South African Industrial Energy Efficiency Project
Phase II
Energy and Gender Impact Highlights
2016 - 2019
The South African Industrial Energy Efficiency Project (IEE Project) has assisted industrial companies around the country to improve their energy efficiency since 2010.

Now in its second phase, the IEE Project Phase II is a multi-stakeholder initiative that supports increased and sustained energy efficiency within industrial and selected commercial sectors – by promoting the increased adoption of Energy Management Systems (EnMS), Energy Systems Optimisation (ESO), and the Energy Management Standard ISO 50001 Series.

The project is funded by the Global Environment Facility (GEF) with co-funding through the South African Department of Trade and Industry (the dti).

The work of the project is implemented by the United Nations Industrial Development Organization (UNIDO), the National Cleaner Production Centre South Africa (NCPC-SA), the Department of Energy and the South African National Energy Development Institute (SANEDI).
In 2018, the IEE Project was recognised for its work in GHG mitigation when it was registered as a South African recognition project entry on the NAMA registry. The NAMA – Nationally Appropriate Mitigation Action – refers to a set of policies and actions, undertaken by countries, as part of a commitment to reduce greenhouse gas emissions.

The IEE Project is one of only two NAMA recognition projects from Africa.

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

- Achieve gender equality and empower all women and girls
- Ensure access to affordable, reliable, sustainable and modern energy for all
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Take urgent action to combat climate change and its impacts

South African Industrial Energy Efficiency Project

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The overall objective of the GEF SA IEE Project remains to accelerate and expand the introduction of Energy Management Systems (EnMS), Industrial Energy Systems Optimization (ESO), and the ISO 50001 series within the South African industrial (and selected commercial) sectors in order to realize increased investment in industrial energy efficiency.

To this end, the IEE Project team has partnered with companies of all sizes to realize in-plant energy savings, which translate into financial and GHG mitigation milestones, as well as a host of non-energy benefits.

The work of the project was further encouraged when it was registered as an UNFCCC Nama Recognition Project – one of only two on the African continent to date.

The pages that follow give a snapshot of the work and achievements of the project, and set the tone for the work that lies ahead.

I remain humbled to be part of such an important effort in our nation’s transition to a green economy.
Unilever

DURBAN

**Sector:** Cosmetics and Chemicals

**Intervention:** Steam optimisation, 2015

The company and their product

Unilever started operations in South Africa in 1891 with the registration of the Sunlight trademark. At the time the green bar was imported from England due to the high costs of imported raw materials like vegetable oil.

The Unilever Maydon Wharf plant opened in 1911 this as the Lever Brothers’ second largest plant in the world and the plant that introduced mass production to South Africa. The plant produces soap and cosmetic products.

The energy efficiency intervention

Unilever South Africa has participated in the Industrial Energy Efficiency (IEE) Project across several of their plants in various regions. The plant implemented a number of interventions namely:

1. The conversion from heavy fuel oil (HFO) to biomass that resulted in cost savings related to fuel purchases.
2. The implementation of various energy efficiency projects including insulation, recovery of lost condensate for use in the cleaning processes, reduction of leaks and the implementation of boiler generation improvement projects such as blow-down heat recovery to pre-heat the boiler feed.
3. The utilisation of a conventional softener system for boiler make-up resulting in a significant reduction in water utilisation for boiler make-up.

Capacity building

The Maydon Wharf site’s personnel attended several end-user energy systems optimisation workshops, including compressed air and energy management systems. The company has derived great benefit from the training because people that sit in key sustainability roles are better equipped to measure, monitor and reduce energy usage and quantify savings more accurately.

**CASE STUDY**

| 6.3% | Reduction in energy consumption |
| 770 053 kWh | Energy saved |
| ZAR 552 903 | Money saved |
| 802.78 tCO₂e | GHG mitigated |
| ZAR 775 000 | Investment made |
The company and their product
Van Dyck Floors, Durban’s oldest carpet manufacturer, is producing sustainable flooring solutions that has minimal impact on the global and local environment.

The company has reduced its Green House Gas emissions by more than 30% in the past three years. Van Dyck Floors is also the first company in South Africa to achieve the ISO 14064 Carbon Trust Standard certification. This certification means that the organisation proactively monitors, records and takes action to reduce greenhouse gas emissions arising from their operations.

The energy efficiency intervention
Van Dyck Floors implemented several energy efficiency interventions on their significant energy users (tile converting, space dye, rubber line and finishing/backing). These interventions ranged from the optimization of heat input and air flow to the recovery and re-use of condensate, as well as the implementation of steam and compressed air leak management systems.

Capacity building
Core team members attended the two-day energy Management System Course and two members went on to complete the expert level training.
The company and their product
ArcelorMittal South Africa (AMSA) is the largest steel producer on the African continent. Their production capacity, in a normal year, is 7 million tonnes of liquid steel per annum. After taking into account various yield factors, this amounts to approximately 4.8 million tonnes of saleable steel products. The company supplies over 61% of the steel used in South Africa and exports the rest to sub-Saharan Africa and elsewhere.

ArcelorMittal’s Saldanha Works is located just outside Saldanha in the Western Cape. They are a largely export-focused plant that is in close proximity to the deep-sea port of Saldanha and employs 568 staff. The plant was commissioned to produce its first hot rolled coil (HRC) in late 1998 and is currently producing at its designed capacity of 1.2 million tonnes per annum.

The energy efficiency intervention
Saldanha Works is a large and energy intensive consumer whose significant energy user (SEU) across the site is the conarc furnace. While implementing the energy management system, the plant identified various saving opportunities that resulted in the plant to reducing electrical consumption by 11.7% and saving R 36.3 million per year in electricity costs. The plant has a well-defined energy policy which has been signed-off and endorsed by the senior management team. The policy is displayed across the whole plant in view of all employees and guests.
The energy efficiency intervention

Meadow Feeds implemented an energy management system (enMS) that undertook to replace mercury vapour lights with LEDs and route stopping, motion detectors for a/c units, and solar hot water.

A significant revelation was how energy could be saved in the feed pelletising machines by replacing the dies when the energy consumed began to rise. Previously dies had been replaced according to production throughput without much regard to the energy cost. The increased energy awareness in the factory resulted in further examination of the die replacement routine and it was realised that dies could be refurbished, thus reducing the replacement frequency.

The company and their product

Meadow Feeds regards itself as the market leader in the South African animal feed industry. They produce a variety of specialised diets and custom feed mixes for the poultry, dairy, ostrich, and pig industries. The Paarl factory produces approximately 360,000 tonnes per year of animal feed, about 27% of the group total.

Meadow Feeds is a business unit of Astral Operations Ltd. Astral is one of the largest integrated poultry producers in South Africa. The overall feed production business had an annual turnover of more than R 6.5 billion during the 2017 financial year.

There has also been a definite increase in the overall awareness of the general cost-benefit of actions by staff, not only with respect to energy performance. The reduced replacement and refurbishment rate of the pelletising dies is the most significant example of an unintended consequence.

Meadow Feed is working towards compliance with ISO 50 001.

Training

Meadows Parl Western Cape had a team of four energy management members that included two external delegates. All members previously attended the two-day EnMS training course. The two Meadow Feed employees further attended the EnMS expert training programme.
Defy Appliances (Pty) Ltd
DURBAN

**Sector:** Manufacturing

**Intervention:** Compressed System Air Optimisation, 2016

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**The company and their product**

Defy appliances, a domestic appliance manufacturer situated in Jacobs, Durban. Defy’s history traces back to almost 100 years. In 1932 the company manufactured the first electric stoves in South Africa.

The Defy Jacobs factory currently manufactures approximately 2500 units a day (free-standing stoves, built-in ovens and hobs, tumble dryers and console air conditioners) and has a workforce in excess of 700.

Defy’s electrical usage was approximately ±11,000,000 kWh per annum with the compressed air system accounting for about 24% of the total plant energy usage. Energy meters were installed across the site to collect the data.

**The energy efficiency intervention**

Defy implemented interventions that focused on compressed air system optimisation. The interventions undertaken were: compressor replacement, installed metering for compressors and shut-off valves in production areas, repaired leaks, upgraded vacuum generators etc.

**Capacity building**

For continued results and success, the Defy energy sustainability engineer took part in the energy management system (EnMS) expert level course in conjunction with developing an EnMS tailored to the plant.

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After the implementation of the compressed air system optimisation Defy was able to hire 84 females.
The company and their product

Tiger Brands Limited, is a South African packaged goods company, that produces Tastic Rice. For over 50-years, Tastic has prided itself in sourcing the best and finest quality rice grains from all over the world. The company’s extensive range of rice products makes it an expert and leader in rice products.

The Tiger Brands’ Tastic plant cleans and packs rice. The company used 5.75 GWh of energy to clean and pack 269,969 tonnes of rice in the 2015-2016 financial year. The main processes are the storage of rice in the silos, transportation system of rice from the silos and the production area, cleansing and removal of foreign materials, and the packaging of rice into 1kg, 2kg, 5kg and 10kg bags.

The energy efficiency intervention

Energy savings were achieved when Tiger Brands installed energy efficient light emitting diodes (LED) in the warehouse and loading bays, replacing the 400W mercury vapour lamps. The company also provided clear roofing sheets, which improved the availability of daylight.
**CASE STUDY**

<table>
<thead>
<tr>
<th>4%</th>
<th>Overall % of total consumption saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 086 GJ</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 167 217</td>
<td>Money saved</td>
</tr>
<tr>
<td>173 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 450 000</td>
<td>Investment made</td>
</tr>
</tbody>
</table>

Tiger Brands Snacks and Treats  
JACOBS PLANT, DURBAN

**Sector:** Agro-processing  
**Intervention:** Steam System Optimisation, 2016

The company and their product
Tiger Brands produces manufacturers food products in the form of tinned and bottled for a longer shelf life. The candies and chocolate plant focuses on Beacon chocolates. The Tiger Brands Treats & Snacks (Beacon Sweets) Jacobs Plant used 103 213GJ of energy to produce 28 756 tons of steam at a cost of R5.8million in 2016.

The energy efficiency intervention
The plant installed a boiler economizer and a new burner, the economizer will preheat boiler feed water from the hot well. The boiler feed water temperature was increased from 50°C to 75°C, flue gas temperature was decreased by 32°C reducing the amount of heat required to generate steam. The boiler efficiency improved from 92.9% to 94%, excess oxygen levels has also decreased from 5.6% to 2.5%.

The company has managed to save 3 086 GJ of natural gas equivalent to a cost saving of R167 217 over 10 months. The reduction in greenhouse gas emissions is 173t of CO₂e.

**CASE STUDY**

<table>
<thead>
<tr>
<th>38.8%</th>
<th>Reduction in energy consumption</th>
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<tbody>
<tr>
<td>53 567 GJ</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 2 380 000</td>
<td>Money saved</td>
</tr>
<tr>
<td>5067.44 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 1 670 000</td>
<td>Investment made</td>
</tr>
</tbody>
</table>

Tiger Brands Snacks and Treats  
MOBENI, DURBAN

**Sector:** Agro-processing  
**Intervention:** Steam System Optimisation, 2016

The company and their product
Tiger Brands manufacturers food products in the form of tinned and bottled for a longer shelf life products. The company is ISO 9001 certified and all its operations are standardised and documented following written procedures. The Mobeni plant manufactures Beacon candies and chocolates.

The energy efficiency intervention
The plant installed a new boiler to replace boiler C3 that had a glow on its shell. They installed an automatic control on boiler C1, and replaced the old steam line that had numerous steam leaks with a new line. They also increased condensate recovery by installing two condensate tanks.

These interventions resulted in improved boiler efficiency, and reduced carbon monoxide production. Boiler C1’s efficiency increased from 45% to 83% and boiler C3’s efficiency increased from 79% to 84%. The accumulated coal savings is 2 380 tonnes.

Candies and chocolate brands such as Maynards, Beacon, Beacon Liquorice Allsorts, Wilsons, Jelly Tots, and Fizzer are part of the 33 brands in the Snacks and Treats portfolio, which are produced in two factories in Mobeni and Jacobs in KZN.
First National Battery

Sector: Automotive

Intervention: Energy Management System (EnMS), 2018

The company and their product
First National Battery (FNB) has four dedicated plants across South Africa to support their production, processing and recycling operations. FNB’s listed holding company drove the ISO 50001 certification of all its plants: Settlers Way, Fort Jackson, Buffalo View and Benoni.

<table>
<thead>
<tr>
<th>3.4%</th>
<th>Overall consumption saved</th>
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<tbody>
<tr>
<td>2346.52 GJ</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 521 445</td>
<td>Money saved</td>
</tr>
<tr>
<td>587 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 187 179</td>
<td>Investment made</td>
</tr>
</tbody>
</table>

BENONI, GAUTENG
The Benoni plant distributes and recycles more than 17 000 tonnes of lead per annum. The plant implemented EnMS and ESO. The plant houses the lead smelter, warehousing, distribution, plus the marketing and finance divisions.

The energy efficiency intervention
The quickest win for the Benoni plant was switching off warehouse lighting at night and over the weekends. Further analysis revealed that replacing old luminaires with LED and adding occupancy sensors could allow for significant savings. Modification to furnace reload operations resulted in less heat loss. Equipment upgrades were identified and will be implemented as capex budget allows.

Capacity building
Twelve employees attended the EnMS end user course, and two attended the EnMS expert level training. Due to the interventions and capacity building embarked upon, the plant achieved an actual performance improvement of 3.4% by November 2018. This exceeded the plant’s own improvement target of 2.5% based on the 2017 baseline year.

<table>
<thead>
<tr>
<th>2.6%</th>
<th>Overall consumption saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6%</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 504 965</td>
<td>Money saved</td>
</tr>
<tr>
<td>1 725 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 0</td>
<td>Investment made</td>
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</tbody>
</table>

BUFFALO VIEW, GAUTENG
The Buffalo View plant is the first factory in South Africa that is dedicated to the production of industrial cells. It is the largest charging facility from all of the four plants.

The energy efficiency intervention
Budget limitations prevented the implementation of capital projects at the Buffalo View plant. Consequently, operational and maintenance control became the main focus of the interventions. The study highlighted 10 projects of low and no cost and four capital projects. Due to the limited time for implementation and resource constraints, 10 low and no cost projects were initiated that resulted in 2.68% savings in annual consumption.

Capacity building
To ensure success in a limited time period eleven signed up for two day End-user EnMS training, while three more attended the energy performance measurement training.
Chris Roberts, FNB’s Safety Health and Environment National Manager, was requested in 2017 to implement the ISO 50001 standard in all the plants. During this period, he met a representative from the National Cleaner Production Centre South Africa (NCPC-SA) at a separate training course, subsequently FNB signed up its plants for energy management system (EnMS) and energy systems optimisation (ESO) training.

**FORT JACKSON, EAST LONDON**

The Fort Jackson plant produces more than 20 million parts annually. This is where the automotive and industrial battery plastic components and casings are moulded and manufactured. The Fort Jackson plant stretches over a total site area of 23,000 m² and has a production facility that is 7,800 m².

**The energy efficiency intervention**

Data from 2017 revealed that the total annual energy supplied to this manufacturing facility was approximately 3.7 million kWh of electricity. From the time when they started implementing the EnMS, the FNB Fort Jackson plant has implemented many technical and behavioural energy efficiency measures without investment. A 2% saving was realised.

**Capacity building**

To ensure success in a limited time period, 11 employees attended the Two-day End-user EnMS and three employees attended the Energy performance measurement training. Due to the interventions and capacity building embarked upon, the plant achieved an actual performance improvement of 2% was achieved.

<table>
<thead>
<tr>
<th>2%</th>
<th>Overall consumption saved</th>
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<tbody>
<tr>
<td>177 GJ</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 66 220</td>
<td>Money saved</td>
</tr>
<tr>
<td>47 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 0</td>
<td>Investment made</td>
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</tbody>
</table>

**SETTLERS WAY, EAST LONDON**

FNB’s Settlers Way plant manufactures more than 10,000 batteries per day. Data sourced from 2017 revealed that the total annual energy supplied to this manufacturing facility was around 26.9 million kWh with a split of 70/30 for electricity and liquefied petroleum gas (LPG) respectively. Since signing up as a candidate plant for the SA Industrial Energy Efficiency (IEE) Project, the FNB Settlers Way plant has implemented many technical and behavioural energy efficiency measures.

**The energy efficiency intervention**

Only four out of the 11 low and no cost projects were completed. Collectively, these saved the plant approximately 1% in consumption annually.

**Capacity building**

Eleven employees attended the EnMS two-day end user course, and two employees attended the two-day energy performance management indicators training.

<table>
<thead>
<tr>
<th>1%</th>
<th>Overall consumption saved</th>
</tr>
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<tbody>
<tr>
<td>131 900 kWh</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 127 058</td>
<td>Money saved</td>
</tr>
<tr>
<td>99 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 0</td>
<td>Investment made</td>
</tr>
</tbody>
</table>
Sappi Southern Africa
SAICCOR, KWAZULU-NATAL

**Sector:** Pulp and Paper – Manufacture

**Intervention:** Energy Management System (EnMS) implementation and certification 2016

**The company and their product**
The Sappi Saiccor Mill is one of the world’s largest cellulose producer with a capacity of 80 0000 tonnes per annum. The company’s cellulose production goes back more than 60 years. The Saiccor Mill is located on the banks of the Umkomazi River near the town of Umkomaas.

**The energy efficiency intervention**
The plan implemented an energy management system (EnMS) using a phased in approach that spanned over 21 months, commenting in January 2016 and concluding in September 2017. The phases consisted of:

- Phase 1: Preparation and commitment
- Phase 2: Planning – energy review
- Phase 3: Implementation and operation – focus on SEUs
- Phase 4: Audit and management review

The EnMS approach helped the Saiccor Mill amalgamate and prioritise energy initiatives from various projects that were previously scattered.

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CASE STUDY

<table>
<thead>
<tr>
<th>2%</th>
<th>Saving of the overall electrical bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 538 611 kWh</td>
<td>Energy saved</td>
</tr>
<tr>
<td>ZAR 7 257 889</td>
<td>Money saved</td>
</tr>
<tr>
<td>8 902 tCO₂e</td>
<td>GHG mitigated</td>
</tr>
<tr>
<td>ZAR 773 000</td>
<td>Investment made</td>
</tr>
</tbody>
</table>

Sappi Southern Africa
STANGER MILL, KWAZULU-NATAL

**Sector:** Pulp and Paper – Manufacture

**Intervention:** Energy Management System (EnMS) implementation and certification, 2016

**The company and their product**
The Sappi Southern Africa Stanger Mill is unique because it uses bagasse as its basic raw material in the manufacture of office paper and tissue wadding. The Stanger Mill is situated along the north coast of KwaZulu-Natal, near the town of KwaDukuza. The Stanger Mill is home to a well-known office paper brand, Typek.

**The energy efficiency intervention**
Through the implementation of an energy management system (EnMS), the Mill saved 14.45% on their overall electrical bill. Some of the interventions included the establishment of an energy forum, and that of an energy baseline etc.

**IEE capacity building programme**
Eight team members of the energy forum, consisting of the engineering, production and SHEQ representatives, attended the National Cleaner Production Centre South Africa’s (NCPC-SA) two-day EnMS training.
The company and their product
Vito Ice-cream is a Halal Certified ice cream manufacturer based in Lansdowne, Cape Town. The company produces lollipops and soft serve ice cream which is sold to customers all around the greater Cape Town area. Vito has 25 permanent staff with 10 part time staff.

Vito Ice-Cream experienced significant competition in the frozen desert market and had to aggressively drive costs down to maintain cost competitiveness.

The energy efficiency intervention
The company achieved the savings by implementing the steam optimisation interventions in phases. The interventions were:
- Boiler lagging & cladding
- Upgrade of boiler control panel
- Water and steam distribution improvements

Other energy savings interventions included the refrigeration systems, compressed air systems, lighting and hot water systems.

Capacity building
The Maintenance Manager at Vito Ice Cream attended the Pumps Systems Optimisation (PSO) Training in May 2016 in Cape Town.

The company and their product
Klein River Cheese is a small family run cheesery in the Western Cape. All the cheese is made using age-old artisanal methods from locally sourced, pasture-fed cows’ milk.

Once made, the heads (or rounds) are kept in one of seven maturation rooms where the temperature, lighting, humidity and air flow are monitored under very strict conditions. Depending on the type, maturation may vary from one month to one year.

The cheeses are currently sold at Pick n Pay; Woolworths; Checkers; Spar; Fruit & Veg; speciality stores/delis throughout South Africa as well as directly from the Cheese Shop on the farm. The range is also exported to Namibia.

The energy efficiency intervention
Energy savings were achieved when Klein River Cheese replaced the boiler that utilized a 4 tonne / hr boiler but only required roughly 150-200kg / hr. The old steam boiler was decommissioned and a used hot water boiler was purchased and hot water piping installed. The hot water tanks and hot water piping were insulated.

This intervention resulted in a 50% reduction in energy saving.
But economically strengthening women is not only a means by which to spur and sustain inclusive industrial development. It is also a matter of advancing women’s human rights.

MR. LI YONG, DIRECTOR GENERAL OF UNIDO
Rosalind Dos Santos

Rosalind Dos Santos joined leading paper and plastics packaging manufacturing business, Mpact Limited, in September 2018 as Group Energy Manager for the Paper, Corrugated, Plastics and Recycling Divisions. She has a BSc in Chemical Engineering and an MSc in Metallurgical Engineering, followed by other certifications, including a Certified Energy Manager qualification with the Association of Energy Engineers, and a Green Star SA New Buildings Accredited Professional. She is currently completing an MBA with the Graduate School of Business at University of Cape Town.

Rosalind is a member of the Future Energy Leaders’ Programme of the World Energy Council, the South African National Energy Association, and the Association of Energy Engineers.

Areas of specialisation
Energy, energy efficiency, water, water efficiency, sustainability, strategy development, carbon footprinting, carbon project development, carbon reporting, and management consulting.

Role of the IEE Project
The IEE Project has been valuable as it has been a continuous source of training, advice and expertise. It has been driving industrial energy efficiency in the South African environment for a number of years and are always there when you need someone to turn to for advice and assistance on energy efficiency, while the NCPC-SA also offers support with resource efficiency and industrial symbiosis, just to name a few of their great projects.

Women and the energy sector
“Experiences in both the energy and engineering fields show that women still have to be better than men to be taken seriously. My female technical colleagues offer work of exceptional quality and they have to, because they are still discounted on gender perceptions until they have ‘proven’ themselves. Work starts with a perception and women have to overcome that. For example, they have to fight a little harder to be put on big, interesting projects. I have learnt that sometimes to get the job done, a team must be composed of the people to whom the other party can relate the best. We need to decide what is important. There is no place for ego – flexibility is key.”
Areas of specialisation
With more than two decades’ experience in the public sector, Hildegard’s background is varied and covers energy, land reform, local government, human settlements and intergovernmental fiscal relations.

Importance of Industrial Energy Efficiency
“There is tremendous value in industrial energy efficiency. Our industries need to be globally competitive, and in order to achieve this, they need to do two things. First, they need to reduce unnecessary costs by becoming more energy efficient, and they can do this if they assess the efficiency of both their business processes and capital infrastructure. Second, energy efficiency leads to a smaller carbon footprint. Since most of the energy currently utilised is fossil fuel-based (whether it’s from coal-fired electricity or direct use of coal, diesel, or heavy fuel oils), the more fuel you use, the greater your footprint. Optimally, firms should be installing renewable energy infrastructure also.

Increasingly, the world is pricing carbon emissions, and sooner or later almost all of our exports will be assessed for their footprint and penalised (or not) accordingly. So the more energy efficient a firm becomes, the more competitive, profitable and sustainable it is.”

Opportunities in the energy sector
“The energy sector offers varied opportunities. Women should not be discouraged if they do not have specific energy experience. If someone is in another field, economics, for example, with a desire to go into the energy field, I would advise her to plot her pathway into the energy world and then start the journey. There are so many short courses that one can take – many online and accredited – that can quickly build knowledge and skills in energy. Also, there are many routes into the energy world. Someone with a qualification and experience in financial modelling, for example, could apply those skills in many energy environments.”

Hildegard Fast is based at the Department of Economic Development where she leads the Energy Security Game Changer for the Western Cape Government. She has a PhD in South African History.
Lauren Hermanus is the founder of a network-based sustainable development consulting practice, Adapt, and a research associate at the UCT Graduate School of Business. She has a BA in Politics, Philosophy and Economics; an Honours in Philosophy; as well as a Master of Art in Philosophy, focusing on complexity thinking and ethics; and a Master of Philosophy in Development Policy and Practice. She is currently enrolled for her PhD, focusing on decentralisation in sustainable energy transitions.

Areas of specialisation
Lauren is particularly interested in the actual and potential interactions between policy, governance, finance, technology, workers and energy users in a just and sustainable energy transition. She applies a complex systems-informed approach to understanding issues of change and transition in the energy sector.

Typical challenges faced by women in energy sector
“Women in the energy sector face particular challenges. We are often kept out of important spaces because of conscious and unconscious biases, and when we are brought in, we can be silenced. This has happened to me more times than I care to remember. A lot of that has to do with how exceptional it still is to be a woman in this sector. Norms and expectations are often exclusive, by default.

The solution is a combination of changing the numbers and combatting the narrative of exceptionalism by supporting other women in the sector. When we find ourselves judging another woman in the sector harshly, we need to ask ourselves if we are starting to think like the old guard and are thus becoming part of the problem.

I see a long future working in the energy sector. Professional settings that are ‘all men’ did not get that way by accident. These are the result of laws, rules and norms and will not change without our combined deliberate effort. I believe in sector development that supports and deepens democracy. This is definitely a future focus area of my work.”
Roula Inglesi-Lotz is an Associate Professor in the Department of Economics at the University of Pretoria. She is also the founding and current president of the South African Association for Energy Economics (SAAEE), the co-leader of the Women in Science workgroup of the Global Young Academy (GYA) and a member of the South African Young Academy of Science (SAYAS). Roula has a PhD in Economics from the University of Pretoria, funded by a bursary from the South African National Energy Development Institute.

Areas of specialisation
As an economist, Roula has always been interested in the issue of resource scarcity and optimal allocation of resources. During her Master’s thesis, she developed an interest in economic growth and its contributing factors. The South African energy supply crisis in 2008 led her to investigate the energy sector, its dynamics and relationship with the economy, starting with the South African case and extending to the rest of the world. In the research associated with her PhD, she aimed to disentangle the determinants of electricity consumption and eventually propose a solution to improve the intensity of electricity usage in South Africa.

Women in the energy sector
“A crucial determinant of our successful future in energy research is the optimal use of all skills available. Something that we lack in the field is a woman’s point of view, not merely as a statistic in the proportion of the energy labour force, but in contributing scientific opinions towards decision-making in the sector.

South African women can make their mark by becoming entrepreneurs, investors, professionals and leaders within the energy field. There is an abundance of opportunities for women in researching energy. The limited participation of young women in technical subjects such as science, engineering and mathematics also needs to improve. Economists or students in the field should consider energy as an option for specialisation. It is such a broad field and allows researchers from economics, engineering, law and others to come together to look for solutions. When you work on energy topics, you need to be passionate and ready to learn more than just economics. You must read as much as you can – academic papers, professional reports, everything. Never think that you know everything, because there is something new to learn every day in research.”
Faith Mkhacwa is a Senior Project Manager in the Industrial Energy Efficiency (IEE) Project. In addition to holding BSc Eng. (Electrical and Electronic Engineering) and MBl degrees, she has also completed a range of short certificate courses, and was the first female Regional Project Manager to join the IEE Project in South Africa.

**Areas of specialisation**
Faith is a UNIDO-certificated Expert on Energy Management Systems (EnMS), a UNIDO-certificated trainer in the areas of Energy Management and Energy System Optimisation, and a RENAC-certificated Renewable Energy Project developer. She is a member of Southern African Females in Energy Efficiency, a chapter of the Southern African Energy Efficiency Confederation, and serves on the Advisory Board of Africa Utility Week. She is also on the interim committee of ESCOs in South Africa and the ISO Technical Committee 301, which focuses on standardisation in fields of EnMS and energy savings.

**Typical challenges faced by women in energy sector**
“Although some progress has been made, women in the energy sector still face many challenges, including a lack of technical support for women entering the sector; a lack of skills (which the IEE Project is doing well in addressing); and a lack of opportunities for partnerships, especially in the Renewable Energy sector. The biggest challenge for me is the fact that the energy sector has a face, and it’s not female. The sector is still relatively small and it is difficult to get accepted into the existing networks. Some women manage to overcome the hurdles and get recognised, but when they get to the boardroom, they are often still not taken seriously. The result is that most women just give up and exit the sector with their skills, experience and knowledge untapped.

Energy is everyone’s problem and everyone’s contribution will be required to enable us to come up with a solution. We need different skills and super-inquisitive minds. Not all of us will be employed so we also have to start women-owned energy businesses and create employment for others while offering excellent service and making a meaningful contribution towards the best sustainable solution for SA.”
Milisha Pillay is a Project Manager at the nCPC-SA, working specifically on the Industrial Energy Efficiency Project. She has a BSc Chemical Engineering (Hons) degree and a Master of Business Administration degree, and is a member of Women in Energy and of the Engineering Council of South Africa.

Areas of specialisation
Milisha has several years of industry experience in the agro-processing sector and has worked on the implementation of energy and water saving projects, from detailed engineering design to commissioning. She is also a UNIDO-certificated ISO 50001 Energy Management System Expert and is currently working towards certification in Steam Systems Optimisation.

Typical challenges faced by women in energy sector
“The energy sector is still quite male dominated, with not enough young women choosing to build a career in the sector for reasons ranging from work/life balance to lower pay for females. Those who do join the industry typically do not reach leadership roles within the same timeframes as their male counterparts. On the positive side, there seems to be a global shift in the number of women making their mark in energy and other industries.

Despite the challenges, there is no better time to enter the energy sector as there are amazing opportunities available. The world has never been as aware of the catastrophic impacts of fossil fuel consumption and energy usage as it is now. This is therefore an opportunity for women to showcase that diversity breeds innovation by bringing original solutions to the table in the fight against environmental devastation and climate change. South Africa’s commitment to international climate change agreements and the move towards cleaner energy also opens up a new avenue for women to pursue, as renewable energy is fairly new in comparison to the nuclear and fossil fuel energy industries that might still have an “old school” mentality. My advice is to skill yourself in everything energy if you plan to be in the field. You can never be over-educated.”
Adri Uys

Adri Uys is currently a Management Trainee at Coca-Cola in KwaZulu-Natal. Her qualifications include a BSc and MSc in Chemical Engineering, and she is a member of the Engineering Council of South Africa, and the South African Institution of Chemical Engineers/IChemE.

Areas of specialisation
Adri’s skills specific to the energy sector include determining carbon footprints and how energy management ties into these; energy (electricity and other energy sources) demand management; identifying waste and implementing reduction initiatives; energy balances, e.g. burners and boilers; motivating for investment in renewable sources, in particular solar; and raising awareness and encouraging staff participation in sustainability initiatives.

Career impact of the IEE Project
“It was the RECP internship offered through the IEE Project that ignited my passion for sustainability and its critical role when integrated into engineering. It became my second pair of eyes through which I view industry. No matter where I go, my natural inclination is to identify optimisation initiatives to improve water and energy usage. I have implemented RECP methodologies over three years, during which I worked as a graduate trainee for two years and a utilities engineer for one year at I&J. It was great to be part of the team that implemented critical water security initiatives and realising significant water demand and usage reductions for the I&J group. Reduced use ensured cost savings and improved water use ratios. The biggest contributors to these achievements were applying the RECP knowledge – knowing what to look out for – and, of course, team-work, management buy-in, and being given the platform to implement change with a good dose of ‘never-say-die’ boldness.”

Making progress in the energy sector
“Women have to equip themselves with an array of skills, bringing a ‘plus-one-service’ to the table. This way, you can demonstrate that you have much more to offer. A mind-set change at management and hiring level is required to provide the opportunities and exposure. In addition, providing a platform for women to prove themselves and innovate would go a long way in increasing valuable contributions from women to the energy sector”.

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