

INTRODUCTION TO BIOPOWER CORPORATION & ITS SANITATION SOLUTIONS

BioPower Corporation (hereafter **BPC**) focuses on the identification of opportunities in the design, construction, research, development and implementation of economically viable projects following a *Green Development Mechanism* in the areas of sanitation and green energy.

BPC uses BioSol SL36 - a 100% natural, non-toxic microbiological mix - to treat organic waste by digesting the sludge and removing the malodours. We also use state-of-the-art, energy efficient green technology to treat black- and grey water from various waste systems and institutions to general releasing standards as per **Section 39 of the National Water Act, 1998 (Act No. 36 of 1998)** which means it is also fit for limited reuse. The company strives towards being the leading authority in the following sanitation- and energy fields:

- The construction and installation of Decentralised Wastewater Treatment Systems (DEWATS)/ Biological Wastewater Treatment Plants (BWWTTP).
- Wastewater Treatment Works (WWTW) and Oxidation Pond rehabilitation and bioremediation.
- Wastewater Treatment processors with offline operation and monitoring.
- Organic waste treatment, e.g., pit latrines, portable toilets, and septic tanks.
- Water Purification chemicals and solutions.

BPC and its various solutions are aimed at assisting Government, municipalities and private entities in their endeavour to achieve the objectives as set out in the Medium-Term Strategic Framework and National Development Plan.

Our objectives are addressed directly through our scope of business:

- Attracting investment into the various peri-urban and rural regions;
- Reducing unemployment by providing job opportunities, skills development and skills transfer;
- Ensuring the equitable distribution of economic growth and reducing inequality;
- Improving the nation's health profile and environment;
- Conserving water and preventing the contamination of water resources.
- Contributing to regional economic integration in the SADC.

BPC has tasked itself to empower those who want to participate through various business opportunities that create socio-economic growth through job opportunities and skills development and transfer.

We have taken much consideration in adhering to all the facets of the South African dream of growth, research and sustainable living. Furthermore, our business model allows us to embark on the development of projects which see the country being a proud landmark in the post liberation struggle and the establishment of democracy in South Africa.

Opportunities

Through our business model on treatment of inhumane pit latrines and portable toilets at rural households, schools and clinics we can create job opportunities at a scale of up to 1 job per 100 pit toilets, alleviating the threat that unemployment has on rural areas.

Flush-Tech Sanitation System (FTS)

The FTS System is a Sequencing Batch Reactor (SBR) functioning as a small scale wastewater treatment plant. The toilets at hospitals, clinics, schools, low-cost developments, estates, shopping centres etc. can be linked to this system for water treatment and the reuse of the effluent for the flushing of said toilets.

There are numerous benefits and applications to the Flush-Tech Sanitation System such as:

- Converts pit latrines to flushing toilets in areas without access to sewage infrastructure or electricity
- Up to 60% potable water conservation by recirculating treated effluent from the system for the flushing of toilets and/or irrigation, freeing precious drinkable water for consumption
- General improvement in sanitation & health.
- Skills transfer and development for local employees regarding construction and operation.
- Skills development as part of the construction, operation and basic maintenance of the system.
- Analysed in WRC's Sanitation Innovation Review 2015 and ranked highest in its class (8.5/10).

BioSol SL36

Our 100% natural product - BioSol SL36 - is applied in all our sanitation solutions. BioSol SL36 is not a chemically based product but contains the following natural elements:

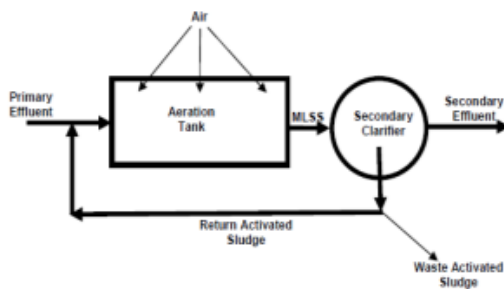
- Bacteria that typically occur in fossilised peat
- Added non-toxic bacteria with specialised abilities
- Naturally occurring nutrients that are specific to these bacteria
- Biologically treated water

Until recently, no SABS standard on biological (as opposed to enzyme-based) sanitation products existed in South Africa. SABS, in conjunction with BioPower, CSIR and other external stakeholders established a task team to standardise the biological sanitation process in 2016/2017. The standard (SANS 1781) was first published in August 2018.

Wastewater Treatment Works and Waste Stabilisation Pond Bioremediation

By using BioSol SL36 and other additive solutions, BPC can re-establish optimum biological conditions for Wastewater Treatment Systems as remediating-, pro-active- or maintenance function.

By applying the product in 5 parts per million ratios (dependent on the water quality) in WWTWs and WSPs, BioSol SL36 removes odours as well as digests sludge to reduce the waste level of the system.



BioSol SL36 works equally well in Waste Stabilisation - and Activated Sludge Systems. In the normal oxidation pond systems, it works directly on the settled- and incoming sludge, whereas in the Activated Sludge process it works as follows:

The activated sludge process relies on the cultivation of a population of millions of microorganisms (MO's) of many different types, mostly aerobic and facultative heterotrophic bacteria, such as contained in BioSol SL36, being suspended in wastewater, as it passes through a reactor (aeration tank), as shown below:

This suspension, referred to as mixed liquor (or Mixed Liquor Suspended Solids, MLSS), is supplied with oxygen and kept mixed by bubbling air through the aeration tank. As such, the MO's in our product enhance naturally occurring MO's organisms already present in the primary effluent, specifically with strains of bacteria which have been optimised to rapidly degrade faecal sludge material.

Following an adequate amount of treatment time, the mixed liquor flows from the aeration tank to a secondary clarifier where the biomass is allowed to settle out of the wastewater and the effluent passes to the next treatment step. The settled biomass is returned to the treatment process to provide MO's, which will continue removing pollutants. More specifically, when BioSol SL36 is present during this sludge digestion process, subsequent multiplication of the MO's occurs with a bias in favour of non-pathogenic bacteria or biomass, for sustainable sludge breakdown, but also results in the generation of another product, namely compost, which can be used for cultivation purposes.

This returned biomass is referred to as Return Activated Sludge (RAS).

Since this is a living and growing process, it will continue to build biomass to the point of having too much. The amount of biomass in the process is controlled by removing (wasting) a portion of it on a controlled basis. This excess biomass removed from the secondary system is known as Waste Activated Sludge (WAS), which in fact can be used as compost.

Processors and Monitoring Equipment for WWTW

BPC offer our Processor technology to the municipality, where our state-of-the-art Control Units can be used to replace current controllers and offer major updated functionality with internet connectivity and remote-accessible offsite capability, with provision made for:

- Offsite Monitoring.
- Offsite Troubleshooting.

Water Purification Solutions

Through our partners in water and sanitation – Indlela Consultants, BPC also offer the following:

- Flocculants and coagulants (All NSF approved)
- Nitrates & Phosphates removal
- Cooling water treatment
- Open and closed loop systems
- Potable/drinking water treatment, and Reverse Osmosis plants
- Solid/Liquid separation
- Process Chemicals: Disinfectants and Conditioners
- Ion exchange systems
- Disinfection equipment
- Filtration systems
- Dosing systems
- Pumps and valves
- Microbial analysis
- Legionella analysis and treatment

Conclusion and the Way Forward

Through our proven track record – both in waste- and wastewater treatment – as well as our current collaborations with SABS, UP, UNISA, WRC and the CSIR, we are very confident that we have the solutions to address most – if not all - of the water sanitation challenges faced. BioPower Corporation also offers real value by incorporating socio-economic upliftment as part of our primary operations.

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