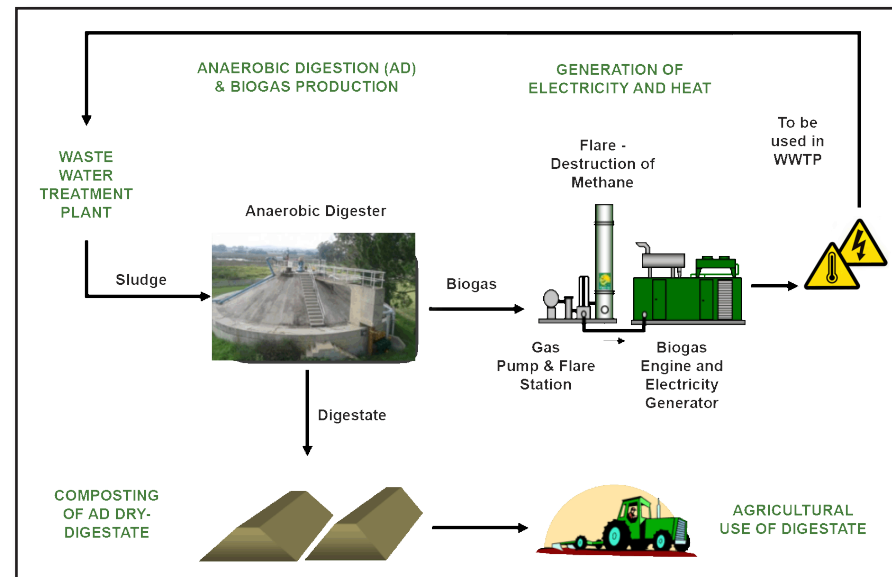


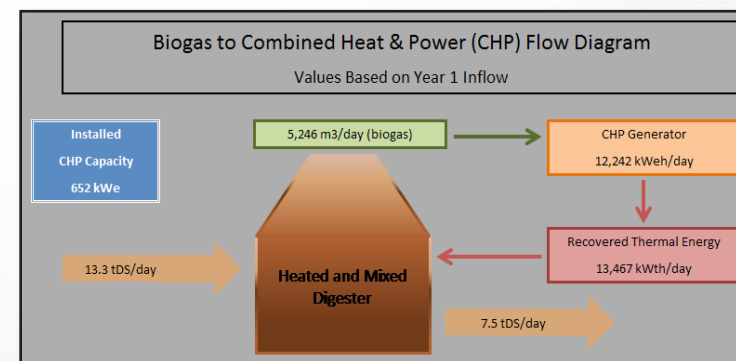
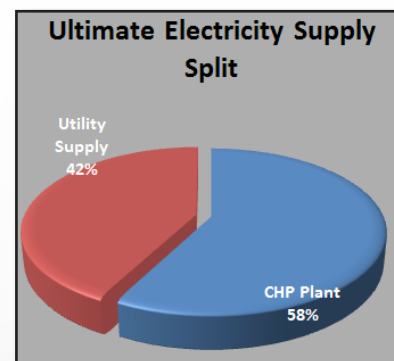


Schematic layout:
Anaerobic Digestion in a
waste water treatment plant

Biogas in Waste Water Treatment Works: In a WWTW, biogas is produced when sludge decomposes in the absence of oxygen, in digesters. This process is referred to as Anaerobic Digestion. South Africa was one of the first countries in the world to utilise digesters as part of sludge management at WWTW. Digesters at WWTW were however not built to capture and use the biogas produced, but rather to assist in sludge management. In most cases, digesters can actually be refurbished to allow for biogas collection.

The biogas produced can be used directly in Combined Heat and Power (CHP) engines, producing electricity and heat (also called cogeneration).

Determining the quantity and nature of sludge available is essential to determine the amount of biogas and, ultimately, electricity which can be generated. This will subsequently give an indication of the financial viability of such a project. The quantity of sludge produced is largely determined by the treatment processes employed by each specific WWTW.



Some of the outputs produced by the excel tool (in the dashboard)

All these documents are available on www.cityenergy.org.za / section Renewable Energy.

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Biogas to Energy at Municipal Waste Water Treatment Works

A Toolkit for Municipalities to Assess the Potential at Individual Plants

Producing energy from biogas in Waste Water Treatment Works (WWTW) has multiple benefits. It has the potential to **reduce the municipal electricity bill** and improve the **security of energy supply**. It can **reduce the amount of sludge** to be disposed of, while **improving its quality**: municipalities can then promote the use of the digester as an attractive agricultural product for farmers and composting companies. Such a project will reduce the amount of methane emitted in the atmosphere, thus **reducing greenhouse gases emissions**. Lastly, building and operating a biogas plant will not only provide new job opportunities, but could also contribute to **skills transfer**.

The Biogas Potential Assessment Toolkit was developed to assist municipalities to determine the biogas potential of their WWTW and the viability of such project at the early stage of decision making process. The Toolkit is intended for use by Water and Sanitation and/or Energy and Electricity departments of municipalities. It provides necessary information to assess the potential for such project and present the project proposal to municipal management.

The toolkit was commissioned by SAGEN in partnership with SALGA, the South African Local Government Association. SAGEN is the South African German Energy Programme implemented by GIZ, the Deutsche Gesellschaft für Internationale Zusammenarbeit. The toolkit was finalised in March 2015 and first published in June 2015.

The Excel spreadsheet was developed by WEC Projects (PTY) Ltd. The other parts of the toolkit were jointly developed by Biogas SA, CapEAPrac and WEC Projects (PTY) Ltd.

THE EXCEL TOOL

The actual calculation tool is in the form of an Excel spreadsheet. The excel tool requires inputs from municipal officials familiar with the wastewater treatment processes employed by the WWTW and from municipal officials familiar with the municipality's finance requirements. The excel tool comprises of 4 sheets:

- **Notes:** This page is for information purposes and explains how to use the excel tool.
- **Assumptions Sheet:** This is the main user interface with the excel tool. Here the user inputs all process and financial information.
- **Dashboard Sheet:** The Dashboard provides an Executive Summary of the potential project allowing the user to quickly ascertain the project's viability based on the information inputted into the Assumptions Sheet.
- **Generator CAPEX Sheet:** The model calculates and approximate capital cost of the complete CHP plant based on the cost of the generator set. These are rule of thumb assumptions and are for guideline purposes only. The cost of the generator set can be modified by the user.

Ultimately the excel tool will only give an indication of project viability and will not provide sufficient information for the municipality to go out to tender the project implementation. The accuracy of the excel tool is only as good as the accuracy of the information it receives. Should the Tool indicate viability, the municipality would still need to appoint suitably qualified consultants to undertake a full feasibility study.

The screenshot shows the 'WWTW Biogas CHP Dashboard' with various financial and operational metrics. Key values include: Total Capacity at 10,000 kW, Working Capital Requirement at \$1,000,000, and a Projected Net Present Value of \$1,000,000. It also displays a 'Electricity Comparison' bar chart and an 'Ultimate Electricity Supply Split' pie chart.

Other relevant studies and reports:

- Biogas potential in selected waste water treatment plants - Results from scoping studies in nine municipalities:**
 This report summarises the results and lessons learnt from scoping studies in nine selected municipalities commissioned by SAGEN and SALGA. These studies initiated the development of the toolkit presented in this factsheet.
- The Renewable Energy Case Study: City of Johannesburg Project: Northern Works.** Municipal Waste Water Treatment Works - Biogas to Energy (Co-Generation).

The image shows the front cover of a report. At the top, there are three logos: 'german cooperation' with a rainbow flag, 'giz' (German Institute for International Cooperation), and 'SALGA' (South African Local Government Association). The title 'Biogas Potential in Selected Waste Water Treatment Plants' is prominently displayed in the center. Below the title, it says 'Results from Scoping Studies in Nine Municipalities'. The bottom half of the cover features a photograph of an industrial facility, likely a wastewater treatment plant, with large blue storage tanks and various pipes and structures under a cloudy sky.

