

## **Why it makes rands and sense for South African farmers to take another look at their electrical motors**

The many tens of thousands of motors used by South African farmers – to drive their irrigation pumps, to cool their broiler houses and cold stores, and to heat and cool their greenhouses – are often amongst the most inefficient pieces of equipment in their operations.

Now developments in the European Union and elsewhere threaten to put these workhorses of local agriculture at an even more distinct disadvantage relative to their peers elsewhere in the world.

Energy efficiency specialist Dr Tsakani Mthombeni says that European standards on the effectiveness of low-voltage AC motors were tightened in June 2011 with the new requirement that only the more efficient IE2 motors may be installed within the EU. And, from 2015 - now just a year away - the EU will mandate that only IE3 motors be installed while IE2 motors will be permitted only if they are equipped with variable speed drives (VSDs).

In South Africa the overwhelming majority of motors used in agriculture are the much older IE1s, EFF2s and EFF3s. According to experts, the implications for local farmers of the European Union move to tighten motor regulation are profound – and potentially severe.

“Simply put, our local market faces being flooded by cheap imports of IE1 motors from manufacturers in the Far East who are now being cut off from their primary markets,” says Mthombeni. “At the same time older low-voltage motors, often rewound and usually well past their prime, are bought by farmers on auction from industrial or mining concerns. As new IE1 motors become available, at relatively low prices because of the EU directives, our agricultural sector risks becoming trapped in an ‘energy inefficient environment’. We are already seeing the effects of what is effectively dumping of outmoded electrical motors on the local market.”

Reflecting the extent to which low-voltage AC motors underpin economic activities, Anglo Platinum’s Dragan Janicijevic and Lindo Hauptfleisch recently reported in an academic paper that in the United States such motors account for 63% of industrial electricity usage – and 25% of the nation’s total electricity consumption.

In some US process industries, including mining and cementation, motors account for 70% of electricity use. Mthombeni says that, while detailed analysis is not available on what percentage of South African agriculture's electricity is consumed by motors, it is safe to assume that this figure is at least in the region of 70%.

Fanie Steyn, energy efficiency motors and drives specialist, describes this country's historical (and growing) dependence on outmoded motors as "a tragedy". Older IE1 motors, he says, are costing farmers substantial amounts of money each year, and have a negative impact on their ability to farm and operate profitably and competitively. There is a widespread perception, Steyn says, that energy efficient motors are unaffordable, beyond the means of all but the biggest farming operations. "The truth is quite different," he says. "Typically, if a new IE1 motor costs R1.00, an IE2 motor will cost a farmer about R1.13 and an IE3 motor R1.66. All of these motors will have the same design life - 20 years - but the energy savings that will be achieved over that lifespan, in fact, over just a few years, from using an energy efficient motor should make the decision to upgrade from IE1 to IE2 both easy and obvious."

Mthombeni says Eskom Energy Advisors are specialists in advising farmers on how electricity use on their farms and in their agro-processing facilities can be improved. They have also worked and collaborated with Project developers (PDs) and Energy Services Companies (ESCOs) to optimise the efficiency of the equipment that is driven by motors - in the case of agriculture, typically, irrigation equipment, greenhouse or broiler house heating and cooling, and the cooling of pack houses.

"Often, all that is needed is a second pair of eyes and, equally often, farmers are surprised at how little it costs to make improvements that will make their irrigation systems, in particular, more efficient," observes Mthombeni.

In the case of irrigation equipment, improvements that are often implemented after discussions with Eskom Energy Advisors, PDs and ESCOs include:

- Replacing or upgrading old and underperforming pipes and seals, valves and sprinklers;
- Fitting of approved Variable Speed Drives (VSDs) in place of mechanical throttling devices such as butterfly valves;
- Using larger-diameter pipes that offer less resistance;
- Optimising the length, size and layout of pipes on the suction side of pumps;
- Correctly aligning of motors and pumps;
- Replacing manifolds that cause unnecessary resistance and turbulence at a great cost in electricity; and
- Aligning the distribution of sprinklers with the system's original, optimal design.

These 'corrections' have all been proven to enhance overall system efficiency and reduce the consumption of electricity, water and fertiliser. But, says Mthombeni, when the motor at the heart of a system is no longer fit for purpose, the system will always underperform and unnecessarily waste electricity. "In such cases the farmer should seriously consider paying the usually small premium needed to achieve energy efficiency."

The imperative of seriously relooking the energy efficiency of motors is only going to become more and more urgent as the cost of electricity continues to rise.

Faced with a looming glut of underperforming IE1 machines, combined with a legacy of reliance on ageing, unfit old motors, South Africa's agricultural sector needs to be aware of the savings that could be realised on the country's farms by adopting more energy efficient technologies.

Until recently South Africa had no nationally-adopted standard spelling out what is and is not an energy efficient motor. However, this situation has now been remedied with the adoption of the International Electrotechnical Commission's IEC 60034-30 standard on low-voltage AC motors. IEC 60034-30 describes three standard efficiency classes for single-speed, three-phase, cage-induction motors and, for the first time, introduces a fourth "super premium efficiency" category (which has yet to be produced).

But there is still no policy prescribing what motors may or may not be imported and sold locally. Until such a policy is in place – and with policies elsewhere in the world being tightened – it is likely that South African farmers will become increasingly important targets for the manufacturers of old-generation IE1 motors.

Eskom Energy Advisors - supported by energy efficient technology suppliers and Energy Services Companies (ESCos) - excel in:

- Understanding and having access to the latest energy efficient technologies;
- Analysing the energy consumption of farms or specific processes on farms;
- Identifying areas of energy wastage on farms;
- Assessing the current and future energy needs of farms; and
- Identifying the most cost effective and energy efficient technology solutions for farms.

Call 08600 37566 and ask to speak to an Eskom Energy Advisor.

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