

ISSN 1818-2119

# Vector

Official Journal of the Electrical Contractors Association of South Africa  
Official Journal of the Institution of Certificated Mechanical and Electrical Engineers  
Official Journal of the Illumination Engineering Society of South Africa

Jan  
2016

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Energy conservation and energy efficiency are the most powerful tools in South Africa's transition to a clean energy future.

# Improving energy performance in plant and buildings: Part 1

by Gary Williams, Carolinas Energy Associates

Renewable energy is an important piece of our energy future, but the largest opportunities currently lie in energy conservation and efficiency.

The efficiency of energy sources has a significant impact on the environment as efficiency improvements help reduce the power demand and offset power interruptions and load shedding. Renewable energy is the cleanest form of energy and has become a more affordable source. However, its adoption is not the first step towards achieving the most optimal energy use.

Energy efficiency optimises the energy system as a whole. It does this by removing energy wastage through employee education and mindset changes, thereby improving efficiency through the implementation of energy-efficient technologies. Simply put, energy not used will always be the cheapest and cleanest energy available.

The time to develop verifiable action plans toward achieving sustainability is now. Developing innovative strategies in the following areas will help companies improve their sustainability, performance and energy efficiency programmes:

- Energy Star plant certification industry challenge.
- Establish carbon treasure hunts.
- Establish green teams by engaging employees in sustainability.
- Bringing the green to Six Sigma.

## Energy Star

Numerous published case studies of companies that have accepted the Energy Star Challenge for Industry have demonstrated their commitment to protecting the environment by improving



Fig. 1: Small steps in the workplace can make a big difference in terms of global warming.

their facilities' energy consumption by 20 to up to 50%.

The Environmental Protection Agency's (EPA's) Energy Star Challenge for Industry is a tool designed to help energy managers and industrial sites improve energy performance and set goals. Industrial sites participate by committing to the pre-established goal of reducing energy intensity by 10% within five years or less. Such certification attests to the achievement of an actual level of energy performance for a specific facility.

Energy Star certifies verifiable achievement of an actual level of energy

performance while certification to ISO 50001 verifies that the organisation has specified systems in place. Both Energy Star and ISO 50001 focus on energy management and offer useful approaches to energy management.

Many manufacturing sites have achieved the Energy Star Challenge for Industry goal of a 10% or greater improvement in energy efficiency within five years or less. The average energy improvement achieved by these companies is greater than 20%, with some companies having achieved as much as 50% savings.

Manufacturing plant outside the USA

are eligible to participate in the Energy Star Challenge for Industry, but their parent companies must have operations in that country; have corporate energy managers or appointed consultants located within the USA, and must be Energy Star partners.

### **Establish carbon treasure hunts**

Establishing carbon treasure hunt teams in your organisation helps employees to better understand key environmental issues and energy saving opportunities, thereby helping reduce the company's overall carbon footprint and CO<sub>2</sub> emissions.

Energy treasure hunts focus mostly on day-to-day operational opportunities, many of which will be low-cost or no-cost efficiency improvements.

Note that the traditional energy audit takes an in-depth look at an entire facility and focuses on equipment modifications that require capital expenditures. Energy treasure hunts have the objective of finding treasure, not problems. Audits and assessments can have negative connotations like the objective of finding "problems".

Carbon treasure hunts differ from traditional energy audits by empowering employees to take the initiative and focus on improvements that can often be made immediately and without significant expenditure by supporting continuous improvement in the following ways:

- *Teamwork:* Engaging and educating employees to identify opportunities to reduce energy usage and to make programme enhancements.
- *Optimisation:* Improving the operation and efficiency of existing equipment before considering equipment replacement.
- *Ownership:* Involving employees to help create a sense of responsibility for the solutions.
- *Repetition:* Frequent carbon treasure hunts produce the greatest benefits.

### *Benefits*

The carbon treasure hunt develops employees' energy knowledge and motivates them to pursue and take ownership of energy innovation. It creates focus on low-cost operational improvements and establishes culture of continuous improvement and cross-functional collaboration. The treasure hunt also reduces overall energy use, energy costs, and greenhouse gas emissions and requires lower initial co-ordination cost compared to audits or assessments.

### **Case study**

General Electric (GE) employees have conducted treasure hunts at over 300 sites around the world. At the time of writing (2015), participating GE facilities have identified opportunities to reduce energy use by 20%. The treasure hunts have contributed to more than \$150-million in savings and the reduction of more than 250 000 tonnes of CO<sub>2</sub>.

### **Establish green teams**

Companies that inspire innovation and in terms of sustainability practices improve staff morale and productivity, grow their businesses and save money. Case studies indicate that, while there is no "one-size-fits-all" approach to sustainability education, engaging employees at every level of the company is essential to success.

### *Benefits*

- *Savings:* Improving operational efficiency and profitability reduces insurance costs by demonstrating effective risk management.
- *Improved staff morale, productivity:* Green teams create a healthier and more comfortable workplace, attract and retain employees, and increase innovation and loyalty.
- *Enhance community and public relations:* These teams enhance your brand and increase visibility by showing leadership in the marketplace.
- *Business growth:* Green teams provide access to new markets and attract new business.

In a white paper titled "The business case for environmental and sustainability employee education", the American National Environmental Education Foundation lists the following quantitative estimates of the value proposition for large companies practicing sustainability:

- Sustainability practices can contribute to a profit increase of 38% when benefits are aggregated.
- Employee commitment to sustainability was a critical enabling factor contributing to this overarching profit increase.
- Companies in the Dow Jones Sustainability Index outperform the general market.
- A report from Goldman Sachs found that leaders in environmental, social and governance (ESG) policies are also leading in stock performance by an average of 25%.
- Carrie Freeman, a corporate sustainability strategist at Intel, noted

in a Green Teams report that, "when it comes to looking at ways to reduce our footprint, we very much see a direct correlation between reducing costs and engaging employees."

### **Bringing green into Six Sigma**

Six Sigma is a tool set for improving processes by identifying and removing the causes of defects and by reducing variables in manufacturing and other processes by creating expertise among employees. Its core tool is the DMAIC improvement cycle, an acronym for "define, measure, analyse, improve and control".

Companies which incorporate social and sustainable responsibility measures into their organisations by including "green" into their Six Sigma practices (forming "DMAGIC") have decreased their organisations' environmental impact by up to 30%.

Six Sigma teams should learn how the G or "green it up" step should be added to the DMAIC process to create DMAGIC; this step is designed to ensure that every improvement project addresses environmental concerns. This also ensures that a socially responsible role is maintained in the community it serves. An environmental matrix can be used to identify the root causes of environmental issues in the green phase of each project before developing counter measures.

Your lean Six Sigma toolkit, which focuses on identifying and pursuing environmental end points in your processes, should include Kaizen Events, which are actions intended to improve existing processes; the 5S organisation methods plus sustainability ("6S"); value stream mapping and DMAGIC.

### **Adding "green" to the DMAIC process**

- DMAGIC ensures that every improvement project addresses the environmental concern.
- Teams perform the Green-it-up phase after identifying root causes and before developing any counter measures to ensure that areas such as air quality (including CO<sub>2</sub>), water quality, waste stream, general ecosystem, societal and economic issues are explored.
- DMAGIC ensures that environmental and societal concerns are included in every counter measure explored before it is evaluated.

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