NATIONAL CLEANER PRODUCTION CENTRE SOUTH AFRICA





South Africa Industrial Energy Efficiency Project

IEA Energy Efficiency Training for Sub-Saharan Africa Pretoria - 14 October 2019

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Presentation Content

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- Project Context and Framework
- Project Results and Outcomes
- South Africa Energy Efficiency Policy Cover
- Lessons Learnt
- Key Next Steps



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Project Context and Framework







IEE Project Partners



Strengthen energy planning, including emissions reduction target setting, through improved data and energy reporting.

Support strengthened policy and regulatory frameworks, and promote the uptake of standards for energy efficiency.

Expand the capacity of the South African industrial sector to implement EnMS and ESO through skills development.

Promote increased investment in EnMS and ESO through the demonstration of energy savings in industrial plants.

Raise awareness of the benefits and opportunities through EnMS and ESO.

Funding, oversight, monitoring and evaluation, reporting.



The NCPC-SA services are highly subsidised, and are aimed at stimulating and supporting the uptake of RECP by industry:





ESO Assessments & EnMS Implementation Demonstration Plants

Skills Development ESO / EnMS Training



Technical & Financial Support

Online tools, sector guides, financial matchmaking

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Advocacy Workshops, case studies & policy advice



UNIDO Industrial Energy Efficiency Portfolio (Dec 2016)







Primary Driver: Electricity Tariffs



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 To create an enabling environment across the South African industrial sector by mainstreaming Energy Management Systems, Energy Systems Optimization and the Energy Management Standard ISO 50001, to realize increased investment in industrial energy efficiency.

Capacity Building Focus

EnMS

Energy Management Systems Implementation

ESO

Systems Optimisation



an Systems Optimisation



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Compressed Air Systems

Pump Systems Optimisation

Steam Systems Optimisation



Capacity Building Modality



Resources and Tools



The Energy Management Source Code





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Energy Performance Measurement

- 11	A	В	С	D	E	1	F	G	н	1	J	K
1		CDD5	Cured	Actual	Expected			Actual	Actual	Target	Target	Target
2		10001		Consumption	Consumption	n i	EnPC	Savings	Savings	Consumption	Savings	Savings
3	Months	[CDD]	[tons]	[kWh]	[kVVh]			[Act-Exp]	[CUSUM]	[2.5%]	[Igt-Exp]	ICUSUMJ
4	01/11	26	164.59	1 531 228								
5	02/11	49	180.89	1 450 494	-			Energy Baseline	100.01	Actual and tar	geted savin	gs
6	03/11	83	212.56	1 460 932					50.00	00		
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17	02/12	30	144.00	1 414 145	1 410 024		1.0029	4 121	33 768	1 374 774	-35 251	-70 771
18	03/12	132	201.63	1 426 610	1 532 942		0.9306	-106 332	-72 564	1 494 618	-38 324	-109 095
19	04/12	68	149.44	1 340 280	1 439 472		0.9311	-99 192	-171 756	1 403 485	-35 987	-145 081
20	05/12	286	189.17	1 641 128	1 617 098		1.0149	24 030	-147 726	1 576 670	-40 427	-185 509
21	06/12	411	186.50	1 544 644	1 692 996		0.9124	-148 352	-296 078	1 650 671	-42 325	-227 834



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Project Results and Outcomes







EnMS Implementation Case Study

Johnson Matthey South Africa

- > Automotive OEM
- Implementation EnMS in 2012
 - Target ISO 50001 certification

Johnson Matthey 2012-2013

Annual Electricity Savings	9.4 GWh
Annual Monetary Savings	R 7.7 M
- Cost savings from projects	R 5.5 M
 Cost savings from behavior changes & operational efficiencies 	R 3.2 M
Total Investment	R 620 000
Payback Period (years)	0.8
ISO 50001 Certified	
2014 - 2016 Savings	16.3 GWh



- Completed implementation in 9 months
- > 4 large projects implemented
 - Compressors optimisation; optimising chillers; production related projects

Success Factors

- Full support and resources from top management
- □ Strong Energy Manager leadership
- Weekly meetings of Energy Team
- Adjusting existing structures to energy specifics (policies, procedures & reporting)





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 201

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.



Socio-economic Impacts

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 O	utcomes
1 4	0 20	416 66	1 237 0	Direct Jobs retained 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.

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





Behaviour Change...the game changer



"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







DESIRED EFFECT

BEHAVIOURAL CHANGE

COMMUNICATION

TRUST

Is it easy to improve?



Actual Project Savings (Apr 2010 - Mar 2019)				
Energy	CO ₂ e Emissions	Rand Value		
5.7 terrawatt hour	5.6 Million tonnes	R4.6 Billion		

Equivalent to the electricity required to power 790,000 middle income South African homes for 12 months

i.e. 18% of all middle income South African households!

Continental 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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South Africa Energy Efficiency Policy Cover







SA Policy and Regulatory Landscape

- Energy White Paper 1998
- National Energy Efficiency Strategy (NEES): (2005-2015), (2016-2030)
- Renewable Energy White Paper 2003
- Electricity Basic Services Support Tariff Policy 2003
- 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)
- Income Tax Act Amendments (12i/k/I...) Tax incentives for EE savings

SANS 941 – MEPS for Electrical and Electronic Appliances and EE Labelling

National Environmental Management: Air Quality Notice 275 of 2017

Carbon Tax Act No. 15 of 2019

Energy Efficient Leadership Network (EELN)



- If successfully implemented, the policies outlined in South Africa's National Energy Efficiency Strategy would increase policy coverage in South Africa, which is currently the lowest among the 7 major emerging economies.
- Only 3% of South Africa's total energy use was covered by mandatory energy efficiency policies in 2017, with potential coverage only at 13%.
- At 7%, coverage was highest in the non-residential buildings due to presence of building standards, which are planned for successive tightening.
- MEPS for consumer appliances including refrigerators and air conditioning units contribute to policy coverage in the residential sector, which is currently around 5%.
- However, potential coverage around 24% indicates that this will grow in future as existing energy using appliances are replaced by new stock.

Post-2015 NEES of South Africa

Sector	Target	Planned policies
Industry and mining	15%	 Increase adoption of energy management systems to those not reached by the IEEE program and not covered by regulation. Introduction of MEPS for industrial electric motors as a package that includes tighter regulation of motor rewinding and differential import duties to reduce price difference between standard and premium efficiency motors Minimum design standards for industrial boilers (addition of economiser, combustion controls, variable speed drive on the blower)
Commercial and public	37%	 Successive tightening of building standards Mandatory display of energy performance certificates Green leases Municipal energy efficiency strategies
Residential	33%	 Successive tightening of MEPs Endorsement labelling
Agriculture	30%	 Awareness raising campaigns Grants to support energy efficiency improvement expenditures
Transport	39%	 Vehicle efficiency standards Corrective tax schemes to favour more efficient vehicles by taxation of low efficiency vehicles, as well as incentive schemes to trade in old inefficient vehicles for efficient and modern ones. Eco-driving as part of the curriculum of driving schools
Economy _{co.za}	29%	

Policy Support, Advice and Commentary

- Funded the second review of the 2005 NEES
- Provided input to the energy consumption data reporting white paper
- Submitted commentary on the Post 2015 NEES draft
- Submitted commentary on the Integrated Resource Plan (IRP)
- Presented suggestions on qualifying criteria for dti manufacturing incentives eg. Black Industrialist Scheme
- Training to SANAS and lead auditor groups on ISO 50001

Energy Efficiency Frameworks in African Countries

- Ghana: National Energy Efficiency Action Plan (2015-2020)
- Ethiopia: Climate-Resilient Green Economy Strategy.
- **Kenya**: Energy Act No. 2006 and Green Economy Strategy and Implementation Plan.
- **Mozambique**: Roadmap for a Green Economy in Mozambique.
- **Rwanda**: Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development 2011–2050.
- **Nigeria**: Energy Support Programme and the National Renewable Energy and Energy Efficiency Policy (NREEEP)
- Tunisia: Energy Efficiency Policy and AMME EE finguce





- Savings can be achieved through purely behaviour change and operational controls
- It is a critical factor to have an EnMS in place to support systematic implementation
- Integrate ISO/SANS 50001 requirements into the existing certificated ISO 9001/14001 Management Systems
- Great benefit will be derived from meaningful **energy consumption baselines** and appropriate **energy performance indicators**.





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"...energy efficiency initiatives that are not monitored and maintained typically have a **six-month half-life of their benefits**. That is, they lose half of their economic benefits every six months if left largely untouched."

Emerson's James Beall, a principal process control consultant who helps manufacturers optimize their processes



Reality: Resource Allocation



Energy Productivity...the new benefits language



- The total value created by the energy deployed
- Customers do not buy 'energy efficiency'. They buy what they value.
- Encourages a focus on supply chains.
- Delivers immense commercial and environmental benefits.

Any real or perceived financial or intangible benefit received from an energy efficiency activity.







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.









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Key Next Steps







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- Identify policy gaps not covered by the NEES.
- Industry is where actions should be targeted in South Africa.
- The implementation of MEPS for electric motors is an important first step, which will increase policy coverage.
- Measures that mandate the implementation of energy management systems should be considered.
- Policy and standards encouraging improved cyber hygiene and coordination with other governments and industry in designing digital resilient technologies.
- In implementing the proposed policy measures, South Africa will be able to benefit from the experiences in the other major emerging economies.

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