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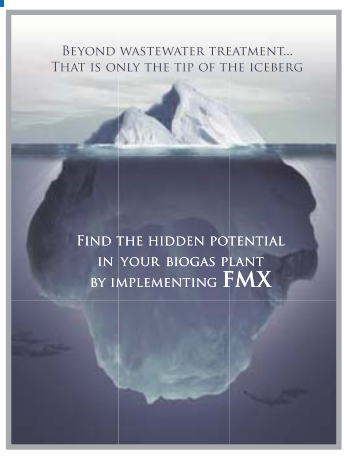


Introduction

FMX filtration is a proprietary membrane filtration system that guarantees to improve anaerobic digestion performace.

What will FMX do for you?

- Solution for wastewater treatment

  Nutrient disproportions prevent digester effluent from further biological treatment. Likewise, emerging discharge limitations prevent direct land application. The only viable option is to physically remove the contaminants from the water with FMX.

- Increased biogas production

  Typical digester effluent contains a significant amount of recoverable microbes and in some cases unused carbon. FMX concentrates the biomass and returns it to the reactor, improving relative conversion and efficiency.

- Stable digester operation

  Like any biological process, anaerobic digesters are sensitive to the inlet conditions. By operating in recycle mode, FMX lessens the severity of fluctuations in the feed material. Added stability also contributes to reactor efficiency by reducing downtime and subsequent reseeding.
  The following results indicate that FMX is ideal for treating the effluent of any configuration of anaerobic digesters.

FMX is the Revolutionary filtration machine specializing in High Density, High Viscosity and High Solid applications

Wastewater Treatment

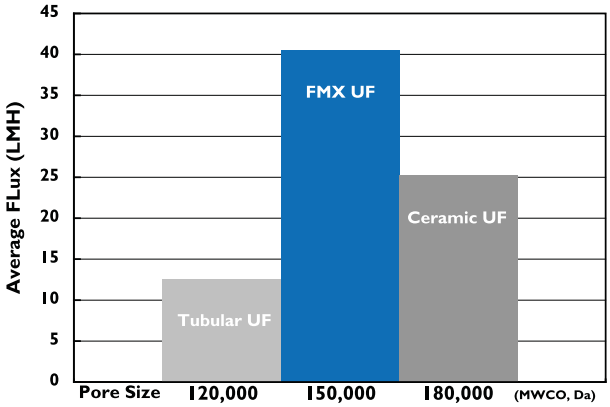
FMX successfully and efficiently treats biogas plant wastewater.

FMX removes all suspended solids allowing conventional purification methods to be used with ease.

Transform your wastewater treatment facility into a stable and efficient operation with FMX. Our technology allows for streams with the most difficult fouling agents to be easily treated.

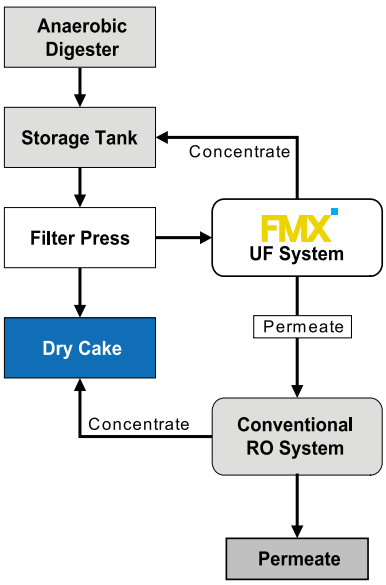
FMX is ideal for biogas plant wastewater effluents because of its proven ability showcased in the examples to the right.

Fouling resistance keeps flow rates high and constant.



FMX expands the application boundaries of the membrane filtration industry making it possible to treat never before thought of effluent streams.

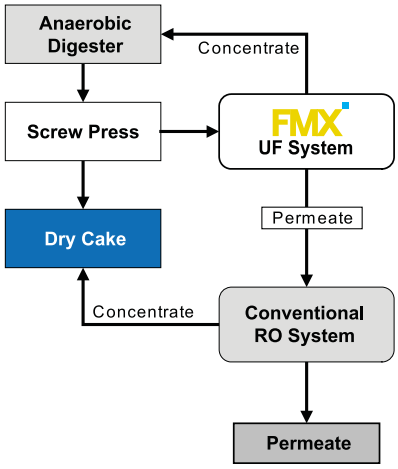
Case I: Biomass without fatty residues



A pilot test was performed in a country that has some of the most rigid water quality standards in the European Union. The above figure outlines FMX's proposed wastewater treatment process.

The feed to the FMX UF unit was the supernatant of the digester effluent. Water quality standards were met, and an increase in methane production was realized.

Case II: Biomass with fatty residues



At the request of our client, an additional pilot test was performed at a biogas plant in another European country that has strict wastewater regulations as well.

While the feedstock this plant uses is much more ideal for biogas production, the fatty residues complicate the effluent treatment by a significant amount. The above diagram illustrates FMX's proposed wastewater treatment process. Table 1 below outlines the operating parameters used in both Case I and Case II.

Table 1 - Summary of results for Case I and Case II

Common Conditions	Membrane Type	Temperature	Pressure	pH
	UF: 150,000 MWCO	34°C	5 kPa	8-11.5
Item	**Case I**	**Case II**		
Flux	180 LMH (liter/m^2·hr)	40.5 LMH		
CIP	20 min hot water / 5 hours	20 min hot water / batch		
Recovery Rate	90%	80%		

In both Case I and Case II, FMX was able to meet the discharge limits of BOD: 25 ppm, COD: 125 ppm, Total Phosphorus: 2 ppm and Total Nitrogen: 15 ppm

Increased Production

Economic Advantage

- Increased Production
  FMX influenced CH_4 production
- Increases efficiency
  FMX increased overall efficiency of the system including more CH_4 production by returning the biomass to the digester.

Stable Operation

- Fluctuations in feedstock quality or quantity did not negatively affect CH_4 production rate with FMX
- FMX helps prevent washout from the anaerobic digester and removes the need to add organic stabilizing supplements.

GET MORE BIOGAS AND STABILITY IN ADDITION TO STABLE WASTEWATER TREATMENT

Table 2- Evaluation of gas Production

Phase	Gas production based on input COD	Gas production based on input VS	Gas production based on removed COD
w/ FMX (Nm^3-biogas/kg)	*0.24*	*0.42*	*0.31*
w/o FMX (Nm^3-biogas/kg)	*0.20*	*0.35*	*0.31*
FMX Advantage (%)	*20*	*20*	*-*

Comparison of gas production rate with FMX and without FMX

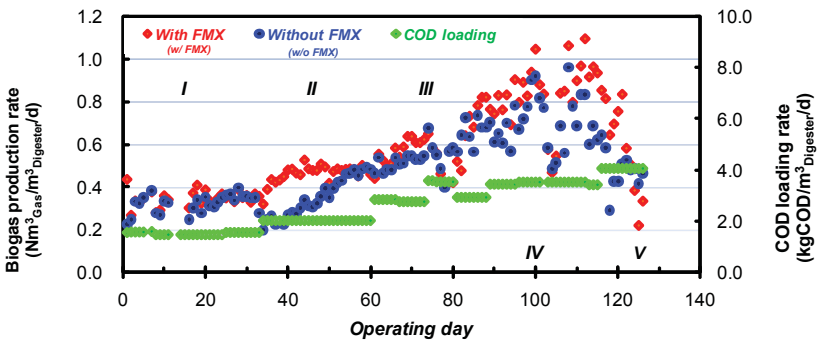
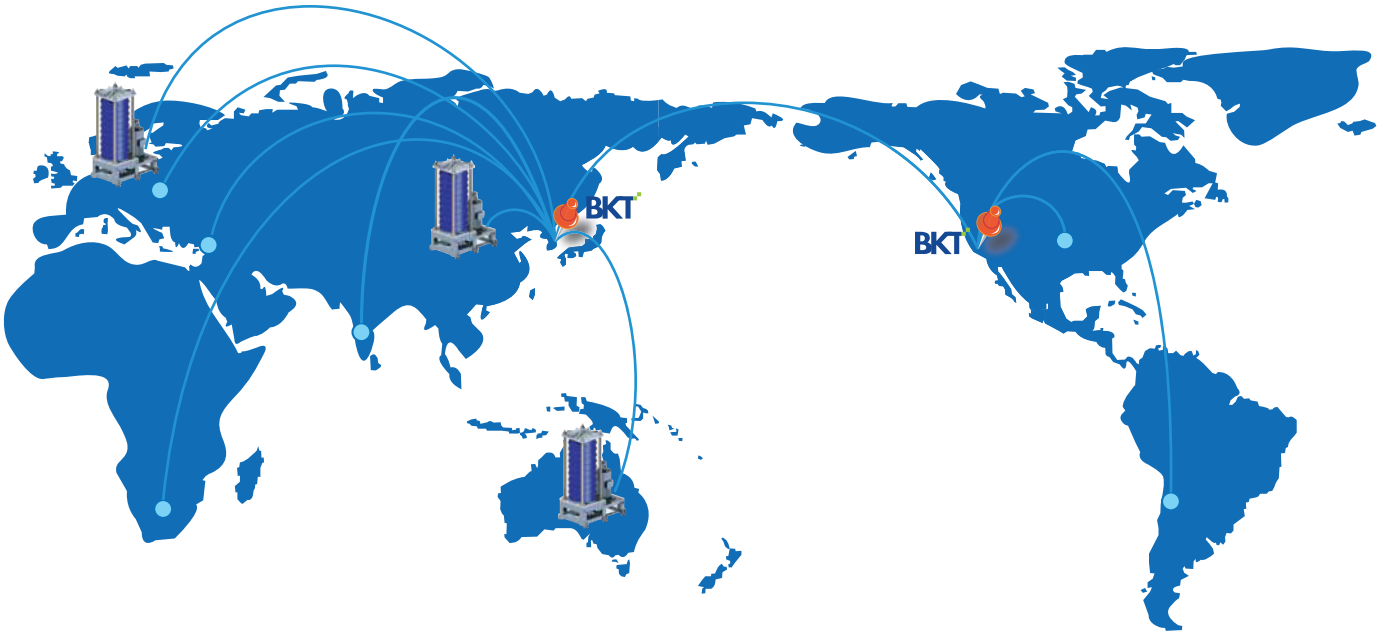


Table 3- Comparison of methane contents

Phase	Methane contents in biogas(%)
w/ FMX	*67~70*
w/o FMX	*58~65*
Difference	*5~7*



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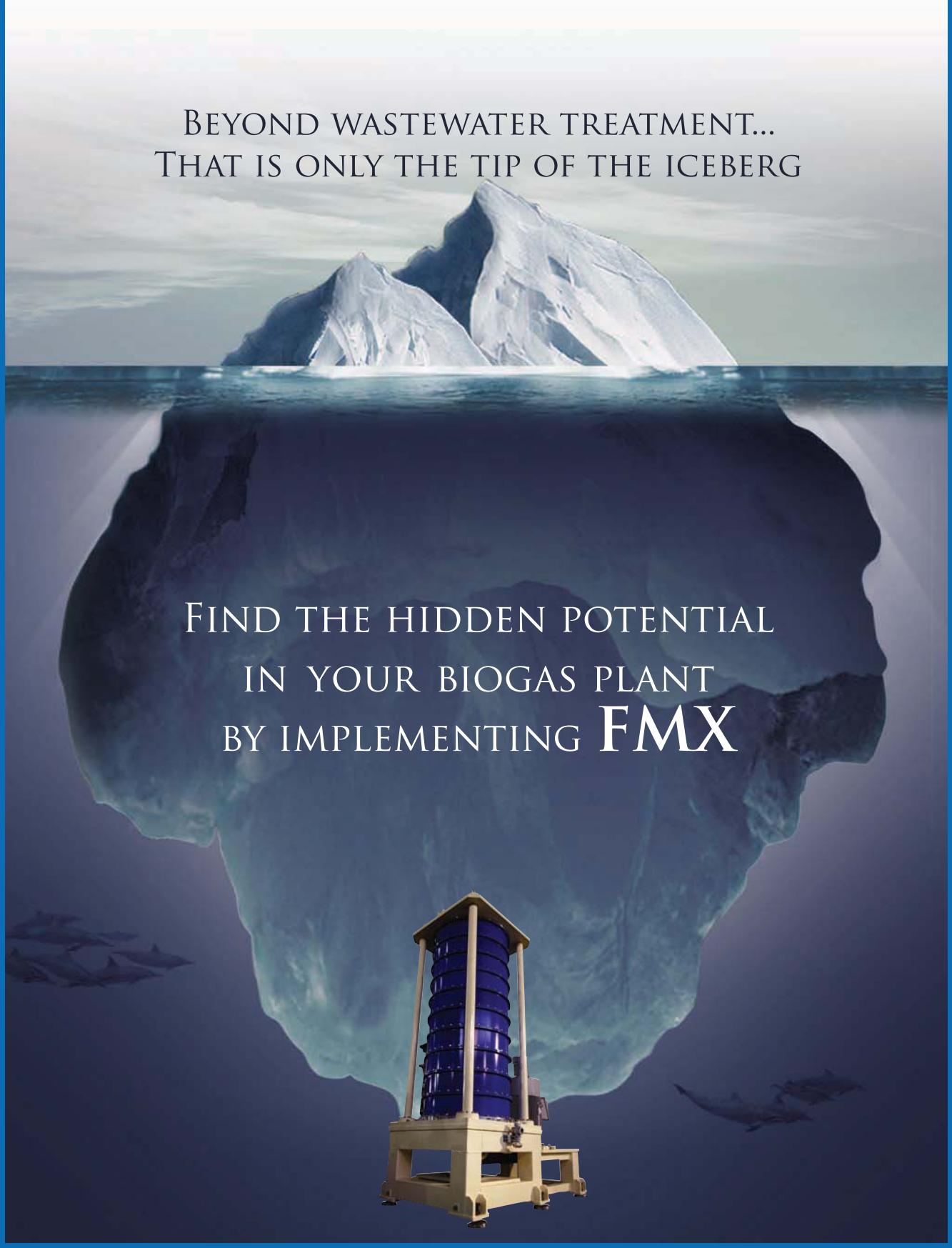

WASTEWATER TREATMENT AND INCREASED PRODUCTIVITY IN YOUR BIOGAS PLANT WITH FMX