

SHOULD YOUR COMPANY



Globally, business is coming under increasing pressure to adopt renewable technologies. Business leaders remain circumspect, perhaps rightfully so, but no one is denying that energy, and how we use it, is on the agenda. Here's why companies need to be looking at smart energy decisions that increase their competitiveness now.

South Africa has to face the fact of an energy-constrained future. We are the 13th-worst country in the world measured by total CO₂ emissions and of the world's 40th largest economies, lie 36th in terms of energy efficiency (measured by GDP output per CO₂ emissions). Eighty-seven per cent of our energy needs are derived from fossil fuels (mostly coal). "The use of fossil fuels has hidden costs that are not included in the price we pay for them," says Frank Spencer, MD of Emergent Energy. "From a sustainability perspective, these could have significant future costs to companies."

Government needs to get serious about taking up renewable energy and 'less dirty' coal technologies as carbon taxes and tariffs begin to take hold around the world. These taxes are considered surcharges to account for the environmental cost of fossil fuels (although the monies raised are rarely ring-fenced for environmental projects). South Africa has already started engaging in carbon taxation of its own, notably the tax on motor vehicle carbon emissions introduced in 2010. This is a necessary journey, because if appropriate signals are not sent to our market through energy taxes, companies will be slow to adopt cleaner technologies. The consequence of this is two-fold: South African businesses

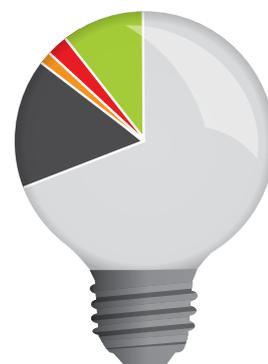
may find themselves ostracised by export market 'sanctions', and secondly, when the energy crunch arrives, as it surely will, South African companies will suddenly find themselves unable to compete in a market where high energy costs demand efficient production processes.

We face tough prospects: invest further in these unsustainable energy technologies; seek alternative, cleaner energy generation; or increase our energy efficiency. No doubt all three routes will be followed as each stakeholder in the market scrambles for the most rational route to fulfil its energy requirements.

Oil companies aren't watching the grass grow, recently putting pressure on society to offer up the pristine Karoo for the exploitation of shale gas, yet another source of fossil fuel. For Eskom, rational decision-making has to include the exploration of cleaner energy technologies, for it is in a better place to take a longer term view. Eskom should be subsidising (and bearing the risk of) research and development, and can pass on sustainability gains to business through the national grid. Through the Integrated Resource Plan (IRP2010), promulgated on 6 May 2011, the government and Eskom are making the commitment to provide more than a third of new energy

from renewable energy (RE) sources by 2030, increasing the RE fraction from 10% to 26%. More efficient coal plants and underground coal gasification are also part of the plan, with a national Coal Strategy document due later this year.

TOTAL PRIMARY ENERGY SUPPLY



Coal	68.9%
Crude oil	16.3%
Gas	1.6%
Nuclear	2.6%
Hydro	0.2%
Renewables	10.4%

South Africa's primary energy supply (which includes transport fuels) is dominated by coal. (Renewables here is mainly biomass – i.e. wood used for heating and cooking.) When focusing on electricity alone, nearly 90% is generated by burning coal.

Source: www.esastap.org.za

BE SOAKING UP THE SUN...



Efficiency first

The cheapest form of energy is the unit you don't consume. Energy efficiency is still the lowest cost route to 'producing' more energy. And there's plenty of room for improvement: Studies by Eskom, comparing South Africa's energy efficiency with other countries with a similar per-capita GDP, show that South Africa is more electricity intensive by a factor of 35-65%. This means that for every three units of energy we consume, a competing economy would get by with only two. In an early move to address this, Eskom, through its integrated demand management (IDM) programme, offers commercial and industrial users lower energy prices if they reach mutually agreed energy-saving targets. Spencer comments, "There's plenty of low-hanging

fruit. In my experience, businesses can realise a 25% energy consumption reduction through energy efficiency interventions." So where can we start looking for savings?

Start with lighting, where immediate and dramatic returns on investment can be gained. For example, Lithotech, a printer within the Bidvest Group, found the replacement of conventional high-bay factory lighting with low-power alternatives at one of its facilities paid for the running of an extra multi-colour, full-production printing press.

Along with improved lighting systems, heating, ventilation and air conditioning ('HVAC' in the new energy industry jargon) can offer significant savings by simply servicing low-performing systems, monitoring systems to identify wasteful usage, and setting timers on equipment.

Again in the Bidvest Group, heating for the laundry service business used to account for nearly two thirds of the operation's entire energy bill. Through measures such as insulation, waste water heat recovery, and improved measurement and control systems, the company was able to reduce energy use by a total of 40%. Laundry Services also invested in continuous batch washer technology, whereby the linen and the water run in opposite directions through the washing process. The process uses about one third of the water of conventional washing machines and conserves heat. Not only does the business save energy, but by reducing the overall turn-around time, gains significant competitive advantage in the marketplace.

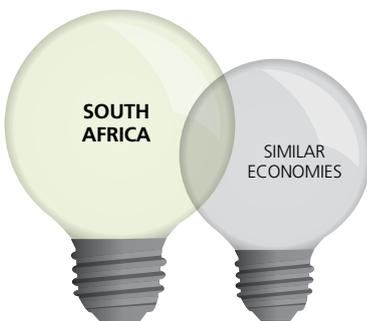
Cogeneration

Most electrical power generation processes also produce heat that traditionally would be lost through the iconic cooling towers so recognisable against the landscape. Cogeneration, also called combined heat and power (CHP), captures this heat and either puts it to use, or returns it to the primary power generation plant, resulting in efficiencies of up to 85% energy recovery from the original fuel source. CHP systems can use a variety of fuels, including biomass, and several companies in South Africa are creating 'green' energy by using waste products such as sugarcane bagasse and wood bark. The IRP2010 expects 0.7% of our national energy mix to come from private cogeneration by 2030. Trigereneration, referred to in the MTN example on this page, produces electricity, heat and cold.

The best gains can be made by making better use of energy that would otherwise go to waste. The sun, beating down on the warehouse roof, can be redirected to heat water; operational heat that would be lost to the atmosphere can be put to use via emerging heat pump technology; and biomass that would be dumped or sold as cheap animal feed can be kept on site to power operations.

MTN's R22-million 'trigereneration project' consists of two gas turbines, powered by methane piped from Mozambique, producing 2MW of power for MTN's ▶

SOUTH AFRICA'S ENERGY EFFICIENCY RELATIVE TO SIMILAR ECONOMIES



OR WORKING SMARTER?



head office campus. The exhaust heat is passed through an absorption chiller, which in turn cools the data centre, and the resulting 'grey water' is used to flush the building's toilets. The cost of the electricity generated in-house is about half that charged by City Power. By producing energy on-site as well as reducing power requirements for air conditioning, the system provides a dual benefit and is expected to pay for itself in five years.

Spencer cautions, "As with any new technology, companies must be sure they understand the risks involved. It is imperative to ensure the right amount of due diligence is done with a project, and that the claims of suppliers are not taken at face value. The biggest constraint at this time is upfront cost, but innovative financing schemes are starting to emerge."

Looking beyond the sun and the wind

Sun and wind-derived energy is renewable in that it does not disturb the natural energy balance of the earth. Coal, on the other hand, is extracted from the earth at a rate many, many times faster than it can be laid down again.

Renewable energy technologies allow us to harness natural energy flows, or briefly divert energy before returning it back to its natural cycle. Solar cells (photovoltaics, or PVs) capture and transfer just some of the massive amount of energy radiating from the sun, while wind turbines do the same with air currents, and hydro turbines with water flows.

Heavy industry faces the challenge that renewable energy technologies are still

primitive and costly. Where a business process requires significant power day and night, PVs and wind turbines simply can't generate enough energy, nor provide it when needed without the additional capital outlay of battery banks. However, we are seeing these systems used ever more frequently to power low wattage systems remote from the national grid. Traffic lights, highway signs and lighting for safari lodges are examples of early adopters. Further innovation will no doubt find more such niche markets.

From biomass waste to biofuel

Of course, nature provides us with an organic source of renewable energy, in the form of fresh biomass, grown on commercial farms every year. For some of the best examples of how the economy can make significant savings in its overall use of fossil fuel-based energy, look to the nation's farms, and our agricultural and forestry processing industries.

Sappi uses waste bark in a retrofitted boiler at its Tugela plant and several sugar producers use bagasse, the fibre remaining once sugar cane has been crushed. In 2010/11 Tongaat Hulett used 418GWh of electricity in all its operations and offices, and generated 322GWh in its sugar mills, predominantly from bagasse. Most of this electricity is used to power operations and some is sold to a green electricity trader for resale as certified renewable electricity to consumers.

Almost any biomass has the potential to be put to use. Grain effluent at Distell's Wellington distillery is sent through an upflow anaerobic sludge blanket reactor

to produce methane gas. This gas will be used to fire a dedicated boiler – soon to be installed – instead of coal. Methane burns more cleanly than coal and reduces the CO₂e emissions at the site.

And high-tech industries far removed from agriculture can benefit too. MTN is experimenting with alternative ways of securing its energy, and recently installed a 500kW biomass power plant, which uses woodchips and macadamia nut shells to produce electricity at its head office.

Conclusion

Look beyond the sun and the wind for energy solutions you can use right now. Humankind has yet to mimic the efficiencies of life processes in converting the sun's energy into a form that can be stored and transported at genuinely competitive rates. As this article suggests, more immediate and practical benefits can be gained from implementing solutions that use existing energy (e.g. wasted heat and biomass) more efficiently.

Businesses that improve their energy efficiency tend to sharpen up all round. By focusing on innovative energy solutions, such businesses become more efficient at delivering services, more competitive, and less vulnerable to the insecurities of the fossil fuel-based energy industry. Customers notice, as do other stakeholders, adding to goodwill and brand reputation. These businesses will become more and more competitive in the future, having prepared for the inevitable – a world adjusting to the reality of the carbon crunch. ☉