How to reduce your carbon emissions: Practical case-studies

By Anél Blignaut

Confronting Climate Change Initiative

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Introduction:

Confronting Climate Change has for a number of years provided a freely available carbon calculator tool. Apart from supporting the fruit-and wine industries of South Africa with the use of the tool through training opportunities and direct support, we would also like to assist the users of the tool to move forward from the measurement of their carbon emissions towards the reduction of these emissions.

Although each organisation has its own structures and limitations or opportunities a few logical steps are provided to guide you through the process of managing and reducing your carbon emissions.

First steps:

Please keep in mind that to reduce your carbon emissions is a long-term process, which should be approached in a step-by-step manner.

1. Find a reputable service provider to compile an energy audit for you. What is an energy audit? It is a systematic approach that will tell you: What you are using; where you are using it and how much you are using? Then an assessment is needed to identify the appropriate options to reduce your energy usage.
2. Reduce your energy consumption by implementing energy efficient practices as recommended in your audit report. This may take place over time as it will have both cost and operational implications.
3. Use renewable energy technologies.

What can we learn from others?

There are a number of technologies and energy efficiency measures that you can implement on your farm, packhouse or winery. What works for one business does not necessarily work for another and that is where the importance of and energy audit lies. However, we can learn a lot from others. Short case-studies are presented below that represents a selection of either green energy technologies or energy saving measures. Please note that there are a myriad of options available and that this information piece is only presenting a summary of a few technologies.

It is very important that before you consider the installation of alternative energy, that you consult with an independent energy consultant rather than a supplier themselves.

Solar PV

An investigation conducted by GreenCape listed a number of solar PV case-studies that are presented below.

Business	Technology	Return on investment
Ceres Fruit Growers	• 986 kWp system installed by SolarWorld Africa and African Technical Innovations (ATI) in Ceres • 4 060 SW250 SolarWorld polycrystalline panels • 58 x 17 kW three-phase Sunny Tripower inverters	• Generating 1 690 MWh per year • 6% reduction in annual electricity consumption • 1 622 tonnes CO2 e avoided per annum
Ceres Koelkamers	• 908 kWp system installed by SolarWorld Africa and African Technical Innovations (ATI) in Ceres • 2117 SW240 polycrystalline PV panels • 3 800 m2 surface area	• Generating 848 MWh per year • 11% reduction in annual electricity costs • 839 tonnes of CO2 e avoided per annum
Stellenpak Fruit Packers	• 420 kWp system Installed by Energyworx in Paarl 1680 • SolarWorld SW250 polycrystalline modules • 2 744 m2 surface area • 21 Steca 20 000 TL3 grid-tied inverters	• Generating 600 MWh per year • 15% reduction in electricity costs • 25-year guaranteed lifespan of the system
ArbeidsVreugd Fruit Packers	• 450 kWp system installed by Renewable Energy Design Engineering in Villiersdorp • 1876 x 240 Wp Trina Solar modules • 26 SMA Tripower 17000 three-phase inverters Online data of power production	• Generating 743 MWh per year • R38 million savings over 25 years • 733 tonnes CO2 e avoided per annum • Estimated payback of six years

Reference: Janse van Vuuren, P. 2016. GreenCape Industry Brief 01/2016. Solar PV on packhouses.

Variable speed drive (VSD)

Reference: ESKOM Integrated Demand Management, 2015. Variable Speed Drives: Reducing energy costs in horticulture.

This is a device that can adjust the frequency to regulate and adapt motor speed to match the actual demand required by the system or application it is driving, resulting in reduced energy consumption. Reducing a pump or fan speed by 20% can reduce energy consumption by more than 50%. Installing a VSD will regulate the speed and rotational force - or torque output - of the motor to match actual demand so that it doesn't work faster than it needs to. A VSD improves power factor correction and has a soft star ting function. When a VSD is not feasible, soft starters or power factor correction can be considered instead (ESKOM Integrated Demand Management, 2015).

A VSD can optimise your irrigation system when:

- movable pipe systems and micro- and drip irrigation are used
- Distances between the blocks of land and the pump stations are different, causing a variation in friction loss and power requirements.
- Irrigation blocks are uneven in size and a different number of sprayers or drippers are required.
- Irrigation blocks are on sloped topographies, requiring different pressures and power.
- Pumps and motors are designed to deliver water to the irrigation block that requires the most pressure
- The pump and motor are oversized and water delivery needs to be throttled.
- A second-hand pump and motor are used for the application and water delivery needs to be throttled (ESKOM Integrated Demand Management, 2015).

Lightning

A case-study on energy efficient lighting at the Kromme Rivier Poultry Farm, South Africa was available on the ESKOM . Integrated Demand Management website that provided useful information on the savings that can be achieved through the replacement of mercury vapour lights with LEDs.

Reference: ESKOM Integrated Demand Management, 2013.

Technology description	Cost	Savings
Replace two 125W Mercury vapour floodlights with 20W light LEDs.	Approximately R70 700	51 226kWh less energy used per annum Saved R60 053 per annum.

Hydro electricity

Reference: Kriel, G. 2015. Farmers Weekly. http://www.farmersweekly.co.za/agri-business/agribusinesses/hydro-electricity-all-the-power-half-the-cost/

Problem: High electricity bill R360 000 and power outages having a major impact on electrical equipment.

Solution: Water on the farm is obtained from springs in the Witzenberg Mountain Range and was ideal for hydro-electric generation.

Savings: The farm saved 50% of their electricity bill during the fruit season (demand 124kWh) and is entirely self-sufficient during winter.

Technology: The hydro-electrical unit can deliver at least 29kWh. They have installed four small turbines in parallel so that they can run the system on one or two turbines when the water flow is low. A turbine can also be services without having to switch off the entire system. Electricity is also stored in a battery bank with a total storage capacity of 30kWh.

To generate electricity from water you need a water sources and a height of about 100m. Water flows from a top reservoir to the bottom reservoir and generates electricity during the high-tariff period, then it is pumped back to the top reservoir during the low-tariff period.

Payback: It is estimated that they system will take approximately 5 years to pay for itself, through savings on electricity bills and repairs (Kriel, 2015).

Who can we contact for help?

National Cleaner Production Centre (NCPC):

They conduct subsidised energy assessments to identify savings based on usage, and provide recommendations for energy saving options. They can also link you to government incentives that can help you to reduce costs.

You can visit their website at www.ncpc.co.za and complete an application to undergo an assessment.

Tel: 012 841 3772

Email: **ncpc@csir.co.za**

ESKOM's Energy Advisory Services

Tel: 08600 37566

Email: AdvisoryService@eskom.co.za

Useful tools and information portals:

Confronting Climate Change: Carbon footprint calculator: **www.climatefruitandwine.co.za**

GreenAgri: **www.greenagri.org.za**

Funding opportunities: Contact GreenCape Green Finance Desk for more information. Please see their website for more information. www.greencape.co.za