

# HARNESSING ENERGY & EFFICIENCY

## UJ PEETS and EWSETA Empower Students in Anaerobic Digestion



The [University of Johannesburg's Process, Energy and Environmental Technology Station \(UJ PEETS\)](#), in collaboration with the [Energy and Water Sector Education and Training Authority \(EWSETA\)](#), recently hosted a short learning course focused on Anaerobic Digestion and Energy Efficiency in Wastewater Treatment Plants. Anaerobic digestion of organic wastewater solids can produce biogas, which is a valuable source of **renewable energy**.

This helps wastewater treatment plants generate their own energy, reducing dependence on the grid and lowering operational costs. The course equipped **20 students and practitioners** with valuable knowledge on the benefits of **anaerobic digestion, particularly in biogas production and the disposal of sludge at wastewater treatment plants**.

With a focus on energy auditing and efficient water treatment practices, participants gained practical insights into the inner workings of wastewater treatment facilities. One of the highlights of the course was a site visit to the [Zeekoegat Wastewater Treatment Works](#), providing students with hands-on experience and real-world applications.

## The Power of Anaerobic Digestion:

Anaerobic digestion, a process that converts organic waste into biogas and biofertiliser, is an efficient, circular solution for sustainable waste management. By **harnessing the power of anaerobic bacteria in an oxygen-free environment**, this process breaks down organic matter, such as sludge from wastewater treatment plants, into valuable byproducts.

**Biogas**, a key output of anaerobic digestion, contains methane and carbon dioxide and can be utilised as a renewable energy source for heating, electricity generation, or as fuel for vehicles. Additionally, the residual digestate can be used as nutrient-rich biofertiliser, reducing the need for chemical fertilisers, and completing the circular economy loop.

Anaerobic digestion also helps in reducing the emission of methane, a potent greenhouse gas. By capturing and utilising biogas, wastewater treatment plants can contribute to mitigating **climate change and meeting sustainability goals**. Furthermore, wastewater treatment plants often produce large amounts of sludge as a byproduct. Anaerobic digestion can help in the **reduction of sludge volume**, making it easier to manage and minimising the environmental impact of sludge disposal.

## Capacity Building for Sustainable Water Treatment:

Recognising the importance of energy efficiency in water treatment plants, the course also emphasised **energy auditing** as a crucial aspect of sustainable energy management.

Energy auditing involves the systematic examination of energy consumption and identifying opportunities for optimising energy efficiency. By conducting energy audits, practitioners can uncover areas of improvement, reduce energy consumption, and ultimately reduce operational costs.

## Site Visit to Zeekoegat Wastewater Treatment Works:

As an integral part of the course, students were provided with a unique opportunity to visit the Zeekoegat Wastewater Treatment Works. This on-site visit allowed participants to witness firsthand the various processes involved in wastewater treatment, from **influent to effluent**.

From **primary sedimentation to biological treatment and sludge management**, students gained valuable insights into the machinery, equipment, and control systems employed in a fully operational wastewater treatment plant.



## Real-World Application: Energy Audit at Zeekoegat Wastewater Treatment Plant:



Students conducting an energy audit at the Zeekoegat Wastewater Treatment Plant

To apply their newfound knowledge and skills, the students were tasked with conducting an energy audit of the Zeekoegat Wastewater Treatment Plant. This assignment allowed them to practically assess the plant's energy consumption, identify potential areas for energy savings, and propose energy-efficient solutions.

By engaging in this real-world exercise, students developed a holistic understanding of the challenges and opportunities in implementing sustainable energy practices within wastewater treatment facilities.

**Micro-digesters** can help with **poverty alleviation, better waste management, and lower carbon emissions**. In contrast to other African nations, South Africa has a low adoption rate for this technology.

This is a result of the technology's unsubsidised cost. As there is inadequate training and assistance, operations and maintenance are also challenging. To solve this, it has been determined where skill shortages and **hard-to-fill vacancies (HTFV)** exist in the fields of project management, construction project management, management consulting, electrical engineering, and safety inspection. Furthermore, sufficient training and knowledge transfer can empower those involved in the development of the micro-digester industry in South Africa.

Participants in the Introduction to Biogas Short Learning Program gained a thorough understanding of biogas production and utilisation in addition to the knowledge and abilities to put these concepts into practice in the workplace.

### The Programme Aimed to:

- Develop an **awareness and comprehension** of biomass and its byproducts.
- Recognise the many **pathways taken by waste-to-energy (W2E) technologies**, such as biomass conversion.
- Identify the **waste to energy technologies' design, installation, use, and upkeep**.
- Determine the general **Organisational Health & Safety (OHS) safe working practices for the generation of biogas**.
- Find **opportunities** in the areas of energy trading, agribusiness, automation, human capacity, installation, manufacturing, supply chain, and air, water, and energy quality.
- Discussing **Fourth Industrial Revolution (4IR) tools** that are useful for producing biogas.
- **Generate revenue streams** that support the circular economy and waste-to-wealth ratio.



The Introduction to Biogas Short Learning Programme welcomed **20 candidates**, with each participant receiving **sponsorship at a rate of R10,220.00 per student** for the course.

The collaboration between **UJ PEETS** and **EWSETA** in presenting the short learning programme on Anaerobic Digestion and Energy Efficiency in Wastewater Treatment Plants has been instrumental in capacitating students and practitioners with essential knowledge and practical skills. Through this course, participants gained a deeper understanding of the benefits of anaerobic digestion, biogas production, and energy efficiency in the disposal of sludge at wastewater treatment plants.

By combining theoretical learning with a site visit and hands-on energy audit assignment, the course fostered a comprehensive understanding of sustainable water treatment practices. With this newfound expertise, the **graduates of this course are well-equipped to contribute to the development, advancement, and implementation of energy-efficient and environmentally conscious solutions in the field of wastewater treatment.**



Students at the Zeekoegat Wastewater Treatment Plant

A heartfelt thank you to **EWSETA** and **Zeekoegat Wastewater Treatment Works** for their invaluable collaboration in our Anaerobic Digestion and Energy Efficiency in Wastewater Treatment Plants course, empowering participants with insights into anaerobic digestion and energy efficiency.

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