Industrial Energy Efficiency Project in South Africa
In the past four years, the Industrial Energy Efficiency Project (IEE Project) in South Africa has assisted industry to achieve energy savings worth over R 344 million.

This has been achieved through the promotion and implementation of Energy Management Systems (EnMS) and Energy Systems Optimisation (ESO) and the strengthening of industry capacity in the energy efficiency field.

The IEE Project is implemented by the United Nations Industrial Development Organization (UNIDO) and the National Cleaner Production Centre of South Africa (NCPC-SA). It is a collaborative initiative between the South African government through the Department of Trade and Industry (the dti) and the Department of Energy (DoE), the Swiss Secretariat for Economic Affairs (SECO) and the UK Department for International Development (DFID).

The IEE Project in South Africa was the first of its kind, developing from concept to implementation over five years – and has served as an international pilot project. Similar projects are operational through UNIDO in 16 other developing countries worldwide.
To achieve this, the project employs a holistic approach based on a number of key elements, or components:

- Encouraging the creation of an enabling policy environment – the IEE Project played an active role in creating awareness and supporting the development and implementation of the South African National Energy Efficiency Strategy (NEES).
- Supporting the adoption and promotion of energy management standards – the Project supported the South African authorities in the development, adoption and promotion of the ISO 50001 group of standards and in the development of the auditing criteria and training necessary for certification.
- Building local capacity to implement EnMS and ESO in industrial enterprises, through specialised training courses and extensive in-plant implementation support.
- Demonstrating the potential and impact of IEE on the bottom line and sustainability of a business through case studies, demonstration plants and awareness-raising.

Services to industry

The IEE Project currently supports South African industry through a subsidised service model. Participation in the Project is at no cost to companies.
Energy Management System (EnMS) implementation

Based on the well-known “Plan-Do-Check-Act” Deming’s cycle, EnMS provides a structured and systematic approach on how to integrate energy efficiency in daily practices and core industry management values, such as cost reduction, increased productivity, environmental compliance and global competitiveness. EnMS provides:

- A framework for understanding significant energy uses.
- Action plans to continually improve energy performance.
- Documentation to sustain and demonstrate energy performance improvements over time.

The IEE Project assists companies in developing and implementing an energy management system in line with the SANS/ISO 50001 Energy Management Standard, and support companies’ efforts to achieve this certification.

Implementation takes place over a period of 9 to 12 months and can either be facilitated internally by the company under the guidance of IEE Project EnMS specialists, or fast-tracked by having an external specialist implement the EnMS directly. The company agrees to serve as demonstration project to showcase EnMS benefits.

SANS / ISO 50001:

- **Purpose**: To enable organisations to establish systems and processes necessary to improve energy performance
- Applicable to all organisations
- Does NOT prescribe specific performance criteria with respect to energy

**ISO 50001** is the only standard that impacts directly on the company’s bottom line, as it aims to reduce overall operating costs by driving down energy spending.

ISO 50001 ensures that energy savings are sustained over time: to remain certified, a company must have systems in place to ensure that the energy efficiency is sustainable in the long term.

Energy Systems Optimisation (ESO) implementation

The system optimisation approach requires to look at the industrial system as a whole, not just at the individual pieces of equipment, and to analyse both the supply and demand sides of the system and how they interact.

Energy-efficient components in industrial systems provide no assurance that energy savings will be attained if the system is not properly designed and operated.

The IEE Project equips companies to systematically target selected systems within their processing facilities and interrogate their performance and effectiveness.

Currently support is available for the optimisation of five energy intensive systems, namely steam, compressed air, fans, pumps and electric motors.

Companies participating in the ESO programme have access to technical specialists in the respective fields to assess their processes in order to identify improvement options.

**Did you know?**

**Component Optimisation vs. Systems Optimisation**

The traditional **components** approach – analysing the performance of various parts or components of a system and addressing how to make these work better – typically results in an energy saving of between 2% and 5%, whereas evidence indicates that a **systems** optimisation approach – looking at how an entire group of parts of components functions together and how changing one will impact on others and the system as a whole – achieves savings of 10% – 50%.
Expert skills development to maximise energy efficiency

The availability of specialised skills is critical to the sustainability of energy efficiency initiatives in industry. Courses have therefore been developed by the IEE Project, under the leadership of UNIDO, to train professionals in EnMS and ESO in a variety of industrial systems.

Training is presented at two levels: a technical advanced level offered in a two-day workshop format, and expert level training, which is completed over a period of months and includes theoretical and in-plant training, and an actual workplace implementation component.

Energy efficiency experts trained through the IEE Project are internationally certified by UNIDO in their areas of expertise, with many available to assist companies in implementing effective energy and cost-savings interventions.

Training programmes

Energy Management Systems

This programme presents a methodological approach to managing energy usage, based on SANS/ISO 50001. It is aimed at individuals who are responsible for developing and implementing energy management systems in their companies.

- The advanced course equips trainees with the knowledge, understanding and tools that will enable them to initiate the development and implementation of an EnMS aligned with ISO 50001.
- The expert-level course is aimed at equipping delegates with the necessary knowledge, skills and tools to support the adoption and implementation of EnMS in industry. Delegates will gain practical experience in implementing and reviewing an EnMS, as well as being able to report on its performance.

Energy Systems Optimisation

The ESO training programmes include individual courses on a number of energy systems, including pumps, compressed air, fans, steam and electric motors. They combine science and theory and cover management processes, case studies, training on appropriate software toolkits and practical sessions, and are also offered at advanced and expert level.

ISO 50001 Auditor Training

The Lead Auditor training is targeted at management system auditors and auditor training course providers, and provides trainees with the knowledge, understanding and tools that will enable them to audit an EnMS aligned with ISO 50001, by applying the auditing principles and practices as defined in ISO 19011 and ISO 17021. Auditor training equips energy team members to audit energy systems in line with ISO 50001 – this training can be offered in-house by the IEE Project.

Energy efficiency qualification development

The IEE Project is playing a leading role in the development of a National Qualification Framework (NQF) registered occupational qualification on energy efficiency, in collaboration with the relevant industry, government and academic stakeholders.

To date, the IEE Project has trained over 2,200 individuals at advanced level and around 80 IEE experts.
Private sector participation opportunities

In addition to the above services, industrial enterprises can participate and benefit from the IEE Project by becoming a:

Host or candidate plant  By allowing expert level training at their plants, companies are enabled to identify energy saving opportunities. In the case of ESO, participating companies receive a systems assessment report, compiled by UNIDO/NCPC-SA experts at no charge. They also qualify for the enrolment of two delegates in the advanced training programme and one in the expert-level programme at no charge.

Demonstration plant  Companies that choose to implement some or all of the recommendations from the assessment report have the opportunity to volunteer as a demonstration plant. The IEE Project will partner with the company to develop a case study on the implementation process and the energy savings resulting from it. The case study will be used on national and international communication platforms, increasing the visibility of the company.

Some IEE Project Success Stories

Toyota South Africa was one of the IEE Project’s first demonstrated successes. The Durban plant began energy efficiency improvements in 2009 and joined the IEE Project in 2010. Two of their team members attended the first expert level training and the Durban plant became a candidate plant for the implementation of an EnMS and various ESO interventions. To date, 103 projects have been implemented at the Toyota Durban plant, saving energy valued in excess of R 24.86 million. (26,668 tonnes of CO$_2$ saved)

ArcelorMittal Saldanha steel works in the Western Cape is the largest single energy saver in the IEE Project’s four-year history. The introduction and implementation of interventions to manage and optimise energy usage at this plant required an investment of a mere R 500 000, but led to gross financial savings of more than R 89.6 million within the first year (2011). By 2013, savings in excess of 176 GWh, with a financial saving of R 171 million, have been realised.

Johnson Matthey South Africa, manufacturers of autocatalysts, joined the IEE Project as a candidate plant for the implementation of an ISO 50001-based energy management system. Several energy efficiency improvement projects were implemented. Following an investment of only R 666 000, energy savings worth R 7.7 million were realised – 9.020 tonnes of CO$_2$ saved.

Sappi Cape Kraft is a paper mill based in Cape Town, and is the only plant in South Africa which uses only 100% recycled paper as its input raw material. In 2012/13 five projects were undertaken, resulting in a total saving of 944 445 kWh of electricity and 540 553 kWh of steam energy – equivalent to a saving of R 894,000 for an investment of R 70,000. (CO$_2$ emissions savings of 1 416 tonnes)

King Shaka International Airport in Durban, uses vast amounts of electricity. Over the period 2010 – 2013, three projects were undertaken, resulting in a total energy saving of 1 932 576 kWh, valued at R 2.76 million. With an investment of R 400 641, the payback period was 1.8 months. (CO$_2$ reduction of 1 850 tonnes)

These and other case studies and success stories are available on the IEE Project website

www.iee-sa.co.za

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