Better management practice	**The production potential of the land is maintained or enhanced through the calculation and achievement of production standards:** • The average RV% for the farm should exceed an industry average of 10% • The average mass of agrochemical active ingredient applied (kg/ha) should not exceed 5kg ai/ha per annum • The actual yield compared to an established yield potential using an appropriate tool • The actual yield compared and recorded against the mill average	**The production potential of the land is maintained or enhanced through the calculation and achievement of production standards** **Relative value (RV%):** The average RV% for the farm should exceed an industry average of 10% **Average mass of agrochemical active ingredient applied:** In order to establish the average mass of agrochemical active ingredient applied per annum, the total mass of active ingredients in all agrochemicals applied to cane is recorded and expressed as an average (in kg active ingredient per hectare of area under cane). All herbicides, fungicides, nematicides, ripeners and insecticides are classified as agrochemicals. The agrochemical label will indicate the volume or mass of active ingredient in the product *Note: Do not include adjuvants (e.g. oils, surfactants or other additives).* The intention is to compare against a global standard of 5kg ai/ha/annum and reduce use over time. **Comparison of actual yield against yield potential:** The yield potential of a farm can be established using a number of web-based or mobile app tools. One such tool is called *StalkGro* and can be accessed from the SASRI website at https://sasri.org.za/decision-support-tools/ *MyCanesim Lite* is a cell phone app for android and iOS phones. The app is a simplified version of the MyCanesim model, requiring only eight inputs from drop down lists, for quick simulation of sugarcane crop growth, water use and yield. MyCanesim Lite can be downloaded for free from the Google Play Store or the i-Store. **Comparison of yield against mill average:** A simple benchmarking exercise can involve the comparison of actual yields against mill average. This provides a very simple indicator of productivity, but is not as useful as establishing your potential using the above-mentioned tools.

Better management practice	• Net primary energy used per ton of cane per annum (MJ/t/annum) compared against a global standard of 300 MJ/t	**Net primary energy used for all on-farm operations per ton cane per annum:** Primary energy use per ton of cane (excluding the energy required to transport the cane to the mill) should be calculated annually for all sugarcane on-farm production operations with the objective of reducing energy use each year. The global standard is 300 MJ/t. ***Primary energy is the sum*** of ***direct*** and ***indirect*** energy use. The calculation of each component is explained below. ***A.*** ***Direct (on-farm) energy use*** – defined as energy content of diesel and electrical power used for on-farm operations $$EU_{direct} = \frac{[(D_{total} - D_{excluded}) \times 37] + [(E_{total} - E_{excluded}) \times 3.6]}{t_{sc}}$$ Where EU_{direct} = Energy use (direct) [MJ.t-1] D_{total} = annual diesel consumed [l], E_{total}l = annual electrical energy consumed [kWh], $D_{excluded}$ = annual diesel excluded (see notes below) [l], $E_{excluded}$ = annual electricity excluded (see notes below) [kWh], t_{sc} = tons of sugarcane harvested in the milling season [t] **Notes:** I. The above equation calculates energy used in: • production of sugarcane (this includes re-establishment, ratoon management, harvest and transport to loading zones), • all contracted operations related to sugarcane production, • sugarcane fallow crops, • farm workshop requirements, and staff and family residing on the farm. II. The excluded variables (***$D_{Excluded}$*** and ***$E_{excluded}$***) account for: • fuel required in road haulage • fuel and electricity required for the production of crops other than sugarcane (if no records are available this must be reasonably estimated) • fuel that is used for personal travel (non-farming related) III. If contracted work is conducted, diesel consumption is unknown or if the contribution from other crops is difficult to calculate, then contact the local extension specialist for assistance.

Better management practice		***B.*** ***<u>Indirect energy use</u>*** – defined as is the energy used to manufacture and transport agronomic inputs (fertilisers, herbicides etc.). To account for the energy used to ***manufacture*** the product $$EU_{indirect} = \frac{(m_N \times 56.9) + (m_P \times 9.3) + (m_K \times 7) + (m_{lime} \times 0.12) + (m_{h\&f} \times 355.6) + (m_i \times 358)}{Y_{sc}}$$ Where mn = Nitrogen application rate [kg.ha-1], mp = Phosphorus application rate [kg.ha-1] mk = Potassium application rate [kg.ha-1] mlime = lime application rate [kg.ha-1] mh&f = herbicide and fungicide application rate [kg.ha-1] mi = insecticide application rate [kg.ha-1] Y_{sc} = tons harvested divided by area under cane [t.ha-1] To account for the ***transportation*** of the fertiliser $$EU_{indirect\_trans} = \frac{(m_N + m_P + m_K + m_{lime} + m_{h\&f} + m_i) \times 0.64}{Y_{sc}}$$

Better management practice	• Energy used for sugarcane transport to the mill (MJ/t) is calculated and compared to a global standard of 50 MJ/t.	**Efficiency of energy used for cane transport (MJ/t):** Energy use per ton of cane transported should be calculated annually with the objective of reducing energy use each year. The global standard is 50 MJ/t. This can be calculated by the following equation. If the total diesel used in road transport (directly from the field to mill, or trans-loading zone to mill) is known, the energy use is calculated by the equation below. $$EU_{trans} = \frac{D_{trans} \times 37}{t_{sc}}$$ Where EU_{trans} = Energy use in transport [MJ.t^{-1}], and D_{trans} = annual diesel consumed in transport [l] t_{sc} = tons of sugarcane harvested in the milling season [t] If the total diesel consumed is unknown EU can be estimated using the following equation. $$EU_{trans} = \frac{(d \times 2)}{c} \times \frac{1}{PL} \times 37$$ Where PL = payload of haulage vehicle [t], d = lead distance (one-way) to mill [km], and c = average fuel efficiency of haulage vehicle [km.l^{-1}]. The fuel efficiency of trucks and haulage tractors range from 1.5 km.l^{-1} (32t rigs) to 2.5 km.l^{-1} (smaller tractor trailer rigs). If one is unsure, contact a local haulier or extension specialist.