistics: 2016



INSTALLED 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

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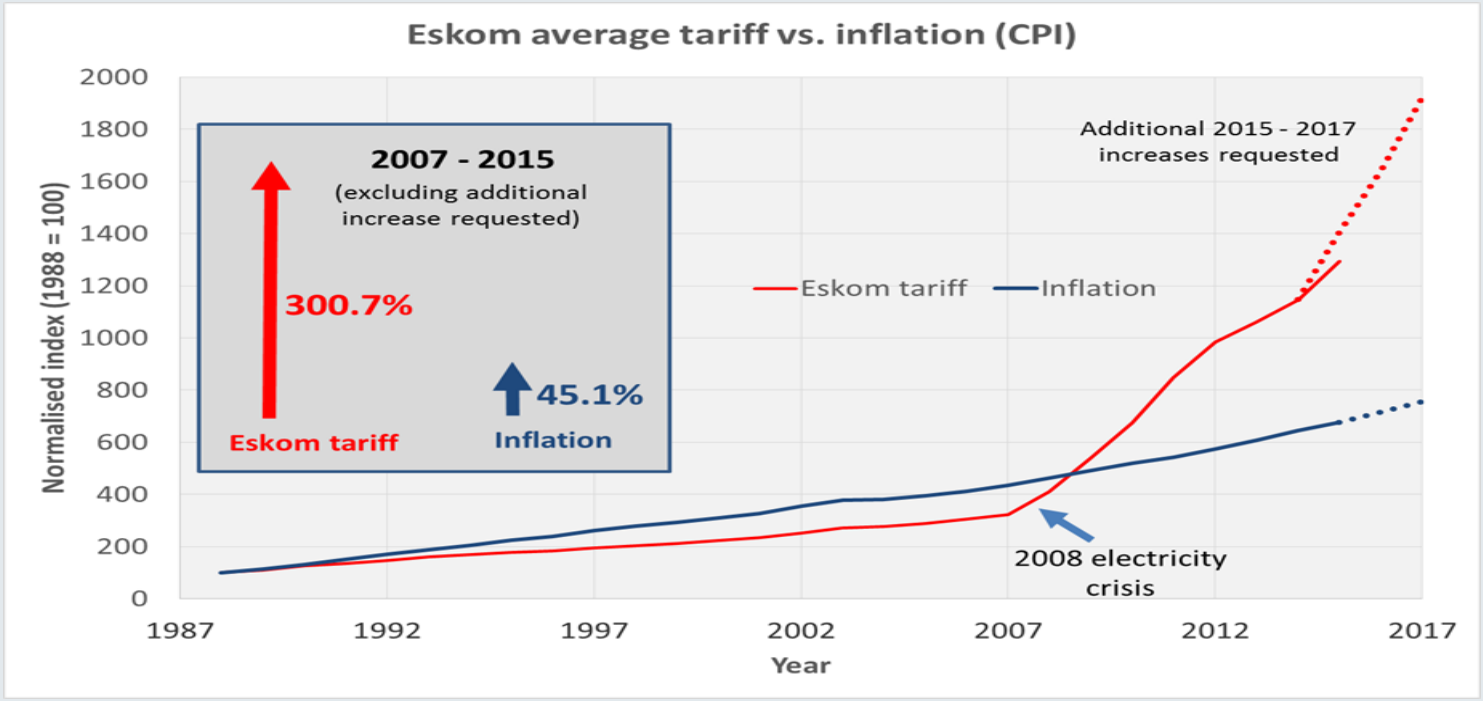
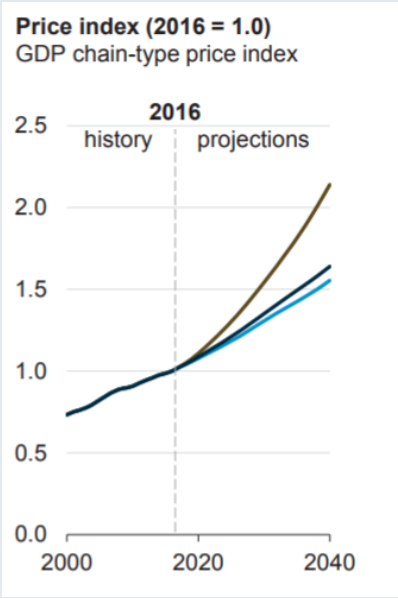
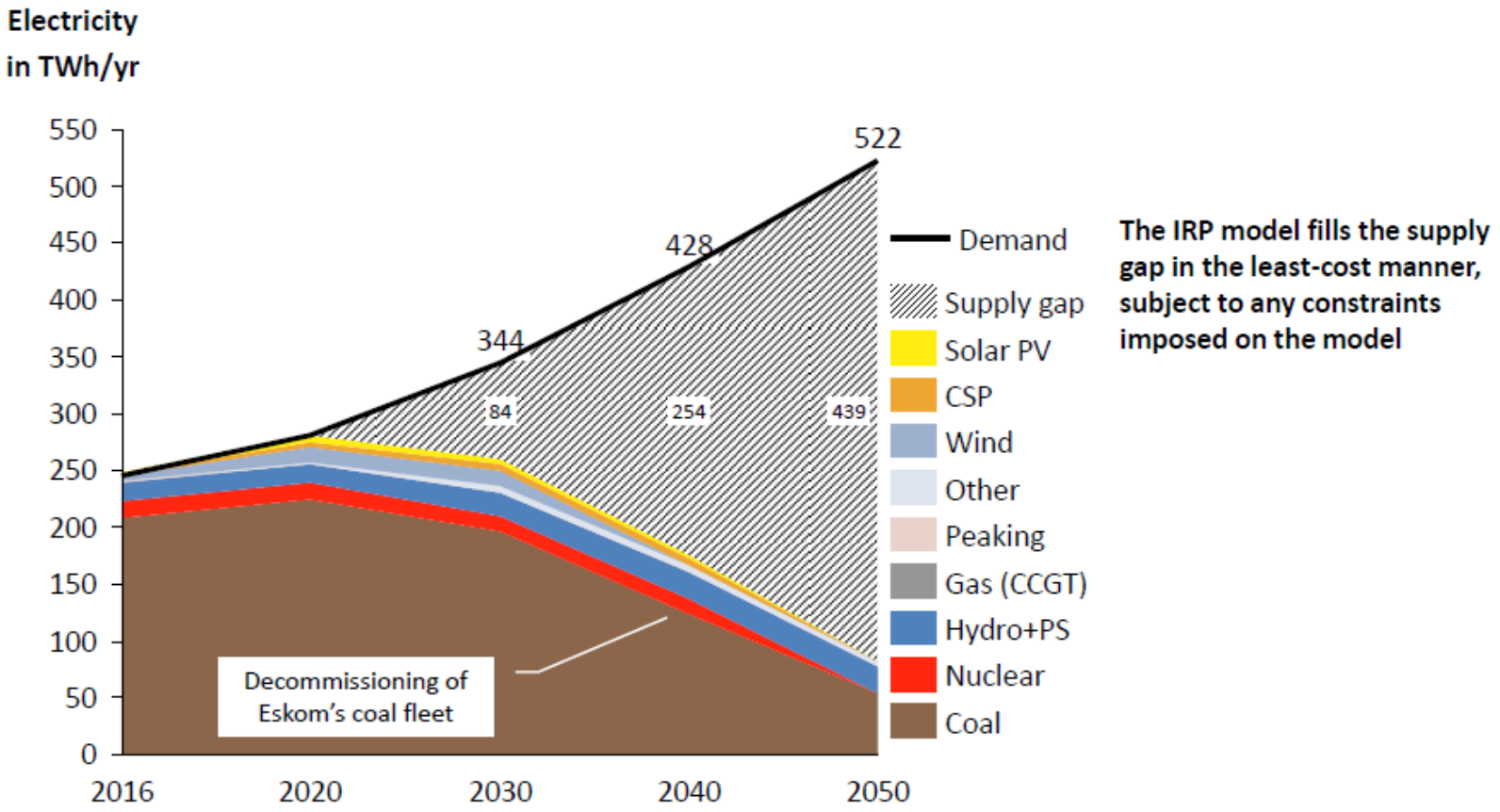
Electricity Tariffs: Past & Future





Supply Gap as Demand Grows



The IRP model fills the supply gap in the least-cost manner, subject to any constraints imposed on the model

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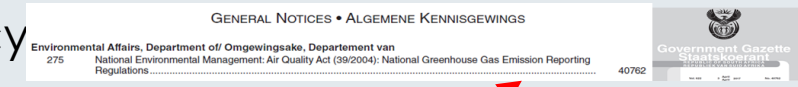
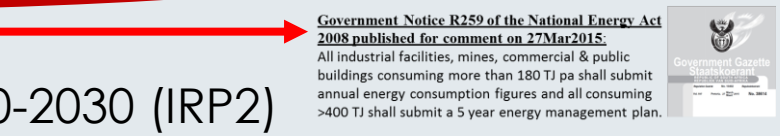
Regulatory Landscape

- Energy White Paper - 1998
- Renewable Energy White Paper – 2003
- 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
- National Energy Efficiency Strategy (NEES): (2005-2015), (2016-2030)
- Energy Efficient Leadership Network (EELN)
- Carbon Tax


GENERAL NOTICES • ALGEMENE KENNISGEWINGS

Environmental Affairs, Department of/ Omgewingsake, Departement van

275 National Environmental Management: Air Quality Act (39/2004): National Greenhouse Gas Emission Reporting Regulations 40762


Government Notice R259 of the National Energy Act 2008 published for comment on 27Mar2015:

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

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Income Tax Act Amendment – 12L

APPROVED

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

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National Energy Efficiency Strategy

- **NEES 2000 – 2015:**

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

- **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

ECM Implementation Driv	R^2	P-Value	Significance F
Size (%) annual electricity tariff Increase	0.9920	0.0040	0.0040
No of Companies implementing ECM's	0.9005	0.0511	0.0511
Electricity tariffs	0.8930	0.0550	0.0550
Cooling Degree Days	0.7473	0.1356	0.1356
Heating Degree Days	0.7345	0.1430	0.1430
IEE Project Team Size	0.6093	0.2194	0.2194
No of training workshops	0.5049	0.2895	0.2895

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
- …

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IEE Project Objective and Framework

Mainstreaming Energy Management Systems, Energy Systems Optimization and ISO 50001, to realize increased investment in industrial energy efficiency.

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

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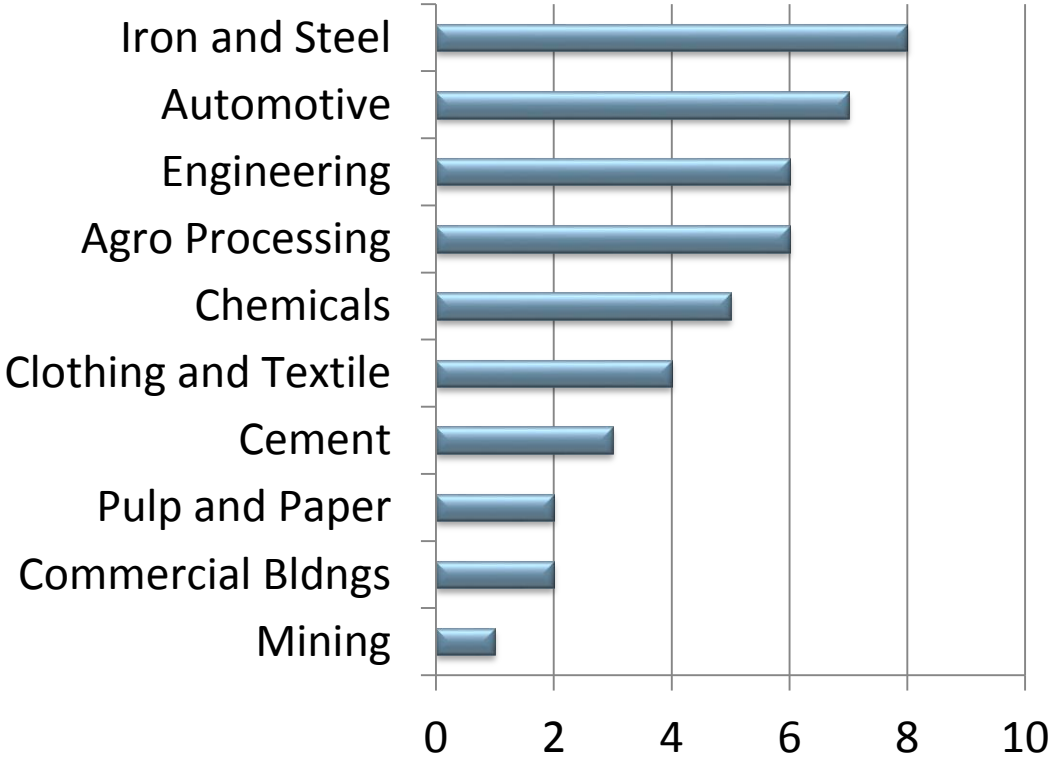
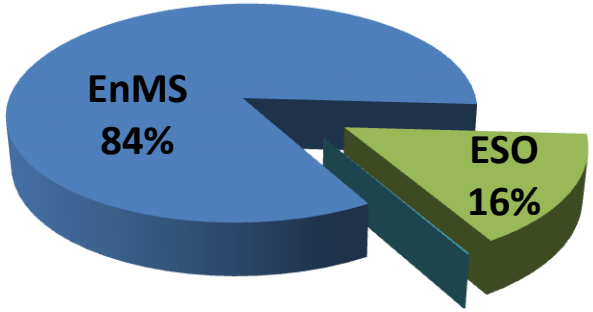
Engagement Footprint

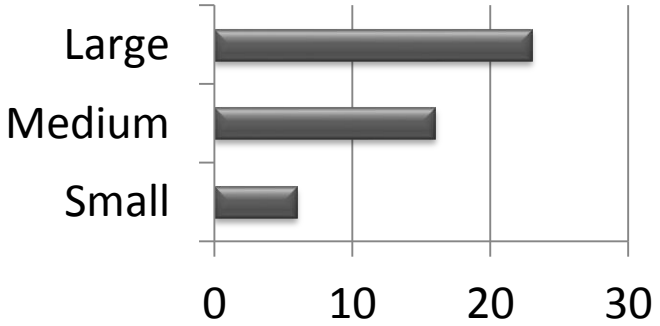
By Sector



By Energy System



By Company Size



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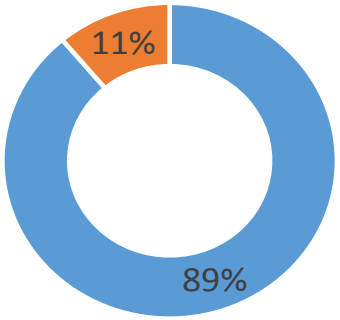
Project Evaluation: 2010-2015

EnMS Implementation



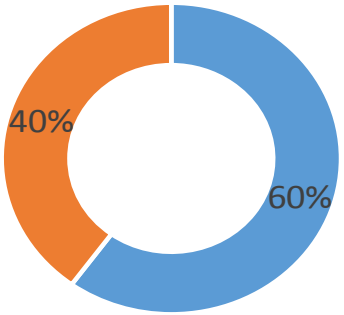
EnMS TA recipient plants: 81

Sucessful implementation: 77

Reporting data to IEE: 25

Succesful Implementation ■ Withdrawals

ESO Implementation



Assessments (incl. host & candidate plants): 185

Implemented recomendations: 65

Reporting data to IEE: 20

Succesful Implementation ■ Recommendations not taken up

Training

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

Case Studies

- 70 published

Policy Development

- 2nd National Energy Efficiency Strategy
- Steel sector energy baseline study

ISO 50001 Certified Plants

- 22 Industrial Plants – 18 supported by IEE Project

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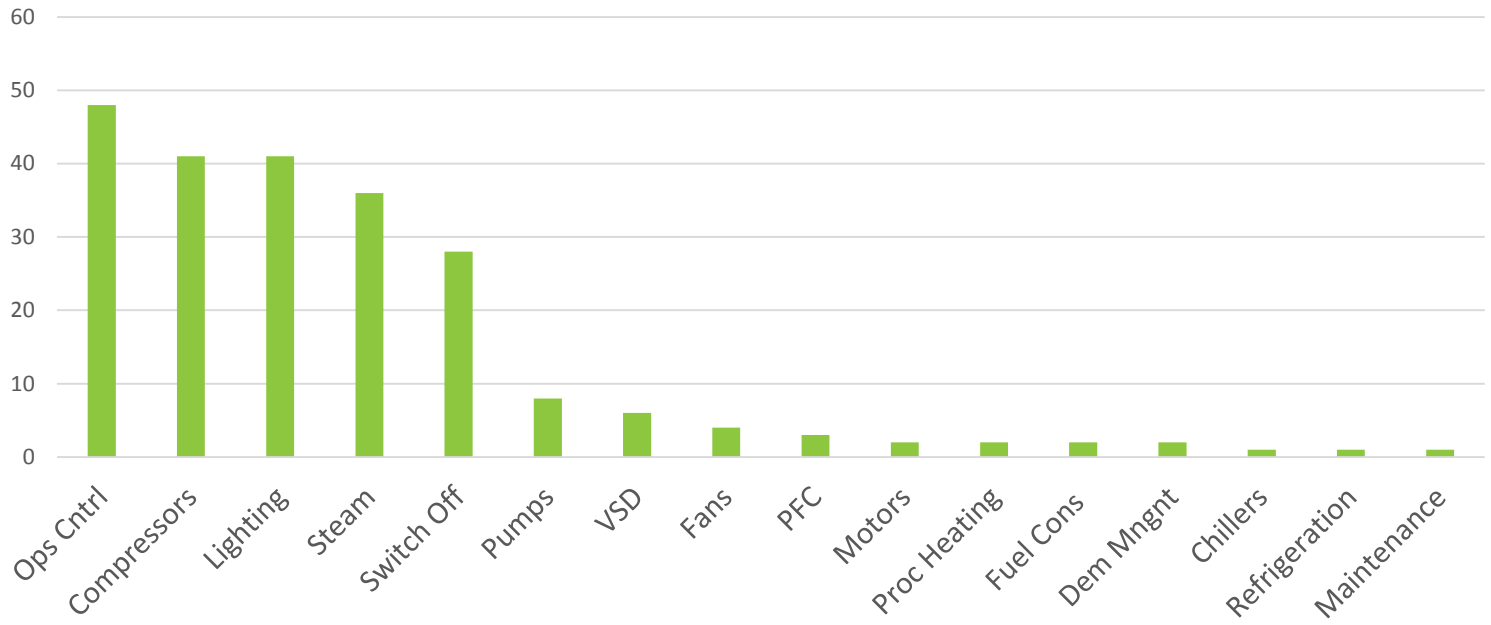
Project Life Results: 2017

Actual Projects Implemented



Energy Saved	Emissions Mitigated	Financial Savings
3.8 terawatt hours	3.7 Million tCO2e	3.1 Billion Rands

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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. …

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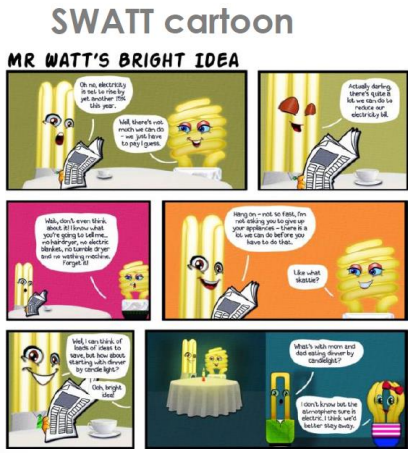
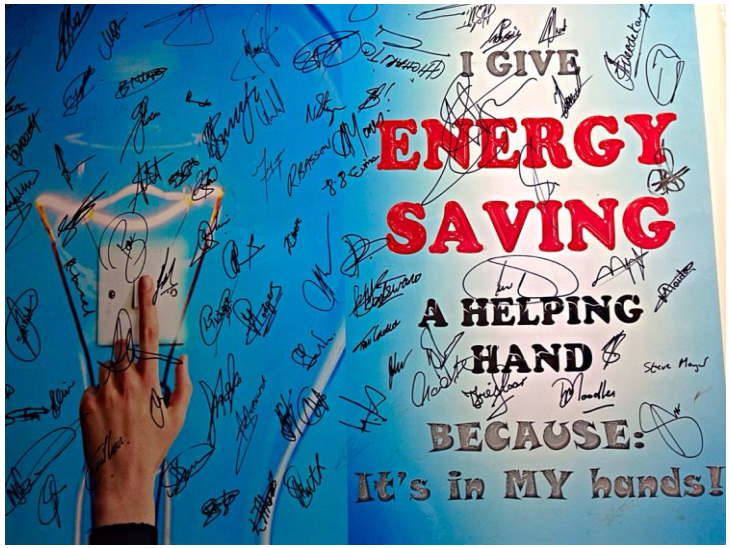
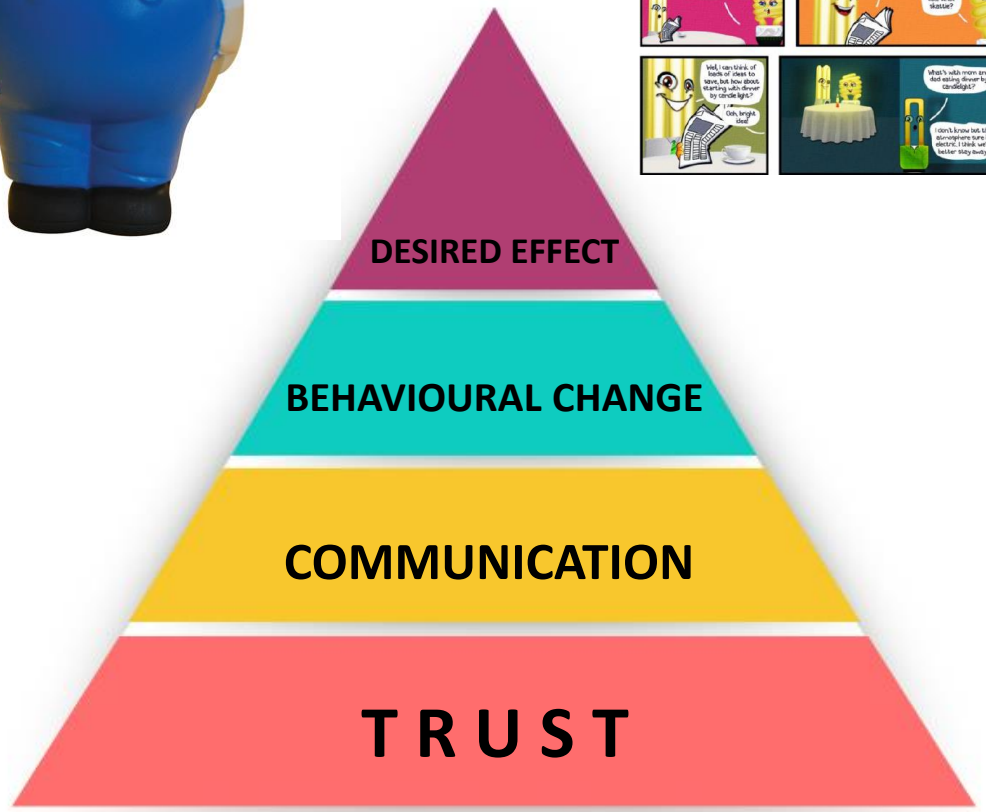
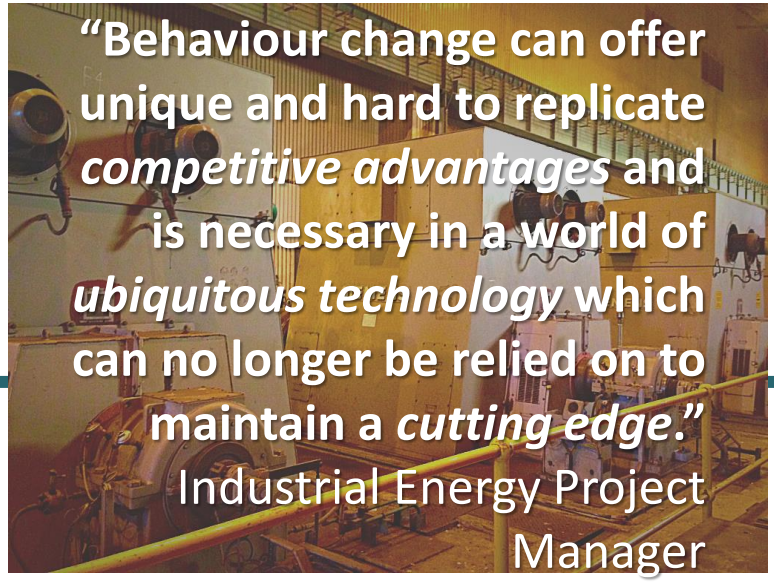
The Human Factor









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Socio-economic Impacts

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.

SA IEE Project Outcomes	SA IEE Project Outcomes	SA IEE Project Outcomes	SA IEE Project Outcomes	
1	0	416	1 237	Direct Jobs retained
4	20	66	0	Direct Jobs created
5	**20**	**482**	**1 237**	**Total Direct Jobs**

*Outcomes largely attributed to the IEE Project's interventions, but acknowledging that other variables would have influenced the outcomes to varying degrees across the study sites.

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Total Direct Jobs retained = 1 654
Total Direct Jobs created = 90
Overall Direct Jobs = 1 744

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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	
Energy Management System Implemented	
No. of Projects/Measures	11
Total Capital Investment	**€31 250**
2011 Gross Financial Savings	**€3.75M**
Overall Payback Period	2.4 months
2011 Energy Savings	**80 GWh**
2011 GHG Reductions (tons CO_2)	77,000
2016 Cumulative Savings	**€17.5M**

- 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

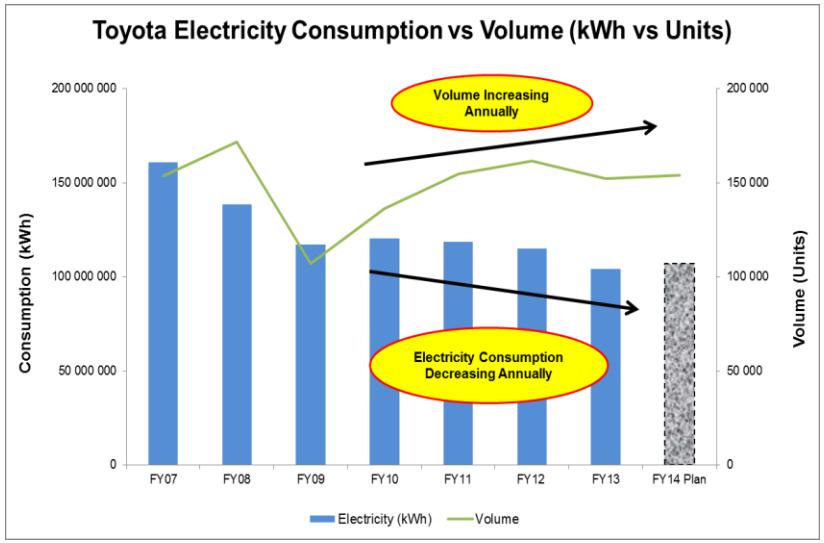
- Plant Director & Energy Manager Leadership
- Training, communication and innovative strategies to secure employees' commitment
- Collaboration between different departments

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	
Energy Management System Implemented	
No. of Measures/Projects	**73**
Total Capital Investment	**€5.2M**
Gross Monetary Savings	**€9.1M**
Overall Payback Period	**0.6 years**
Annual Energy Savings (MWh)	**15,603**
2011 GHG Reductions (tons CO_2)	**13,058**



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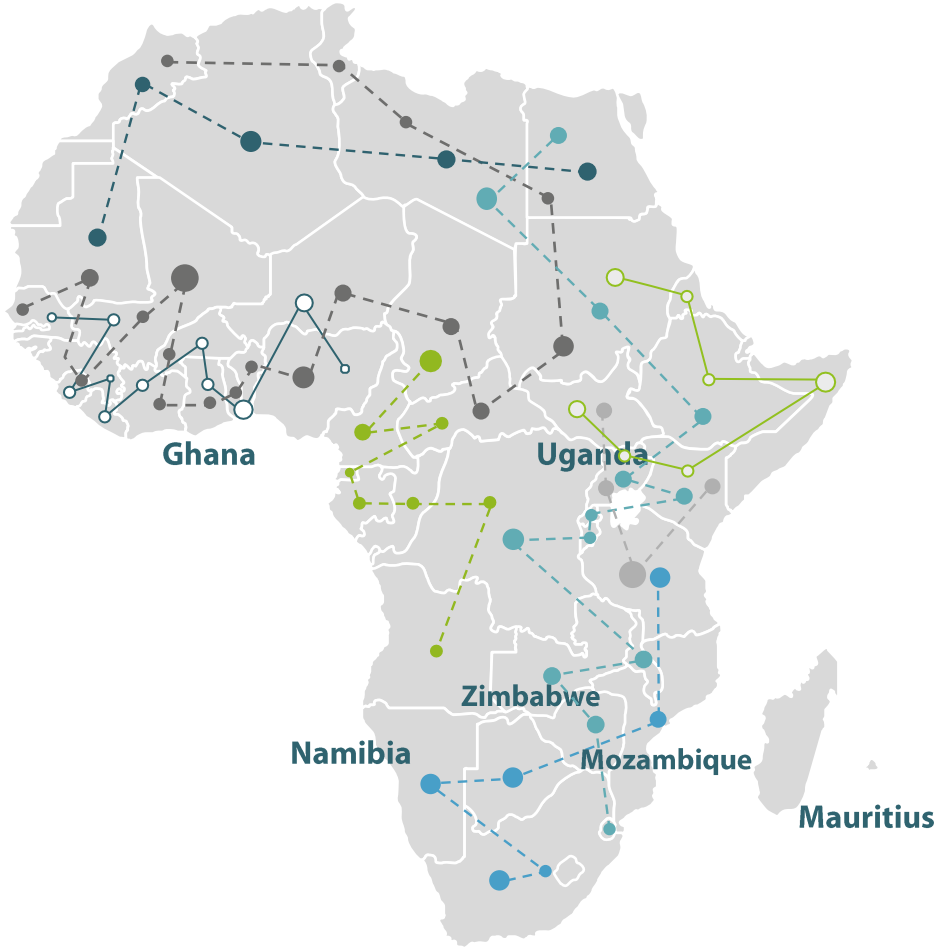
Regional Footprint



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.

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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

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EMAIL
ahartzenburg@csir.co.za

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