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THE FUTURE OF MICRO DIGESTERS IN SOUTH AFRICA – AN ALTERNATIVE ENERGY SOURCE

The South African National Energy Development Institute (**SANEDI**) commissioned the University of Johannesburg's Process, Energy and Environmental Technology Station (**UJ PEETS**) to take stock of the current status of micro-digesters and the wider state of the skill in South Africa and globally. UJ PEETS, together with the DSI/NRF/Newton Fund Trilateral Research Chair in Transformative Innovation, the Fourth Industrial Revolution and Sustainable Development (**UJ-TRCTI)**, conducted research over the period of two years, with significant levels of stakeholder engagement that has culminated in the development of a Sector Development Plan (**SDP**).

IMPACT

Prof Rebecca Hanlin from UJ-TRCTI and lead author of the SDP explains: "This plan provides an opportunity to revitalise the micro-digester arena which has been lagging behind other green energy solutions in South Africa. Stakeholders appreciate the focus of the SDP beyond rural energy access and recognise the multi-modal solution nature of the technology. They also emphasised the need for the SDP to strongly outline how demand can be created and the need for greater focus on facilitatory policy activities".

The SDP outlines three major pathways that the micro-digester sector in South Africa can take to ensure growth and sustainability of the sector by 2030. The first pathway focuses on increasing uptake of this technology in rural areas. The second pathway looks to pilot micro-digester use in urban areas, especially urban gardens, food establishments and small housing developments. The third pathway is cross-cutting and focuses on actions to create a supportive enabling environment relating to skills and training, financing, regulation and policy

If these pathways are progressed, South Africa has the potential to significantly reduce rural energy poverty, urban organic waste to landfill, as well as boost employment and business opportunities. The potential size of the sector is estimated to be 21,000 units initially, followed by a maximum annual demand potential of 54,000 units. Based on this annual market size, it has the further potential to create at least 17,000 jobs and will create 150 MW of daily capacity that is diverted from less clean and green energy sources including firewood and charcoal.

UJ PEETS Manager, Nickey Janse van Rensburg, notes: "With the ever growing need to find alternative environmentally friendly energy sources and an effective waste management policy there is an essential need for this SDP to revitalise micro digesters in both urban and rural areas as an energy source and thereby also contributing to a green circular economy through education, upskilling and job creation."

The SDP focuses on expanding an existing market in rural areas for micro-digesters to provide an alternative energy source for cooking; enabling households to move away from firewood.

However, micro-digesters are a multi-modal solution, providing not just cleaner cooking fuel sources, but also an organic waste solution, as well as the provision of fertilizer for farming and gardening. As such they have huge potential for urban environments – a segment of the market in which efforts to promote micro-digesters was not a focus in South Africa up to now. This solution is particularly pertinent for metropolitan municipalities that are introducing organic waste to landfill regulations, such as the city of Cape Town.

Micro-digesters have traditionally been promoted as an owner operated venture. However, a key factor identified during the research that informed the SDP was the difficulties of operations and maintenance. The SDP therefore promotes the creation of organisations (community based or private company) that will operate and maintain micro-digesters. These organisations have the potential to create jobs and upskill significant numbers of young people and women who are currently excluded from the workforce.

RESEARCH

The SDP was developed based on a total of 11 stakeholder engagements between July 2020 and March 2022. It was informed by a wide ranging and thorough desk review of academic, industry and other stakeholder literature on the status of the micro-digester sector in South Africa and also in other parts of the world. The SDP was further informed by fieldwork results from a review by UJ PEETS of the status of micro-digesters in Gauteng, Limpopo and KwaZulu Natal that had been supported by SANEDI. The latter was part of an allied project to assess and define the optimal working conditions of micro biodigester sites installed over the past five years with SANEDI funding.

The development of the SDP and allied activities have also benefited from the convening power of the Southern African Biogas Association (SABIA) and the micro-digester working group as well as UJ PEETS' and SANEDI's partnerships with the Gauteng Department of Infrastructure development (Gauteng), the University of Venda (Limpopo) and the University of KwaZulu Natal (KwaZulu Natal). The SDP has also benefited from activity that is also ongoing to create a national Waste to Energy Roadmap.

THE WAY FORWARD

While improvements in the technology are possible, a key obstacle to the development of this sector in the past has been the reliance on donor or government funding. As a result, the SDP outlines action areas that are needed - related to business model, marketing and organisational innovation. These focus on new ways to create demand and stimulation of the market. They also include policy innovation that create more facilitatory processes and systems for the sector. Key action areas include working with relevant government agencies to introduce grants for urban farming collectives, food establishments and property developers to purchase micro-digesters and the design of financing schemes for operations and maintenance costs of micro-digesters amongst others.

On the potential of this SDP, Professor Erika Kraemer Mbula, the SARChi Chair at UJ-TRCTI, commented: "These findings aid to support strategic decision-making as the environment in which the micro-digester industry operates is complex and rapidly changing. Biogas technology possesses massive potential in South Africa. There is a need for policy realignment, key stakeholder collaboration and community education to accommodate this emerging technology, which will create employment and address most of the challenges associated with fossil fuels."

Action owners will take forward their activity areas under each pathway and the management committee regularly reviewing progress against the monitoring and evaluation framework outlined in the SDP, thereby contributing to the Department of Mineral Resources and Energy's 2019 Integrated Resource Plan which recognises biomass and biogas as energy sources and its ability to assist towards just transitions including through job creation. This will also contribute to the National Development Plan 2030 and the need to move South Africa towards low-carbon and clean energy sources.

#call4action #microdigesters #STI4SDGs

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Allied documentation

1. A policy and innovation perspective on micro-digesters in South Africa report is available on: https://www.uj.ac.za/faculties/college-of-business-and-economics/trilateral-research-chair-in-transformative-innovation/trcti-publications/reports/
2. An industry status report is available here: https://www.uj.ac.za/wp-content/uploads/2021/10/uj_peets_sanedi_unlock_the_energy_of_micro-digesters_in_sa_report.pdf

About the partners

UJ PEETS was established in 2010 under the support of the University of Johannesburg and the Technology Innovation Agency (TIA), an agency of the Department of Science and Innovation (DSI). UJ PEETS´s mandate is to support SMEs in the circular green economy through technology innovation and knowledge transfer.

The Trilateral Chair on Transformative Innovation, the Fourth Industrial Revolution and Sustainable Development (TRCTI) is hosted at the University of Johannesburg (UJ), where it operates as a research centre located in the College of Business and Economics. Funded by the South African National Research Foundation and the British Council, the programme is an international research collaboration between the University of Johannesburg, the African Centre for Technology Studies (ACTS) in Nairobi and the Science Policy Research Unit (SPRU) at the University of Sussex in the UK. The programme builds on the expertise of three partners to strengthen African scholarship for examining transformative innovation and its policy dimensions in the context of the fourth industrial revolution (4IR) and efforts to achieve sustainable development.

The South African National Energy Development Institute (SANEDI) was established in 2011 under the National Energy Act, 2008 (Act No. 34 of 2008). The Act provides for SANEDI to direct, monitor and conduct energy research and development, promote energy research and technology innovation as well as undertake measures to promote energy efficiency throughout the economy.