

# **NEWGENERATOR™ OFF-GRID TREATMENT SYSTEM SLOVOVILLE LESSONS LEARNED DURING THE FIRST YEAR OF OPERATION**

**Gunter Rencken<sup>1</sup>, Arrigo T. Fadda<sup>1\*</sup>, Timothy Fisher<sup>1</sup>, Robert A. Bair<sup>2</sup>, Daniel H. Yeh<sup>2</sup>**

<sup>1</sup> Process Engineering Department, WEC Projects, P.O. Box 4195, Dainfern, 2055

<sup>2</sup> Membrane Biotechnology Lab, University of South Florida, Tampa, FL, USA

\* Corresponding author (arrigo@wecprojects.com)

## **BACKGROUND**

This study investigates the design and technical lessons learned from the first commercial application of the NEWgenerator™ (NG) in an informal settlement in Slovoville, South Africa. The NG is a non-sewered sanitation system that enables water-based sanitation through onsite water recycling. The technology was originally designed by the University of South Florida (USF) but was licensed by WEC Projects for South African design, manufacturing, and sales. The NG system commissioned in Slovoville was designed and built by the USF Team but was handed over to WEC Projects for installation and operation. Through this pilot program WEC Projects hoped to learn from the system's operation to further improve its resilience, cost, and reduce its maintenance requirements. The NG was installed in Slovoville in time for World Toilet Day 2021 beginning operation shortly thereafter.

## **RESULTS & DISCUSSION**

For the first year of operation, the NG was able to meet the general discharge limits with minor downtime for system maintenance. While the system performed as intended, there have been many lessons learned related to its operation. Of primary concern is the reliability of remote monitoring and operating of the system. While the NG was designed for remote operation and monitoring, the system has been susceptible to poor and infrequent cell phone signal. This is particularly relevant to South Africa where load shedding and battery theft can cause cell phone outages. As physical maintenance and inspections are costly and time consuming, improving the reliability of the remote monitoring capability of the NG will be essential to lower operating costs. The NG was designed with an operator notification system, however, this has since been removed following operational difficulties.

The USF built NG was designed to be extremely compact and this resulted in some tight spaces within the containerized system. In particular, the nutrient capture system, which required some regeneration of the ion-exchange media, was challenging for operators to service. Incorporating additional hardware such as maintenance specific piping would make the servicing both easier and more time efficient. This was particularly important when the NG showed decreased phosphorus removal over time. Regeneration of the nutrient capture media is required as part of routine maintenance of the plant to ensure sufficient treatment of the incoming sewage.

Lastly, instrumentation and other equipment failures were noted during the operation and maintenance of the NG. Replacement of the faulty equipment was completed in a timely manner. However, more robust equipment should be investigated for increasingly remote installations.

## **CONCLUSION**

The Slovoville NG has operated in its intended environment for a full year. Raw sewage was consistently treated to general discharge limits and provided recycled water for the operation of the toilet block. The lessons learned during the operation of the NG centered around the operation and maintenance of the plant. Above all else, remote operation of the plant will be required for future, increasingly remote installations. The design of future plants should consider a larger container with more workable space, quick-couple connections for both electrical and piping connections for ease of replacement and maintenance. Instrumentation and ancillary equipment should be sourced as far as possible locally to limit plant down-time. Future installations will require more robust equipment to limit unnecessary site visits and maintenance.

Keywords: modular wastewater treatment system, water recovery, remote monitoring, and control

Subthemes: