



BETTER BUSINESS GUIDE TO ENERGY SAVING

Introducing measures to help organisations save carbon.



Introduction

Most businesses could use a lot less energy. Experience shows that even low and no-cost actions can usually reduce energy costs by at least 10% and produce quick returns.

This guide shows how to identify measures where energy and cost savings can be easily made with little or no cost.

It is designed for use by anyone new to carbon saving (especially in smaller businesses) and recognises that not everyone has the time or resources to undertake a full carbon management programme.

This guide can be used on its own or as an introduction to the many other publications available from the PSEE. Free publications can be downloaded from www.psee.org.za.

Did you know?

63% of companies say that they are now taking action to reduce energy use in their operations. The survey was conducted globally amongst 2,956 companies by McKinsey in 2010.

A 20% cut in energy costs represents the same bottom line benefit as a 5% increase in sales in many businesses.

Carrying out an energy walk around

Conducting regular housekeeping walk arounds and noting down and acting on any maintenance issues can identify opportunities for energy savings and avoid expensive problems later on.

To identify where energy savings can be achieved, it is essential to start by looking at how energy is currently being used. Conducting a walk around with a checklist will identify:

- What is happening on the ground
- Wasteful energy use
- Opportunities for savings.

It will also demonstrate a commitment to improving energy performance.

The areas to look at on a walk around are heating, lighting, office equipment and, if applicable, factory and warehouse equipment. The checklist opposite is a useful guide, and the sections that follow give more information on what to look for.

As the pattern of energy use will differ throughout the day, it is useful to conduct a series of walk arounds and to vary the times that they are carried out, for example:

- When the cleaners are on duty
- At lunchtime
- At night or over weekends
- At a time when you would expect to be using little or no energy.

Varying the times of walk arounds will provide a better picture of when and where energy might be being wasted. It is helpful to plan future walk arounds for dates such as when the clocks change and at the beginning and end of the heating season. This will ensure that controls are set correctly for the time of year. Key members of staff can and should get involved with walk arounds, both to help identify problems and opportunities and to ensure they feel part of the process.

Comparing the findings of the walk around with meter data will help to pinpoint areas of high energy use.

It is important to prioritise energy saving actions once they have been identified, rather than expecting to do everything at once. Usually, those with the biggest savings potential or least disruption to the business will decide this. In some cases the savings are easy to identify and calculate; this guide should help you to estimate the potential savings of many of the common improvements. Where the savings are more difficult to calculate, contact the PSEE (details can be found inside the back cover).

Example energy walk around checklist



| Area | Issue | Priority | Action |
|--------------------|--|----------|--------|
| Heating controls | Are heating controls set correctly for the time of year? | | |
| Lighting | Are lights switched off when not in use? | | |
| Office equipment | Are office equipment (printers, copiers, etc.) switched off when not in use? | | |
| Factory equipment | Are factory equipment (conveyors, etc.) switched off when not in use? | | |
| Energy audits | Have energy audits been carried out? | | |
| Energy savings | Are energy savings opportunities identified and acted upon? | | |
| Energy performance | Is energy performance monitored and reported? | | |
| Energy management | Is energy management systems in place and working? | | |
| Energy training | Are staff trained on energy saving measures? | | |
| Energy policy | Is there an energy policy in place? | | |
| Energy targets | Are energy targets set and monitored? | | |
| Energy reporting | Are energy reports produced and reviewed? | | |
| Energy improvement | Are energy improvement measures implemented? | | |
| Energy savings | Are energy savings opportunities identified and acted upon? | | |
| Energy performance | Is energy performance monitored and reported? | | |
| Energy management | Is energy management systems in place and working? | | |
| Energy training | Are staff trained on energy saving measures? | | |
| Energy policy | Is there an energy policy in place? | | |
| Energy targets | Are energy targets set and monitored? | | |
| Energy reporting | Are energy reports produced and reviewed? | | |
| Energy improvement | Are energy improvement measures implemented? | | |

Heating

Heating typically accounts for about half of the energy used in offices and forms a significant proportion of energy use in other areas of a business. It is a key area to target with energy saving measures. Many businesses are overheated which can cause discomfort and waste money.

Overheating is often the result of heating areas that do not need to be warmed (such as storage areas or corridors) to the same temperature as those that do, such as occupied areas. Overheating can also be the result of poor control of heating systems.

Preventing heat loss by improving insulation and draught control can also significantly reduce heating bills.

Key areas and issues to look out for when carrying out an energy walk around, are:

Equipment and heat usage

When were the heaters or boilers last serviced?

- Heating costs can increase by 30% or more if

the boiler is poorly operated or maintained. Ensure they are serviced at least annually and adjusted for optimum efficiency.

Is there evidence of use of portable heaters?

- Portable electric heaters are expensive to run. If portable heaters have to be used, install a simple time switch so they turn themselves off after a designated period, for instance 30 minutes.

Are there heaters and air conditioning units operating simultaneously in the same space?

- Simultaneous heating and cooling of a space is commonplace and wastes a lot of money. Set a 'dead band' of 5°C between heating and cooling, to avoid this happening.

Heating costs rise by about 8% for every 1°C of overheating.

Further information

PSEE has a range of publications on saving energy aimed at all levels of experience.



Visit www.psee.org.za
or call 0801 113 943
to find out more.

How is the hot water provided?

- Consider installing local instantaneous water heaters where small quantities of hot water are required a long way from the main heating plant. This may also allow the main boiler to be switched off in the summer.
- Insulate all hot water tanks, boilers, valves and pipework unless they provide useful heat to occupied spaces.

Do all areas have the same heating requirements?

- Consider heating the building in zones to allow heating to be adjusted for each area. Areas such as storerooms and corridors, or areas where there is a high level of physical activity, require less heat.
- Warehouses are sometimes heated in an attempt to reduce humidity and maintain product quality, but warm air can often hold more moisture than cold air and heating may actually increase humidity. Dehumidification can be more efficient for this purpose.
- Remember the effect of sunlight – are you heating areas that are already warmed by the sun?

Controls and timing

Are thermostats correctly set?

- Thermostats should generally be set at 19-20°C for heating.
- Install thermostatic radiator valves where possible to provide local control of radiators and make sure they are used correctly.
- Are thermostats placed in the correct locations – away from draughts and direct sunlight and at a distance from any heating sources?
- Zone controls allow heating or cooling of different parts of a building at different times and different temperatures according to occupants' needs.

Are time controls correctly set?

- Does heating come on only when needed?
- Control heating using seven-day timers to allow it to be turned off or down during regular unoccupied periods.
- Money can be saved by adjusting any preheat period in the morning to match weather conditions. Controls are available that can do this automatically.

How are extractor fans, for example in toilets, controlled?

- Fans left running extract warm air and waste money – consider fitting time switches or occupancy detectors.

Energy Efficiency Financing

Investing in energy efficient equipment makes sound business and environmental sense. A number of different financing options are available depending on the solution required.

To find out more about these options, get in touch with our advice line at info@psee.org.za or 0801 113 943.

Draughts and avoiding heat loss

Are windows and doors left open during the heating season?

- Windows are often opened because rooms are too hot.
- Instead of opening windows, turn down thermostats a little until a comfortable temperature is reached.
- Use promotional material and staff meetings to raise staff awareness.

Are there cold draughts coming from windows and doors?

- Draughts are not only a cause of complaint and discomfort, but waste money.
- Fit draughtstrips and seal up windows and doors that are no longer used.

Case Study

Eskom

By developing and implementing a robust energy efficiency strategy, Eskom has been able to achieve an 18% reduction in electricity at its head office (Megawatt Park, Woodmead) which equates to a R 3 million saving.

The strategy is based on two pillars: replacing inefficient electrical products and changing employee behaviour.

Interventions included replacing all lights with compact fluorescent lamps, installing variable speed drives in air conditioning units and installing solar water heaters.

Changing employee behaviour involved ongoing awareness campaigns and implementing policies such as switching the lights off from 19:00 to 05:00.



During summer months, extraction fans are turned on at 04:00 to draw cold outside air into the building to cool down the structure. This enables the air conditioning chillers to be switched on about three hours later.

Lighting

There are many simple and inexpensive ways to reduce the energy consumption and costs associated with lighting without compromising health, safety or comfort levels.

Key areas and issues you should look out for when carrying out an energy walk around are:

What type of fluorescent tubes are in use?

- Slimline fluorescent tubes (26mm diameter) use 10% less electricity and are cheaper to buy than the older 38mm tubes
- Installing new high frequency fluorescent lighting eliminates flicker and hum, extends lamp life and can often reduce consumption by around 25%.

Are lamps, fittings and rooflights clean?

- Dirty shades and rooflights greatly reduce lighting levels.

Are standard (tungsten) light bulbs still being used?

- These bulbs are very expensive to run for long periods and produce more heat than light

- Replace standard light bulbs with more efficient compact fluorescent bulbs – they have a longer life, lower maintenance costs and use up to 75% less energy
- ‘Task lighting’ is a good way to minimise the amount of electric light being used, by lighting just the working area to a higher level and providing background lighting at a lower level for the rest of the space. The use of ‘task lighting’ can also reduce glare on computer screens making it more comfortable for employees.

Is there an opportunity to use LEDs?

- LED lighting can provide substantial energy savings. LEDs typically have a long lifetime and will need less frequent replacements than many other lighting types.

Lighting in a typical office costs about R16/m² annually, but in the most efficient office only costs about R5/m².

Top tip – Banks of lights are often controlled by a single switch. Consider installing more switches or pullcord switches to improve control of individual fittings.

Did you know? Fluorescent tubes use only a few seconds’ worth of power in start up – therefore, it is always better to switch them off when leaving a room.

Is the exterior lighting always switched off when it is not needed?

- Exterior lighting should be limited to the hours of darkness.
- It may not be necessary to have lights on continuously throughout the night. Consider fitting lighting controls to limit hours of use.

Are lights switched off when the premises are not occupied?

- A lot of energy is wasted when unnecessary lights are left on after hours.
- Carry out an out-of-hours check to see if this is a problem.
- Make staff responsible for switching off the lights.
- Use promotional material and staff meetings to raise staff awareness.

Case Study

British American Tobacco

British American Tobacco, as part of its energy efficiency strategy, undertook a study of lighting used at its Heidelberg production factory.

The factory has approximately 3 700 lights, of which 550 are 250W mercury vapour lights and 3 150 are 400W mercury vapour lights. These are high intensity discharge lamps, which have a shorter life span, lower lumen efficacy and consume more energy than other technologies such as induction lighting and LED lamps.

A pilot study to test these newer technologies is expected to save over R 1,1 million.



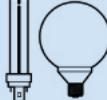
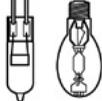
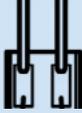
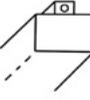
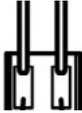
Make sure that the most efficient type of lighting is installed. The following table shows different types of bulbs and whether there might be a more efficient alternative.

Did you know?

It is possible to cut your lighting costs by up to 30% by implementing energy saving measures outlined in this overview.

Lighting a typical office overnight wastes enough energy to heat water for 1,000 cups of tea.

*Take care when tungsten light bulbs are used as task lighting for machinery in workshops. Replacing them with energy saving bulbs can cause a stroboscopic effect, so tungsten bulbs can sometimes be the safest option. An alternative is to use a compact fluorescent fitting with high-frequency electronic control gear which eliminates the stroboscopic effect.

| Existing lamp type | Energy-efficient option | Energy saving benefits |
|--|--|---|
|  <p>Standard (tungsten) light bulbs</p> |  <p>Replace with energy saving compact fluorescent bulbs in the same fitting*</p> | 75% energy saving plus longer lamp life |
|  <p>38mm (T12) fluorescent tubes in switch-start fittings</p> |  <p>Replace with equivalent 26mm (T8) fluorescent tubes of lower wattage</p> | 8% energy saving plus longer lamp life |
|  <p>High wattage filament lamps or tungsten halogen lamps as used in floodlights</p> |  <p>Replace with high-pressure sodium or metal halide lighting</p> | 65-75% energy saving plus longer lamp life |
|  <p>Mains voltage reflector lamps, filament spot and flood types</p> |  <p>Replace with low-voltage tungsten halogen lighting or metal halide discharge lighting</p> | 30-80% energy saving for equivalent lighting performance |
|  <p>Fluorescent fittings with the old 2ft 40W, and 8ft 125W fluorescent lamps</p> |  <p>Replace with modern, efficient fittings using reflectors/louvres or efficient prismatic controllers with high-frequency electronic or low-loss control gear and triphosphor lamps</p> | 30-45% energy saving with much improved lighting quality. The use of high-frequency electronic control gear eliminates flicker, hum and stroboscopic effect |
|  <p>Fluorescent fittings with opal diffusers or prismatic controllers which are permanently discoloured</p> |  <p>Replace with new prismatic controllers or replace complete fittings as above</p> | No reduction in energy consumption but increases the amount of light by between 30% and 60% |

In the office

Businesses rely on a range of office equipment. From computers and photocopiers to teleconference facilities, these items have become integral to daily activity.

However, it is not always appreciated how much this equipment can cost a company.

Apart from heating and lighting savings, energy consumption in offices can be reduced by looking at the way equipment is used.

In an air conditioned office it can take half as much energy to remove the heat generated by office equipment as it takes to run the equipment in the first place.

Have the computers got in-built energy saving features?

- The best known energy label for office equipment is the Energy Star rating, whereby equipment automatically enters a low power mode after a preset amount of time.

However, these savings can only be achieved if the energy management software has been enabled.

- Screensavers do not save energy. They only save the screen image from 'burning in' when the image does not change for a long period.

Are computers left on overnight?

- By switching computers off at nights and weekends, rather than leaving them running, their energy consumption can be reduced by 75% per year.
- If the monitor is also turned off when not being used (including lunchtimes, etc), and the standby options are activated, energy consumption can be reduced by 90% per year.

On average, 20% of the total energy bill in commercial offices is accounted for by office equipment – about half of this use stems from PCs and monitors.

Are photocopiers located in air-conditioned areas?

- Place photocopiers in areas that are naturally ventilated where possible. This will help avoid any air conditioning plant having to compensate for the associated heat gains.
- Run copies in batches to reduce the amount of time the machines are running in idling mode before and after use. This will allow machines to remain in power save mode for a higher proportion of the day.
- A photocopier left on overnight uses enough energy to make over 5,000 A4 copies.

Is other office equipment left on unnecessarily?

- Activate energy saving mode where available on printers and fax machines, as this will allow the machine to automatically power-down after a set time period.
- By switching laser printers off in the evenings and at weekends, energy consumption can be reduced by 75%.

Don't forget to switch off cold drink vending machines and water coolers overnight and at weekends too. Install a plug-in seven-day timer to reduce the likelihood of machines being left on after hours. These are inexpensive and can be bought from most DIY stores. Consult your manufacturer for advice.

Check what equipment is being used in the office kitchen: old kettles, tea urns, or refrigerators tend to be less efficient than newer models – it could be worth investing in a new, energy efficient appliance to improve performance and save money in the long run.

Did you know?

A computer and flatscreen monitor left on 24 hours a day will cost around R265 a year. Switching them off after hours and enabling standby features could reduce this to less than R80 a year and prolong the lifespan of equipment.



In the factory or warehouse

There are some excellent opportunities for energy saving that can be made on the factory floor or in the warehouse. The exact equipment used and the processes will be unique to each business, however it is possible to highlight a few common areas in which opportunities can often be found.

Compressed air

Is the system leaking?

- Check for wasteful leaks in the compressed air system (20-50% leakage is not uncommon) and repair them immediately – this simple measure could produce dramatic savings.
- It is easiest to check for leaks during quiet periods when there is no demand for air.

Does the compressor run when not needed?

- Many factories run their compressor for most of the day, even when compressed air is not needed, and are unaware of how much this is costing them – encourage staff to switch the compressor off when not in use.

Electrical equipment

Is equipment left running when it is not being used?

- Conveyor systems, machine tools and other equipment should be switched off when not in use.

Are Higher Efficiency Motors fitted?

- Higher Efficiency Motors now cost no more than normal ones and can save 3-5% of the running cost.

Are Variable Speed Drives (VSDs) fitted to equipment?

- In many cases, using a VSD to reduce the speed of a pump or fan by just 20% can halve its running cost.

Tax incentives

A number of different tax incentives are available to encourage investment in energy efficiency, such as those under 12L of the tax act.

To find out more about these options, get in touch with our advice line at info@psee.org.za or 0801 113 943.

Motors can consume their purchase price in energy costs in just a few weeks.

Case study

BHP Billiton Aluminium SA

The company produces over 800 000 tonnes of primary aluminium per year from its two smelters in Richards Bay. As one of the most energy intensive industries, the company is implementing a range of energy efficiency and renewable energy measures to reduce energy use.

To date, these measures have resulted in an energy savings of 113 500MWh and reduced greenhouse gas emissions by 135 000 tonnes CO2 equivalent per year.

Energy efficiency projects cover lighting, heating, ventilation and air conditioning, fans, motors, variable speed drives, liquid fuels efficiency, power factor correction and process efficiency improvements.

Refrigeration

Are the seals on refrigerated areas/ equipment in good condition?

- Replacing worn or damaged seals can drastically reduce refrigeration costs.

Make sure that doors to refrigerated areas are kept closed.

- If doors to refrigerated areas are left open, even for short periods, costs can rise significantly.
- Are the doors adequate to prevent warmer air entering the chilled space?

Is the refrigeration equipment well maintained?

- Badly maintained chiller plants will increase energy consumption.
- Are chiller units free of ice build-up and are they regularly serviced?
- Is the chiller outlet free of debris and blockages?



Using bills and meter readings to investigate energy use

Looking at energy bills and taking regular meter readings helps track energy use and take control of energy costs.

Reviewing energy invoices and checking meter readings regularly will help build a picture of your energy performance. These measures will also help to:

- Ensure that only the fuel actually used, is paid for
- Assist with comparing current consumption and costs with previous years
- Enable assessment of the seasonal pattern of consumption
- Identify unexpectedly high or unusual patterns of energy use so that quick action can be taken.

Electricity and gas meters are two of the most important tools in helping to identify opportunities to save energy. Taking regular meter readings should help to establish a pattern of energy consumption, which can be

compared against what the business should be using. Inconsistencies between the two could show where energy is being used unnecessarily.

The meter

Know where energy meters are

- Remember, there may be more than one meter for each type of fuel.

What type of meter is it?

- Meters that need to be read manually will have either a digital display or an analogue dial.
- Increasingly, energy companies are installing meters which automatically send information on energy usage to them on a regular basis – sometimes every half-hour. If this type of meter is installed, the data should be available from the energy supplier.

Analysing data

- Record meter readings regularly. If there is a change that can't be explained, or no reduction when you would expect to see one (e.g. summer holiday periods), check controls and settings – equipment may be left on when it is not needed. Ideally energy use should be plotted over time graphically to make it easier to see trends.
- Fluctuations in energy use may have many possible explanations, including variations in workload, holidays, the season or the weather.

If there is an unexpected fluctuation, then it is worth looking further to check if some equipment malfunction or change in working method has caused an increase in energy use.

Pay less for your energy

There are many factors that affect the price of a unit of electricity. To reduce costs, bear in mind that the price of a unit can vary significantly throughout the day and be substantially cheaper at night.

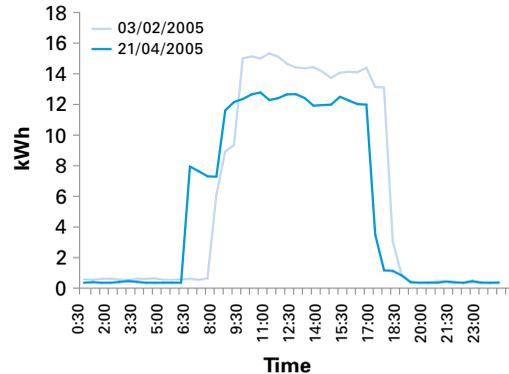
Contact the electricity supplier for further information.

There are several ways of paying less for each unit of electricity, for example:

- Make maximum use of cheaper electricity rates, especially those at night-time.
- Minimise use of peak rate and winter units.
- If possible, reschedule work activity so that the maximum daily demand for electricity does not fall in peak rate times.
- Check tariffs to ensure you are paying the minimum amount.
- Check with the supplier that the load (the amount drawn from the supply) has no unusual characteristics that may affect the unit price.
- Check the power factor.

In addition, the maximum demand – i.e. the maximum number of electricity units the premises take from the supplier in any half-hour period – can have a big impact on the cost, especially if the maximum demand exceeds what is agreed with the supplier. Check what the maximum demand limit is – it should be on the bill but check with the supplier if it isn't. Maximum demand is usually provided as a figure expressed in kW (kilowatts).

An example of reduced energy use after installing a half-hour meter



Power factor

Some electrical equipment, e.g. motors and fluorescent lighting, can exhibit an effect known as power reactance (a bit like driving a car with the brakes on). The combined measure of this unwanted effect in a business is the power factor. A low factor places an increased load on the power supply and means that the electricity could be more expensive. However, Power Factor Correction (PFC) equipment is available which corrects the power factor effect.

It is always advisable to consult an independent consultant when exploring this measure – it can produce significant cost savings but is not applicable in many businesses and needs expert help to implement.

Many businesses pay too much for their energy, including electricity; paying less needn't always involve switching supplier

Next steps

Once the opportunities for savings have been identified, it's time to act.

The following steps should help you to take effective measures.

Step 1. Make someone responsible

Give one person responsibility for an energy saving initiative at the site. They could:

- Be responsible for reading the meters and checking fuel bills
 - Carry out a walk around at designated times to identify new sources of wasted energy
 - Manage specific energy saving projects
- Make sure other staff know about the main areas of energy waste and show them how to save energy – and the benefits of doing so.

Step 2. Plan and organise

Draw up an action plan which should be a simple schedule of the improvements that need to be made, when they will be made, and who will be responsible for them. When writing an action plan:

- Make someone responsible for each improvement
- Allocate resources – both time and money if needed – to each improvement
- Where possible, set deadlines for the completion of each improvement and keep checking to ensure each has been done
- Identify a governance structure and reporting lines so that the person(s) with day to day responsibilities have a Director level contact in charge of ensuring that the improvements proceed as planned
- Prioritise improvements according to energy cost savings and time taken to recoup the cost. The PSEE can assist with this – email info@psee.org.za or call 0801 113 943.

Step 3. Involve staff

Although one individual may be responsible for energy efficiency, the involvement and commitment of all staff is crucial to achieving success. Encourage all staff to participate in a campaign of energy efficiency. Raising awareness is the first step on the way to getting staff participation.

Posters, stickers and leaflets are an inexpensive, effective way of reminding staff to be energy efficient. These can easily be produced in house. Many companies have introduced incentives schemes to ensure that actions are undertaken and that all staff contribute to energy saving measures.

Further information

[Energy management guide](#)

[Creating an awareness campaign](#)

Plug into energy efficiency with PSEE

The Private Sector Energy Efficiency (PSEE) project aims to improve energy efficiency in industrial and commercial sectors across South Africa. PSEE offers a variety of services to help companies plug in to energy efficiency:

Website – Visit us at www.psee.org.za for our full range of advice and services.

➔ www.psee.org.za

Publications – We have a library of publications detailing energy saving techniques for a range of sectors and technologies.

➔ www.psee.org.za/Resources

Case Studies – Our case studies show that it's often easier and less expensive than you might think to bring about real change.

➔ www.psee.org.za/Resources



Remote advice – Call us on 0801 113 943 or visit www.psee.org.za to access independent, authoritative advice and our publications and tools.

Survey-based support – Review of energy use for medium-sized companies to identify energy saving opportunities and develop a suggested implementation plan.

➔ www.psee.org.za/Services/Medium-Companies

Strategic energy management – Holistic engagements for large companies to help improve operational energy efficiency and support the development of a comprehensive energy and carbon strategy.

➔ www.psee.org.za/Services/Large-Companies



The Private Sector Energy Efficiency (PSEE) project aims to improve energy efficiency in commercial and industrial companies in South Africa through the provision of various services to assist companies in identifying and implementing energy saving measures. The PSEE project is implemented by the National Business Initiative (NBI), supported by the Department of Energy, and funded by the UK Department for International Development (DFID).

e-mail: info@psee.co.za

tel: 0801 113 943

web: www.psee.org.za

This publication is based on original content developed by the Carbon Trust. Whilst reasonable steps have been taken to ensure that the information contained within this publication is correct, the authors, PSEE, NBI, the Carbon Trust, its agents, contractors and sub-contractors give no warranty and make no representation as to its accuracy and accept no liability for any errors or omissions. All trademarks, service marks and logos in this publication, and copyright in it, are the property of the NBI or the Carbon Trust (or its licensors).

Nothing in this publication shall be construed as granting any licence or right to use or reproduce any of the trademarks, services marks, logos, copyright or any proprietary information in any way without NBI's or the Carbon Trust's prior written permission. The Carbon Trust enforces infringements of its intellectual property rights to the full extent permitted by law.

Published in South Africa: September 2014.
© National Business Initiative 2014. All rights reserved.

