



TERMS OF REFERENCE FOR A SOLICITED WRC PROJECT

KEY STRATEGIC AREA:	9 (Business Development and Innovation)
THRUST	3 (Business Development)
PROGRAMME	2 (Impact Expansion)
TITLE	Market Analysis: Determining the extent and potential of a water to energy market in South Africa (waste and small/micro hydro)

Rationale

Global reports approximate the waste to energy market value at USD 28.43 billion in 2017 towards an expected USD 42.74 billion by 2025. The Waste Water Treatment to Energy (WWTtE) market saw capital and operational investments of USD 531 million in 2017. When considering that wastewater is a carrier of over 50% of waste resources that is either lost or unrecovered as materials, energy and water, why is this circular opportunity not being taken up? The City of Cape Town working with New Horizon Energy saw a R400 million waste-to-energy investment project, that was upfront deemed viable, put on hold. What are the blockages and pathways to market being missed by current research?

Previous studies have shown that the organic matter in wastewater contains approximately 10 times the energy needed and that wastewater treatment works can produce all the energy required for treatment of the very same water. Considering the savings that can be made from resource recovery and additional revenue generation, why is the South African wastewater to energy sector still in infancy? Water scarcity, growing population sizes and rapid urbanisation coupled with prospective residential, commercial and augmentation projects indicates a growing market for wastewater to energy products and services.

South Africa was one of the first countries to utilise Anaerobic Digestors (AD) to produce biogas from sludge and utilise the digestate as organic fertiliser. However, the paradigm shift to consider and

implement alternate technologies and innovative processes has not occurred in majority of South African water utilities and less so in households. Previous studies have also alluded to the regulatory environment being one of the main obstacles in creating the correct market conditions in transitioning fully to a circular economy. Though, the passing of relevant by-laws is within the management area of local municipalities.

When considering other technological developments, South Africa's hydropower potential was initially estimated at 8,360 MW per annum and later suggested that this stands at 12,160 MW. South Africa's small and micro hydropower potential presently stands at 5 times larger than the currently installed capacity. The advantage of small and micro hydropower plants is their modularity - either as standalone or as hybrid combinations. Extant research has suggested that small and micro hydropower is a commonly used option to electricity supply for rural and isolated communities in countries such as Nepal, India and China. And has been proven to be technically feasible alternative. In addition, South African Government has committed to achieve 10 gigawatts from renewable energy sources.

Currently 16% of South Africa's population has no access to electricity. There are approximately 30 sites across the Eastern Cape and Kwa-Zulu Natal with the potential to take-up small-scale hydroelectric power. Pipes and storage facilities within cities provide further opportunities that could be harnessed, including new build projects. What is unknown are the barriers to market, whether there exists a large enough market and the types of investment required for such markets to be developed in South Africa. At the same time such research should not discount the socio-economic spin offs that could be realised in the short to long term.

The Water Research Commission (WRC) drives a strong Water and Sanitation Research, Development and Innovation agenda. To achieve impact in the water sector, it is imperative to develop insights through a targeted research project to determine the size of the small/micro hydropower market and wastewater to energy market in South Africa, including its export potential.

Objectives of the study

General

Undertake a market analysis of various water to energy sources for South Africa, reflecting and unpacking areas of opportunity within the public water sector, domestic and commercial activities.

Specific

- A proposed methodology to assess and determine the size and potential of new water to energy markets;
- A detailed market analysis (quantitative and qualitative) of current and future trends, forecasts, growth drivers, constraints and risks;
- Identify dominant and underlying opportunities and competitive scenarios;
- Undertake a market segmentation analysis in relation to geography, technology, and emerging innovation;
- Outline key developments required to improve market structure (supplier, buyer, manufacturing, penetration, affordability, regulatory environment, etc);
- Recommend industrial development, process, technological and implementation strategies to be pursued; and
- Provide recommendations for future research, policy and practice.

Deliverables:

The following deliverables are suggested as outputs and may be adjusted depending on the proposed market research methodology:

1. Inception report;
2. Market Segmentation Analysis;
3. Competitive Framework;
4. Opportunities map and recommendations;
5. At least one stakeholder engagement (linked to market research methodology);
6. Market analysis report outlining:
 - a. recommended economic, socio-economic, political considerations;
 - b. export potential;
 - c. strategies, research, policy, and practice recommendations; and
7. Draft paper for submission to a relevant academic journal.

Time Frame:

18 months

Budget allocated

R650 000

National Transformation and Development Agenda

The WRC supports the socio-economic agenda of South Africa and encourages proposers to consider transformation, gender, youth and trans-disciplinary priorities in response to the research terms of reference.