

# Commercialization of Wastewater Sludge Beneficiation

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## The service

Sewage sludge disposal has become a costly and environmentally challenging matter that requires an innovative approach. Agriman (Pty) Ltd is a South African based company with an international footprint that provides a complete value chain solution for the handling, processing and beneficiation of wastewater sludge to a commercially marketable fertilizer.

Depending on existing infrastructure and processes employed at a wastewater treatment works (WWTW), Agriman has developed the ability to migrate upstream in the process line to perform and manage critical functions related to the digesters and dewatering of sludge that have a direct effect on sludge quality. By means of accelerated solar drying, sludge is dried and stabilized before disinfection and granulation takes place. Once granulated the product is then blended with conventional fertilizer feedstock to customer requirements for agricultural use, effectively transforming a hazardous waste into a registered organic fertilizer that is safe for agricultural use.

## Impact on the sector

Wastewater treatment has for the greater part been considered as a liability, with environmental legislation, public pressure and limited alternative options escalating disposal costs.

Wastewater treatment works has several by products from its processes of which authorities must responsibly dispose of to ensure that there are no detrimental social, environmental, and economic impacts. While methane emissions can be flared, wastewater sludge has traditionally been disposed of at either landfill sites, sacrificial land or spread on agricultural land (depending on whether allowed by authorities). Disposal to landfill sites is not environmentally beneficial or a sustainable solution and has significant transport and handling costs which is often for the account of wastewater authorities.

Disposal of untreated wastewater sludge on agricultural land has limited use, only under certain conditions can it be applied and is not suitable where crops for direct animal or human consumption are planted. Transportation costs to suitable agricultural land is normally for the account of wastewater authorities.

Agriman's process of sludge beneficiation, together with energy harvesting of biogas and appropriately treated effluent has now turned the wastewater treatment works into a resource center. Not only has it impacted the wastewater sector, the agricultural industry has been positively impacted by the production of a granular organic fertilizer that can compete with conventional

fertilizers in hardness, flow properties and density. Beneficiating wastewater sludge to fertilizer products unlocks value and completes the nutrient cycle.

Marketing and sales based on scientific data and agronomic principles is essential. Agriman developed the complete value chain, from the point of sludge production right to the end where the farmer applies the product, to ensure maximum valorization of the so-called waste product. Valuable carbon is thereby returned to the soil profile, revitalizing soil microbial biomes that enforces sustainable farming practices.

Sludge beneficiation is a sustainable and economically viable long-term solution for the disposal of wastewater sludge. Investment in and focus on proper sludge production and processing, yields a positive return in sales value, while it will require no further cost for disposal.

With the required infrastructure established the sludge can be processed into a marketable product for use in commercial agriculture. In the long term this solution saves the wastewater authorities on transport costs, disposal site costs and eliminates the negative impact of sludge disposal on the environment, economy, and social impacts.

A sustainable and economical viable enterprise attracts competent and skilled staff. This leads to higher efficiencies and creativity that benefits the entire process of wastewater treatment. With Agriman's model, wastewater treatment works will become profitable resources centers and will allow authorities to attract skilled and professional staff.

## Lessons learned from implementation

The majority of wastewater treatment works across the world are under the control of public entities. Financial compliance has become one of the major driving forces in terms of how public entities operate their businesses due to the drive to obtain clean audits. This in turn often determines the supply chain processes followed when tenders are compiled for services. Traditional tenders for sludge disposal consist of transport services to an approved disposal site plus gate fees.

It is critical to inform and educate authorities of the complete solution that Agriman has developed as an alternative to disposal of sludge and the long-term cost savings that can be derived from implementing it.

The development of an environmentally and socio-economically friendly organic fertilizer product that is marketable to commercial farmers entailed significant research and development work by Agriman. It is also essential that the complete value chain that includes sludge handling, beneficiation, marketing and sales of the organic based commercial fertilizer is developed to ensure that the processes and products are economically viable as an environmentally and socially acceptable long-term solution.

## Opportunities for scaling

The environmental, economic and socio-economic impact of the traditional disposal methods of wastewater treatment works' sludge is not a sustainable solution. Authorities are also being pressured by laws and legislations that are phasing out the disposal of sludge at landfill sites. Provided that dewatered sludge can be dried cost effectively at a specific WWTW, Agriman can provide a sustainable long-term alternative that can be implemented on a large scale to safely handle and process sludge to an organic based fertilizer. The trend towards sustainable farming practices creates a high demand for commercially available organic fertilizers to supplement chemical fertilizers. This demand is currently not being met. The potential to commercially beneficiate wastewater sludge to a registered and

approved agricultural fertilizer on a global scale has been shown by Agriman as a model that is economically viable for wastewater authorities, the agricultural industry and sustainable development.

## References

Department: Forestry, F. a. (2022). *The Compendium of The National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008), Regulations, Norms & Standards and Guidelines.*

Water Research Commission. (2006). *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 5.* Pretoria.



**21st African Water Association International Congress & Exhibition  
and  
The 7th International Faecal Sludge Management Conference**

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Francois Burger – Agriman (Pty)Ltd, South Africa**



Abidjan, Côte d'Ivoire  
19-23 February 2023



“An objects value is not intrinsic, but changes according to it’s context”



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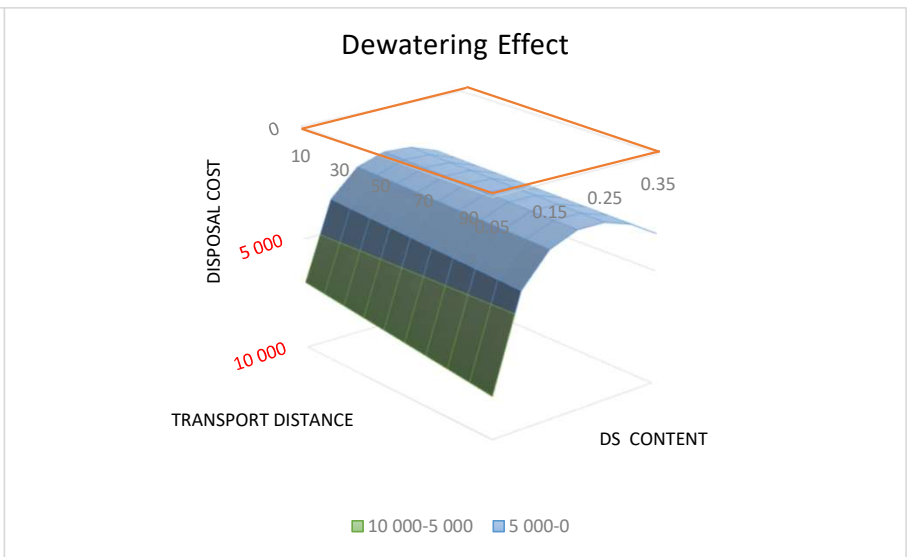
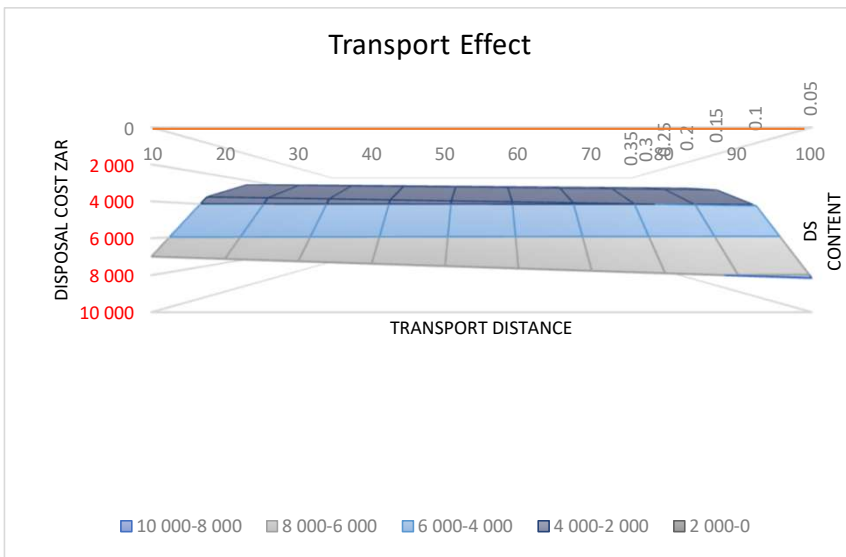
# Negative Values Associated with Conventional Disposal Options



1. Sacrificial land
  2. Landfill
  3. Agricultural land
  4. Incineration
  5. Environmental threat
- “Cradle to grave”  
responsibility

### Variables

Gate Fee (R/ton)	R	300.00
Transport (R/km @ 34t)	R	22.00
Transport (R/km.t)	R	0.65
Floculant (R/kg)	R	80.00





## Intrinsic Value

1. Nutrients
  - i. N, P K, S only = R2 245
  - ii. Micro Nutrients
2. Carbon C
  - i. Physical soil improvement
  - ii. Water retention
  - iii. Cation Exchange Potential
  - iv. Buffer Capacity
3. Stimulates Microbial Activity

## Regulatory Requirements

1. Sludge Disposal Guidelines (SA), EPA 503 (USA), European Environment Agency
2. Fertilizer and Farm Feeds Act – Registration
3. GlobalGAP, ECO Cert, Consumer regulations
4. Environmental and Waste Management Legislation



# KNOW YOUR MARKET



## CUSTOMER REQUIREMENTS

- Conventional practices
- Dust free
- Free flowing
- Hardness
- Density
- Nutrient Composition
- Prescribed products
- Soil Analyses
- Agronomic Advice
- Handling and Packaging
- Registered Fertilizer Product
  
- Price!



R2 400 – R6 000/ ton

R12 000 – R16 000/ ton



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Precision Farming requires:

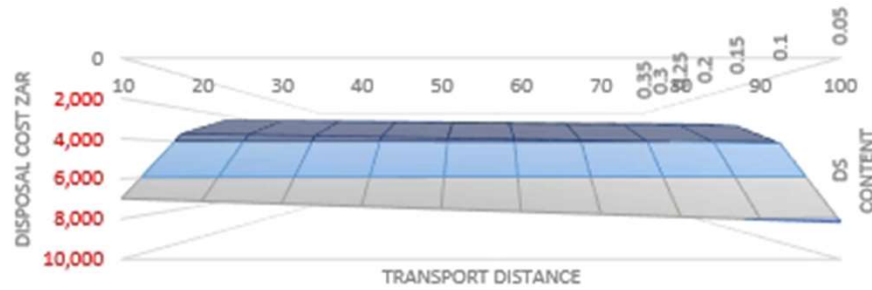
1. Prescription Blends with the
2. Required Macro and Micro elements
3. At the right concentration
4. Packed to customer choice



**Variables**

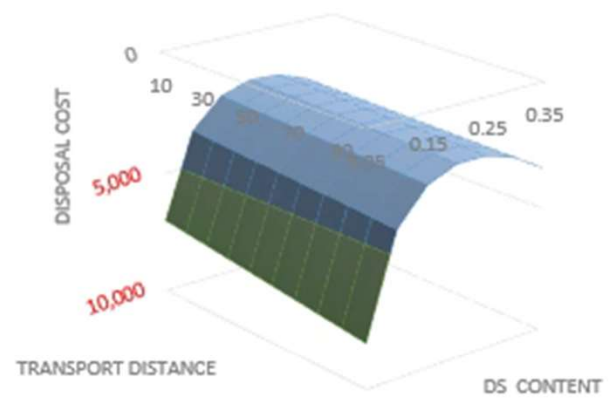
Gate Fee (R/ton)	R 300.00
Transport (R/km @ 34t)	R 22.00
Transport (R/km.t)	R 0.65
Poly (R/kg)	R 80.00
Processing cost (R752)	R -
Sales value (R2400)	R -

**Transport Effect**



■ 10,000-8,000 ■ 8,000-6,000 ■ 6,000-4,000 ■ 4,000-2,000 ■ 2,000-0

**Dewatering Effect**

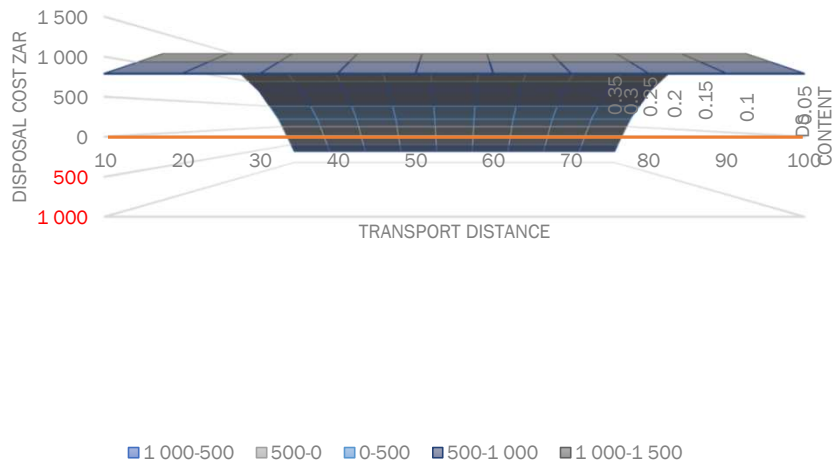


■ 10,000-5,000 ■ 5,000-0

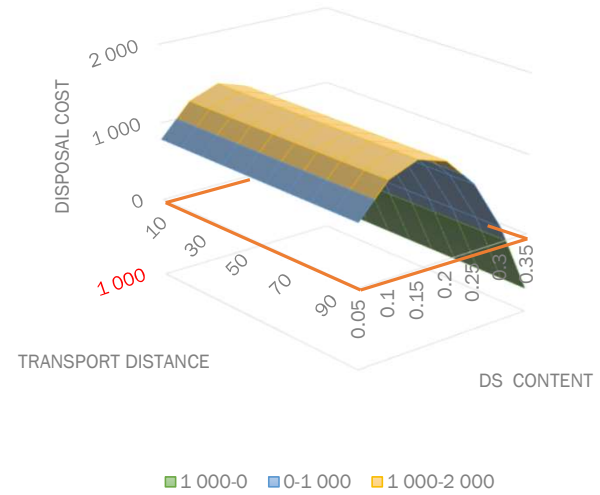
Variables	
Gate Fee (R/ton)	R -
Transport (R/km @ 34t)	R -
Transport (R/km.t)	R -
Poly (R/kg)	R 80.00
Processing cost (R752)	R 752.00
Sales value (R2400)	R 2,400.00



Transport Effect



Dewatering Effect





Negative value  
Environmentally hazardous



High value  
Environmentally friendly



Conventional fertilizer + 30kg/ha Biosolids

Conventional fertilizer



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Conventional fertilizer + 30kg/ha Biosolids

Conventional fertilizer

Santè!



Cheers!

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