A method and a system for converting large quantities of wastewater into water and fertilizer - the YSATÎ case, based on Patent INPI PI 0905596-7 A2

Eng. Silvio Ricardo Taboas
tabVlae Engineering Services ltda.
Businesses Development and Project Finance
Brazilian offices: São Paulo, Ribeirão Preto and Rio de Janeiro

Abstract

The Patent granted in 2017: A method and a system for converting large quantities of wastewater into water and fertilizer

Field of the invention
The present invention relates to a method and system for converting wastewater from sugar, bio-ethanol and bio-diesel production into substantially purified water and a powder containing the waste. A single process line consisting of a system according to the invention is able to handle a quantity of wastewater of up to 20000 m3/day.

Background for the invention
The traditional production of bio-ethanol from sugar cane is based upon fermentation and distillation. The wastewater – the so-called vinasse – from this process is today being sprayed to the fields.

However this way of depositing the vinasse is not environmentally acceptable and methods have been investigated to avoid the deposit of vinasse on the fields. Specifically in Brazil the amount of vinasse produced per year amount to around 450 billion liters/year.

The dry matter of the vinasse is high in Potassium (K^+) and is needed for adequate growth of the sugar cane. Today Brazil import Potassium for fertilization in the range USD 4 billions/year. By retrieving the Potassium from the Vinasse one can reduce the importation of Potassium and use existing source of Potassium as a dry fertilizer.

Description of prior art
The converting of wastewater into fertilizer is a normal process with evaporation and drying. The evaporation have been done utilizing either tubular or plate evaporation. For the drying step normally the use of a spray dryer or a spin flash drying is being used.

The quality of the water (condensate) produce by the evaporation step is generally undefined as vinasse contains volatile solid components which components are at least partly stripped during the evaporation process and therefore ends up in the purified water (condensate) as impurities.

For many years scale dispersants and sequestering agents has been used in different types of water treatment with the objective of minimizing scale formation i.e. avoiding salts crystallization on membranes or heat exchange surfaces but it has never been recognized that the use a sequestering agent with dewatering of vinasse would make it possible to process huge amount of waste water.

Key words: Biofuels, Water, Fertilizer, Wastewater, Vinasse, Sugar Cane, Ethanol, Brazil, Reverse Osmosis, Ultra-Filtration, Evaporation, Drying.

The patent is attached for a complete view of the flow and the invention specifications.

YSATÎ (the "Company")[1] is a Brazilian company with corporate headquarters in SP/Brazil that provides industrial wastewater treatment for the Brazilian sugarcane ethanol industry, and organic mineral fertilizer for the Brazilian agricultural sector. YSATÎ, which takes its name from the Guarani Indian word for "pure water", transforms its customer's wastewater into pure water and potassium-rich fertilizer powder, conserving water and contributing to the sustainability of ethanol as a biofuel while saving money for its clients.

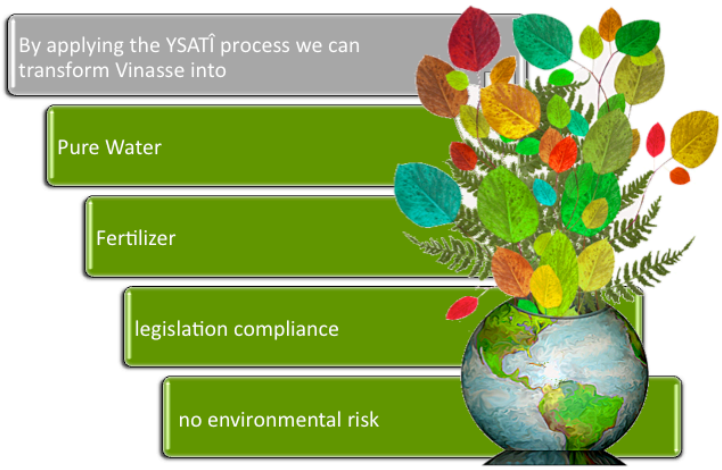
The Company uses a unique and patented physical and chemical process that addresses the costly challenges faced by the Brazilian sugarcane ethanol industry with vinasse, the highly pollutant and corrosive industrial wastewater produced in large volumes during the distillation process. The application of technology new to the industry provides significant cost advantages. The YSATÎ process transforms vinasse into pure water and potassium-rich fertilizer powder, reducing or eliminating the need for potassium fertilizer purchases. YSATÎ's technology also eliminates vinasse management costs and substantial infrastructure investments associated with disposal or land application of liquid vinasse as fertilizer (fertirrigation). The YSATÎ process eliminates harmful environmental impacts associated with fertirrigation, and creates opportunities to implement sustainable land-use practices that increase sugarcane agriculture productivity and ethanol production.

YSATÎ's commercial approach allows customers to avoid major capital expenditures and significantly reduce operating expenses. Potassium recovery provides an additional revenue stream to finance the company's treatment equipment costs. Charging a single tariff for vinasse treatment and eliminating fertirrigation or vinasse

[1] **All figures are referred to 2014 business plan and were not updated so far**.

disposal reduces operating expenses significantly. The customer does not incur infrastructure costs or capital expenditures for the YSATÎ installation.

The Company has already negotiated letters of intent that include prices and conditions with three large international groups. These groups represent more than 20 million t/year of cane processing and have nine operating mills, which together represent 50% of YSATÎ's ten-year sales plan. The total Brazilian market potential is comprised of 200 large distilleries producing 360 million m3/year of industrial wastewater and 18% of the current potassium fertilizer market. Each typical installation will generate R$ 10 million of EBITDA on an annual basis. Based on the company's projections, it should reach R$ 509 million in annual revenues in year ten of its business plan.



Brazil, the world's second largest emerging market economy, offers unique growth opportunities for companies that provide environmental technology and services. Emerging markets accounted for 72% of world GDP growth in 2014. Brazil has been one of the world's fastest-growing water and wastewater markets globally since 2004. The fundamental drivers of the demand for the water/wastewater engineering and environmental services in Brazil continue to be strong: water scarcity resulting from pollution of surface water resources, prolonged drought, and poor water infrastructure; an expanding middle class; urbanization; industrial development; and increasing environmental regulation and enforcement. The YSATÎ technology provides a solution to an environmental and operational challenge faced by the sugar-alcohol industry that reduces costs and eliminates debate regarding the sustainability of sugar-based ethanol as a replacement for fossil fuels.

In the last three decades, Brazil has emerged as a global environmental leader. A combination of economic reforms, privatization, urbanization, expanded environmental policies and growing awareness of the environment has supported the growth of environmental markets during this time. The country has enormous untapped natural resources including vast petroleum reserves and diverse mineral deposits, and boasts a world-class agricultural sector that has not yet reached its potential. Representing the largest environmental market in Latin America in absolute size, Brazil's environmental market is valued roughly at USD$ 14.3 billion.

Key Management

The YSATÎ founders' team combines decades of experience in water treatment, solid-liquid and liquid-liquid separation technologies and drying processes of food and similar materials. They have applied these technologies in several industries including the sugar-cane industry.

Steen Hedetoft – (shareholder)
Inventor

Dr. Juan Carlos Staibano – (shareholder)
Inventor

Biography: **Silvio Ricardo Taboas, is speaker of the YSATÎ Board.**

He is an executive of large global corporations in the segments of energy, food, cement, automotive, logistics, agribusiness and business consulting. Since 2006, he has been dedicated to start-ups and silent management turnaround through his own company, **tabVlae**, which developed the business of YSATÎ (www.ysati.com.br) and owns exclusive rights regarding the patent.

Professional Experience
• Owner and CEO of **tabVlae**
• Former CEO of Biofuel Energy ASA (currently UMOE Energy) and President of the Biofuel Energy ASA - Ethanol Distillery
• Former CEO of MAHLE-BEHR Brazil (automotive)
• Former VP of Brasilferrovias - currently ALL/ Rumologística

Educational Background
• PED and ISTE - International Institute for Management Development, Lausanne, Switzerland
• MBA - (IBMEC) - Rio de Janeiro
• Bachelor Mechanical Engineering - Federal University of Rio de Janeiro (UFRJ) - Rio de Janeiro



Email: ysati@ysati.com.br / tabVlae @ tabVlae.com / skype: sillvio.taboas