Sustainable energy efficient management

By G Niesing, R Lotriet and LJ Grobler, North West University, Potchefstroom, South Africa

Energy efficiency knowledge often resides with individuals in a company rather than within the company – and this has a direct impact on sustainability. The goal is to obtain an aligned commitment between organisational behaviour at all levels and the new culture of energy efficiency in South Africa.

The current electricity supply and demand situation is still under immense pressure. During the electricity crisis in 2008, the reserve margin fell to practically nothing, resulting in the implementation of load shedding and conservation [1]. The situation (which is likely to last until 2016) has a direct impact on the probability of the occurrence of load shedding and rolling blackouts as experienced in 2008.

Figure 1: Operational capacity and reserve margin.

Businesses are concerned about key issues like the European debt crisis and galloping increases in administered prices such as electricity and fuel [2]. Failure to address these serious issues will impede the economy’s ability to meet future electricity demands [3]. To mitigate this supply risk the South African government has outlined an energy efficiency strategy by setting a goal for an improvement in energy efficiency of 12% by 2014 relative to projected consumption [4]. The imperative of the social partners in South Africa to start working more effectively towards addressing the microeconomic constraints such as the security of electricity supply and water cannot be understated [5]. It forms essential foundations for long-run economic performance.

The case study in this article is based on a manufacturing company in the South African industry. This company forms part of a multi-diversified group, which has a global footprint. The corporate division employed an energy manager to establish an energy centre which would be responsible for all energy-related activities, with the objective in reducing the energy demand at all sites. The initial scope of the energy manager was to roll out EE- initiatives such as implementing a remote metering solution, starting energy awareness campaigns and initiating energy audits to meet the objectives set out by the energy policy. The energy manager contracted the audit team to perform an energy audit at one of its manufacturing plants.

Unfortunately, after the audit was completed, the energy manager relocated to another company. This resulted in all the energy management activities losing momentum. Facility and sustainability managers of the various companies in the group ended up running all the energy management activities individually, without considering their mutual interest. This decentralised approach resulted in the ‘un-alignment’ of the corporate objectives and targets.

EE audit

The company contracted an audit team to assist them in alternative solutions to reduce its energy demand. One of the key activities identified was to conduct an energy audit in order to identify the site’s energy balance and significant energy users.

This is a typical organisational development situation analysis where organisational development - as a process of change - implies the dynamics between important elements [6]:

- Organisation’s present state in terms of effectiveness, efficiency, and work satisfaction, systems, structures management and functioning
- Desired future state as determined and described by means of its vision ad mission
- Approach to change through planned interventions and the skills of the ‘change agents’

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An energy audit was performed at one of the manufacturing plants. The savings opportunities ranged from no-cost, low-cost to medium term payback initiatives. No-cost and low-cost saving measures implicate strategies that were applicable and affordable to implement in order to reduce energy demand as quickly as possible. Medium term savings initiatives indicate energy reduction initiatives with a payback of less than two years.

Data, provided by the ‘PowerWatch System’, proved that a compressor at the site was operating 24 hours per day - despite the fact that the plant was operating intermittently, only during certain hours. (PowerWatch is a remote metering solution with performance visualisation capabilities). It was recommended to switch off the compressor during the periods when the various sections of the site did not require compressed air.

A 10-month period elapsed before the company started to switch off the compressor. The first reason was the loss of momentum when the energy manager left the company; and the second reason was a possible lack of buy-in by employees to make energy reduction activities their responsibility - as well as a resistance to change in the attitude of the operation personnel. The facility manager was well aware of this audit report but it took some time before the savings initiatives became a priority for him. Resistance to change and a lack of aligned commitment prevented the company from realising the savings intended.

When considering the period from 1 – 12 September 2011 it can be seen that substantial savings were achieved (on average 37% on weekdays, 29% on Saturdays, 39% on Sundays). If this intervention could be maintained for a period of one year, the impact would be total electricity consumption savings of 220 600 kWh/year (or when converted to rand value an estimated saving of R176 480). This intervention could result in a 4% reduction on their demand of their annual electricity bill. As a result, these savings have a dual outcome: On macro level contributing towards being part of the green economy; on a micro-level, for the individual companies, the cost savings contributed to improving its bottom line thus, adding shareholder value.

Managers and employees need to focus and align goals with shared values. This will encourage a motivating climate for sustainable change.

Perceived present state of energy management at enterprise level

Experience from the audit team identified some of the key challenges the commercial sector face towards the implementation of energy management activities, which are the following:

Management commitment

Pro-active top management recognises the importance of starting to reduce energy consumption and realise that escalating energy prices have a negative effect on their bottom line. However, if the management of a medium sized company, with relatively high-energy consumption, was asked if they feel that the company needs to employ an energy manager to effectively manage its energy profile they are most of the time reluctant in doing so. A lack in commitment indicates that they still see energy costs as an overhead expense rather than a direct cost affecting profitability.

Establish an energy policy

Another barrier towards sustainable energy management is that most companies struggle to develop and implement an effective energy policy. The purpose of an energy policy is to provide a road map, indicating specific requirements towards an organisations goal and commitment in reducing its energy footprint. An effective energy policy should specify the availability of resources to implement energy efficiency initiatives, communicate to all levels in the organisation,
set specific energy reduction targets and provide a framework to continually review the effectiveness of the policy.

Appointing a dedicated energy 'champion'
A common perception is that top management and human resource departments believe that it does not justify medium size companies to appoint an energy manager for their site. Most would make use of either a facility or risk manager to oversee the additional task of managing its energy consumption. This situation usually leads to a lack of focus and in many situations work overload.

Awareness Creation
A common mistake is to assume that people will adopt energy-efficiency practices simply if they understand the need to conserve energy. The fact that the employees believe that energy efficiency is important, and know what actions to take does not mean that they will implement measures to reduce its energy consumption. Many studies conducted over the last 30 years have shown that these factors alone are not enough to change behaviour. If the program is based solely on providing information to people, it will almost certainly fail.

Uncertain markets
Persuading people to change their habits is a challenge because so many external factors can influence behaviour. A lack of information and the understanding of financial and qualitative benefits towards operational behaviour, lack of adequate technical skills for developing and implementing EE measures and projects, poor monitoring systems and data, initial costs are more important than recurring costs [7] (capital vs operating budgets) all increase the risk and uncertainty of implementing energy initiatives.

Overcoming barriers
In the commercial sector, it is common for organisations to incorporate energy management roles by recruiting maintenance personnel and facility managers, which are already under immense pressure to achieve their workload and targets. Sustainable commitment in managing an organisation’s energy demand entails the empowerment of all personnel at all levels in an organisation, especially focussing on the bottom line. The key to a sustainable energy management plan is the commitment of top management and their appointment of an energy representative. If the resources in an organisation do not allow the appointment of a dedicated energy manager, it is advisable to make sure that the employees have enough spare capacity for energy management activities.

Integrating organisational development as a process of change
From the above mentioned problem statement, it is proposed that, if an organisation really wants to develop and grow into its desired future state, it needs to implement the core principles of successful change management. This will lead to a new approach and change the working habits of employees at all levels and requires the implementation of modern leadership skills and techniques. Table 1 illustrate these principles when introducing planning and goal setting. The goal is to obtain an aligned commitment between change management and organisational behaviour where employees at all levels of the organisation demonstrate commitment with the challenges of EE.

<table>
<thead>
<tr>
<th>Purpose principle:</th>
<th>Determine the reasons for change and thus establishing what the end-results of the plan of the change process should be.</th>
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<tbody>
<tr>
<td>Necessity principle:</td>
<td>Clarify the need for change. Change for change’s sake is not acceptable. The need for change should thus be identified to ensure that a real need exists. All employees who are responsible for energy consumption should be involved and committed</td>
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<tr>
<td>Create leadership and stakeholder involvement – change must be both led and managed. Top management must be involved and demonstrate their total commitment to EE.</td>
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<tr>
<td>Diagnostic principle:</td>
<td>Diagnose present functioning of the change process continually. Energy is spend on addressing problems, while using existing strengths as a positive force of change is mostly neglected.</td>
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<tr>
<td>Polarity principle:</td>
<td>Distinguish between problems that can be solved and polarities (dilemmas) which cannot be solved, but which must be managed to achieve the purpose of EE.</td>
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<tr>
<td>Integrating principle:</td>
<td>Design a results orientated change strategy. Refrain from a lot of activity, and rather on achieving results. Goals should be met by results.</td>
</tr>
<tr>
<td>Aligned commitment principle:</td>
<td>Align the vision, mission, goals &amp; objectives - all elements in the change effort.</td>
</tr>
<tr>
<td>Diagnose and manage apathy and resistance to change proactively:</td>
<td>As a continuous part of the integrating principle. This includes identifying possible sources of, the reasons and the kinds of resistance. Use top-down and bottom-up communication to mitigate resistance to change.</td>
</tr>
<tr>
<td>Learning principle:</td>
<td>New culture creation principle. Long term transformational changes require a change in organisational culture supportive and conducive to adopting and implementing sustainable EE initiatives.</td>
</tr>
<tr>
<td>Managerial leadership principle:</td>
<td>To achieve this a special brand of leadership is required. Transformational leadership that use instruments such as monitoring and evaluating the progress, also as inputs to the application of the other principles.</td>
</tr>
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</table>

Table 1: Ten principles for successful change management [8].

Apart from the mentioned management principles, a number of approaches exist in the discipline of Organisational Behaviour and
change management. One approach is the ADKAR Change Management Model. This is an effective method to use when implementing awareness as well as other energy strategies. Through a series of five building blocks, energy change management can be successfully implemented when individuals in the organisation have [9]:

**ADKAR**

* Awareness of the need for change  
* Desire to participate and support change  
* Knowledge as to how to change  
* Ability to implement required skills and behaviours  
* Reinforcement to sustain the change through recognition and rewards and public and individual levels

The energy representative needs technical skills regarding the fundamentals of energy management. The representative should also have commitment, communication skills and especially experience in change management and organisational skills to align employees at all levels in the organisation towards energy reduction and awareness activities.

A sense of urgency needs to be created, powerful change leaders must be recruited, a vision must be developed and effectively communicated, obstacles need to be removed, and the momentum needs to increase. If these principles are executed, regarding energy awareness, there will be sustainable benefits in energy management and behaviour at all levels of the organisation.

**Conclusion**

The importance of realising energy savings initiatives at macro level depends heavily on the demand reduction at micro level. To realise this industry faces reluctance as well as resistance to change form ‘the business as usual’ activities.

Understanding that there will be resistance to change will assist organisations to anticipate resistance, identify its sources and causes eg the lack in the implementation of the energy conservation measures. If the employees in the case study were made aware of the negative impact ‘resistance’ has on the company both - financially as well as operationally - it could have made a difference. However, if commitment between employees and company is lacking, barriers of resistance will remain.

The change intervention selected must fit the particular diagnosis and must be suitable to bridge the gap between the present state and the new vision.

**References**
