

# EnBiorganic Technologies

Redefining Wastewater Treatment Solutions



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# Introduction to **EnBiorganic** Technologies

## Outline:

- **EnBiorganic's (EBT) flagship process technology: EBS-Di**
- **Bioaugmentation**
  - The existing industry
  - EBT's game changing technology
  - Selling Results NOT Microbiology
- **Primary components to the EBS-Di**
  - Microbiology
  - Generator
  - Firmware
- **Summary**



# The EBS-Di



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# Introducing the **EBS Di**

Simultaneously improve the overall performance of your client's wastewater system while reducing its environmental footprint.

Using the dynamic and autonomous EBS-Di for the all natural, bioaugmentation of wastewater.

**Performance Guaranteed**



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# Introducing the **EBS Di**

The EBS-Di is patent pending and uses EBT's proprietary microbial formulation.

It is the only **autonomous bioaugmentation** system for the treatment of wastewater.

One unit is ready to service a municipality of 10,000 people, **with ease.**



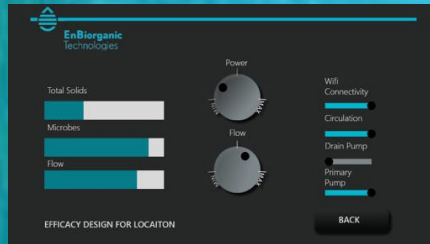
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# EBS-Di Features



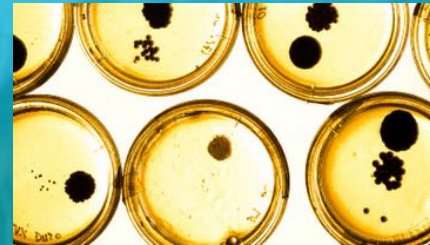
## GENERATOR

- Compatible with existing infrastructures
- Compact, secure and durable
- Easy to install
- Simple maintenance management



## FIRMWARE

- Fully automated
- Remote monitored and controlled
- GPS and WIFI Hot-Spot built-in
- Complete IoT system



## CUSTOMIZED MICROBIOLOGY AGENT

- Naturally derived from soil
- Completely non-pathogenic
- Proven positive impact on the environment
- Industry leading capabilities for the past 30 years



## ENGINEERING SUPPORT

- In-house engineering support
- Dedicated laboratory
- Customized approach for each facility



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# EBS-Di Specs

## DIMENSIONS

LENGTH: 47"

WIDTH: 25"

HEIGHT: 36"

DRY WEIGHT: 325 lbs

## ELECTRICAL

OPERATING VOLTAGES:

30 amp 220 volts

OPERATING ENERGY:

Less than 2 kw



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# Bioaugmentation



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# Bioaugmentation

## Status Quo

### Defined as:

“the introduction of cultured microorganisms into a contaminated environment in order to enhance bioremediation of pollutants.”

### Industry terms:

- Bio-dosing
- Bio-treatment
- Bug in the jug

### Industry Standards:

- Spore state microbes
- Expensive
- Manual dosing
- Increased technical knowledge or requirements for the end-user



# Bioaugmentation

## Competition

### Benefits:

- Environmentally friendly alternative to sludge/biosolid remediation
- Fats Oils and Grease, Odor, and H<sub>2</sub>S reduction

### Reputation:

- Results are not guaranteed, and the technology is usually ineffective
- Municipal sector has a dim view of microbiological treatment solutions because so many people sell bacteria alone
- Customers must buy the microbes and manually dose on their own, which adds extra labor



# Bioaugmentation

## Competition vs. EnBiorganic

### Competition:

- The competition rely on **SPORE STATE** microbes
- Spore state microbes rely on the system itself to activate
  - Only when the microbes are activated can they begin to breakdown sludge, FOG, and odor
- These companies rely on multiple and expensive dosing events to shore up spotty reliability and effectiveness.

### EnBiorganic:

- We autonomously generate, activate, and dose our microbes on site
- The microbes are ready to perform before they enter the system



# Bioaugmentation

## Selling Results, Not Microbiology

- We produce custom formulations onsite through the EBS-Di
- Our proven consortium is delivered continually into the target wastewater stream in selected locations to achieve the desired results
- EBT, in partnership with its licensees, provides all of this wrapped into a service contract that is performance driven
- This means there is no risk to the end user





# Bioaugmentation

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Automated  
Bioaugmentation  
with the **EBS-Di**

- Microbes are generated onsite
- Active state microbiology
- No CAPEX required for End-User
- **Guaranteed results**



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# KEY BENEFITS OF THE EBT SERVICE TECHNOLOGY



## SLUDGE REDUCTION

- 80-100%
- De-sludge lagoons
- Including FOG



## AERATION ENERGY SAVINGS

- Up to 65% energy reduction



## REDUCED OPEX

- 40-80%
- No CAPEX



## ELIMINATE SSO AND ODOR

- 100% Odor
- Surcharge reductions

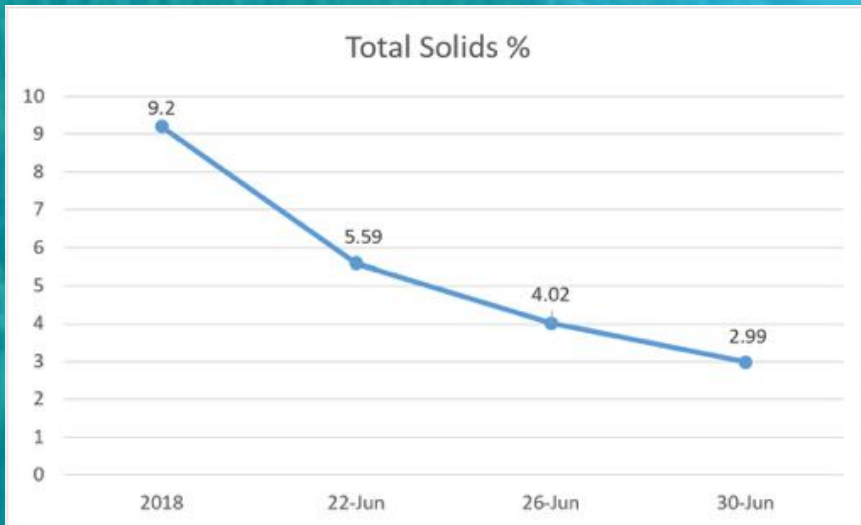
**100-200% INCREASE - EFFICIENCY | CAPACITY**



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# Selling Results Not Microbiology

Lagoon Performance Trial  
Kindersley, SK, Canada



**67.5%** decrease in **sludge**

- Customized proprietary solution and formulations
- Performance guaranteed
- No operation required by End-User
- No risk – No CAPEX
- TaaS Model  
Treatment As A Service
- Savings in operational costs are greater than monthly service fees



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# Primary Technology Components: Microbiology



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# Microbiology Defined

- The term microbiology refers to extremely small life forms that are only visible with a microscope.
- Bacteria are among the many of these tiny life forms and, in fact, outnumber all other lifeforms many times over.
- A single cubic centimeter of wastewater may contain more bacteria than the entire human population on earth.



# The EBT Difference

- EBT utilizes microbiology in a special formulation consisting of several strains of naturally occurring bacillus soil bacteria that replace traditional microbiology for wastewater treatment solutions.
- EBT has created an autonomous system – coupling its microbial formulation with a “smart” generator that is continuously monitored, producing a large volume and high concentration of active microbes for addition to wastewater.



# Our Microbiology

- Derived from soil and is **non-pathogenic**
- Specifically formulated for each site
- The bacterium is trained to grow off the target wastewater then released into that wastewater environment, **already adapted to its food source**
- The released, **active**, adapted microbes grow quickly in the target wastewater, rapidly doubling and steadily increasing their population.
- Our microbes are facultative - When food is in short supply, they go into spore state. When the food is back in good supply, they return to active state



# Our Microbiology

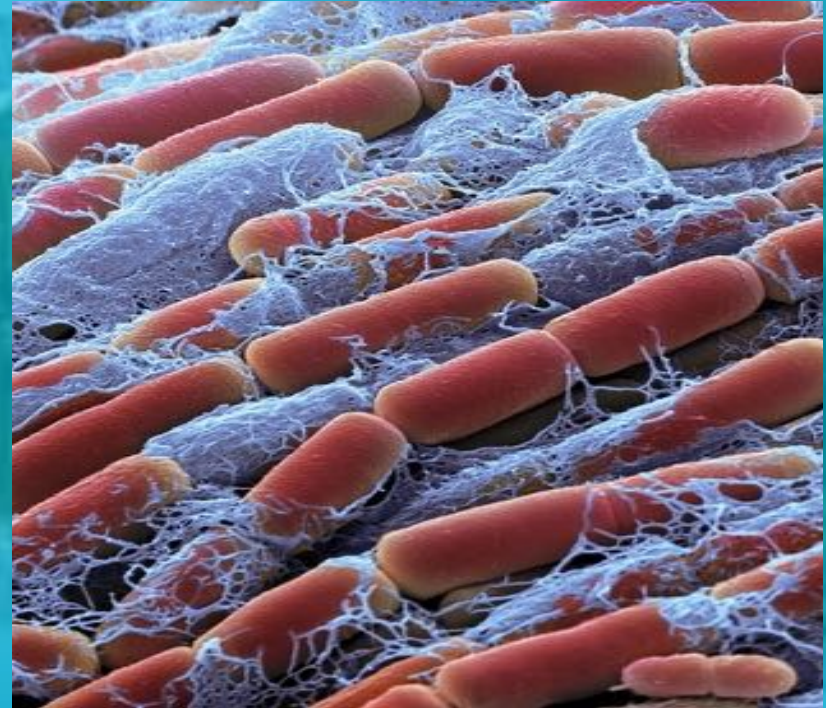
- Consists of several strains of naturally occurring bacillus soil bacteria that replace traditional microbiology for wastewater treatment solutions
- Refined formulation has been **proven to treat wastewater with minimal energy input** in traditional wastewater treatment processes
- Eliminates traditional biosolids that are harmful to the ecosystem





# Working With Bacillus

- **Bacillus.** (Science: bacteria) a genus of bacteria of the family Bacillaceae
- This includes large aerobic or facultatively anaerobic, spore forming, rod shaped cells, the great majority of which are gram-positive and motile.



# Working With Bacillus



In water and soil, they **outcompete pathogenic** bacteria, fungi, algae, and other organisms that are undesirable



They outcompete pathogens because they are **specially formulated** to consume the same nutrients



They also produce antimicrobial compounds against those organisms to stop them from reproducing



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# Bacillus and Safety



- The Bacillus in our formulation are generally regarded as safe (GRAS)
- If you spill the concentrate, clean spill up with 10% acidified bleach solution. Allow contact for 5 minutes to kill spores and vegetative cells.
- If you are working directly with the formulation, make sure that you wash your hands after contact and that you are not eating or drinking in areas where the mix is being actively worked with
  - They may not cause disease, but they are highly concentrated and will “clean your pipes”.
  - Once they are in the soil, water, or installed in a system there is a lesser concern.





# Primary Technology Components: Generator



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# EBS-Di

## Microbial Generator and Dispensing Unit

- Compatible with existing infrastructure
- Secure, compact and durable
- Easy to install
- Modular design is built for simple maintenance management



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# EBS-Di

## Microbial Generator and Dispensing Unit

- All components of the technology are housed inside of the EBS-Di
- Only 5 connection points

### **Key connections:**

- 1 hose to draw RAW sewage effluent
- 1 hose to dispense treated effluent with our ACTIVE STATE microbes



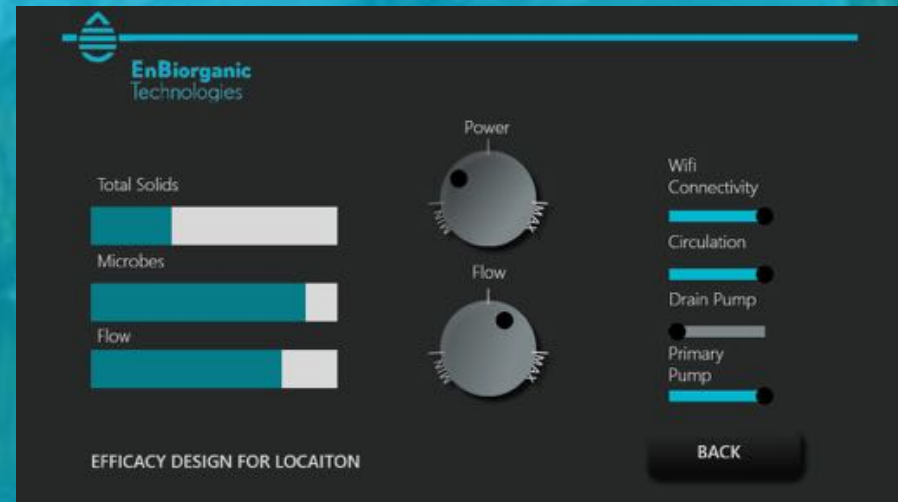
# Primary Technology Components: Firmware



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# EBS-Di Firmware

- Automated remote control and monitoring system
- Fine tuned dosing to match changes in flows and conditions to optimize treatment
- Diagnostic programming to pre-empt problems
- Battery backup allows reporting of any problems, including power failure





# EBS-Di Firmware

## Engineering Support

- We utilize the engineering expertise from our in-house laboratory
- Resolve challenges reported by EBS-Di firmware
- Ability to adjust output as needed to ensure achievement of guaranteed results
- Remote shutdown capabilities in cases of emergency



# NO END USER LABOR REQUIRED AT ANY STAGE: INSTALLATION OR MAINTENANCE

←—————→  
The system is installed, maintained, and monitored by EBS and its team of trained licensed service providers



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# Summary



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# Summary of EBT Service

- EBT, in partnership with its licensees, offers municipal wastewater clients an automated bioaugmentation service
- This service is achieved through the capabilities of the EBS-Di and the microbes it generates, activates, and dispenses onsite in an automated process
- No CAPEX or additional labor is required by the End-User
- The EBT solution is a **service** that minimizes risk for End-User and allows EBT to adjust as needed to achieve the guaranteed results





# Summary of EBT Benefits

End-Users can expect the following benefits:

- 80-100% reduction in sludge/biosolids, including FOG
- Elimination of Odor, SSO, and H<sub>2</sub>S gases
- Increased lifespan of infrastructure
- Up to 65% energy reduction
- 40-80% reduction in OPEX with no CAPEX or extra labor required

