



Press Release

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Immediate Release

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### **How kitchen waste is helping to win a war**

*Food scraps are an unlikely ally in any battle – except in the one we cannot afford to lose. Two military bases in Limpopo are proving that the war to save the planet can be won one kitchen at a time.*

A man on a military base who talks and even sings to what is in essence a high-tech compost heap is not an every-day sight – unless you find yourself on the outskirts of Louis Trichardt in Limpopo. There, on South Africa's most northern air force base, civilian military member Morris Rathumbu has forged a close relationship with the biodigester he has made his own over the past two years.

Air Force Base Makhado and the 523 Squadron (SQN) army base in the town of Louis Trichardt, were selected as the pilot sites for the Department of Defence's biodigester project in partnership with the South African National Energy Development Institute (SANEDI). In 2021, this saw the installation of a pre-cast biodigester on each base to turn kitchen food waste that is normally sent to landfill into biogas that is used for cooking.

The biogas plants consist of large, sealed anaerobic digesters in which waste material is decomposed to produce methane gas. These were installed underground at the bases to make them unobtrusive and to prevent any unpleasant sights or smells around them. In addition to gas for cooking, the digesters produce an organic by-product, called the digestate, which is an excellent organic fertiliser.

A relatively simple solution to the twin problems of waste management and energy costs makes perfect sense. There is, however, a critical success factor that often scuppers biogas projects and that, says SANEDI's Dr Karen Surridge, is people. "Biodigesters are the most labour-intensive renewable energy technology. I always say it's like having a baby, and people don't believe it until they have a biodigester to look after and keep alive."

When SurrIDGE says the biodigester must be kept alive, she means it literally. Biodigesting is an organic and biological process driven by the same bacteria that keep the human digestive system healthy. These live organisms are the reason that every biodigester is unique, with its own preferences and quirks. And that is why they require such care.

“I know that my biodigester likes more water on Wednesdays and the time it takes me to sing Happy Birthday twice gets enough water into the digester’s daily diet,” says Rathumbu. “I love this technology because it is like having a family. Learning about it has broadened my horizons.”

SurrIDGE remembers introducing the project two years ago and Rathumbu immediately being interested. “It is thanks to his dedication that the project is such a resounding success at the air force base,” she says. Where it usually takes a biodigester six months to become fully operational, Rathumbu’s “baby” got there in only four months and in the two years since it has run without a single glitch. “I’ve never seen anything like this,” SurrIDGE says. “It is unheard of for a biodigester to be this happy.”

The upshot of the digester’s happiness is that it produces enough gas for the stove-top cooking required to provide breakfast and supper for 220 people every day, thus saving a predicted amount of around 116 MWh of electricity over the combined system’s lifetime. Based on this performance, it will be possible to add two more biodigesters in parallel on this system to power additional cooking burners and a water heater in the kitchen.

The pilot at the 523 SQN base had followed a more roundabout route to success. Although the base commander had also adopted his biodigester from the start, the duties of a high-ranking officer limited the attention he could pay to it. Twice since July 2021 the biodigester had “died” and had to be resuscitated – both times when the commanding officer had been away from the base. SurrIDGE laughs at the memory of receiving a phone call on a Saturday morning: “Doctor, the baby is dead!” shouted the officer down the line. It seemed that cleaning fluids used to clean the sink in which the macerator is installed had ended up in the biodigester and instantly killed all the bacteria. There was also the time when the system was fed too much undiluted starch, which clogged the pipes and the resultant gas build-up blew back into the kitchen through the sink. “It looked like the macerator had vomited,” says SurrIDGE.

Fortunately, none of these incidents “killed the baby” and they provided ample learning opportunities. Although it has taken almost 21 months to reach full capacity, 523’s biodigester is humming these days, producing enough cooking gas to prepare daily meals for the people stationed at the base.

Over the past two years, SurrIDGE collected performance data from both biodigesters: to date 17,5 MWh of electricity has been saved, 6,5 tons of CO<sub>2</sub> emissions avoided and 30 tons of kitchen waste diverted from landfill.

The two bases were carefully chosen to demonstrate that biodigester plants can be tailored to specific needs and provide a wide range of solutions, and that they can be scaled up or down by orders of magnitude, depending on the energy requirements and raw materials available. “Two years down the line we can declare the pilot a success,” says SurrIDGE.

Reflecting on what the project team have learned and will apply in future projects, SurrIDGE emphasises again the human-centric nature of the technology. It is a live system that needs looking after, and while it’s not a full-time job it is certainly a constant one. “This technology requires a mindset of doing something for the greater good,” she says.

In addition, SurrIDGE highlights the importance of integrating the system into the daily routines and rhythms of a kitchen. The sink with the macerator that chops up the food scraps must be where the food preparation is done, and the gas burners close to the existing stoves and ovens. Finding ways to automate the system a bit more, something that are currently being assessed, will also make adoption easier.

The reality is that a biodigester can be like a new puppy. It is very cute and exciting in the beginning, but then it loses its shine and people’s interest wanes. Also, it takes about six weeks of feeding the system before it starts producing any gas and another two or three months before it is gas you can cook on. “You have to put in lots of love with almost zero return for several months. That’s a long time to keep the faith,” says SurrIDGE.

But once it works like it should, the rewards are plentiful. Not only are the bases saving money and supporting the environment and contributing sustainably towards the DoD’s green soldiering initiative, but during loadshedding, gas from the biodigester has supported the AFB Makhado kitchen in serving hot meals. Furthermore, the more gas is used, the more the digester will produce. At present the gas is not storable and needs to be used as it is produced.

The biogas project is one of several waste recycling and energy saving programmes being undertaken by the SANDF in partnership with SANEDI. The DoD and SANDF want to reduce energy-usage costs, while ensuring that military bases have energy security in a constrained energy system. The biogas project is also aligned with the SANDF’s green soldiering concept under which strong environmental protection measures are being introduced in all its operations.

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