FENIX®
An ISO 9001:2008 Company

ENGINEERING-EQUIPMENT-TURNKEY SYSTEMS

Environmental Technology

Wastewater Treatment

Solid Waste Management

Industrial Emission Control

Biogas Purification

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FENIX ENVIRONMENTAL TECHNOLOGY DIVISION

WASTEWATER TREATMENT

- ANAEROBIC WASTEWATER TREATMENT
- WWT FOR OIL AND GAS INDUSTRY

SOLID WASTE MANAGEMENT

- HIGH RATE BIOMETHANATION

INDUSTRIAL EMISSIONS CONTROL

- BIOFILTERS
- BIO-TRICKLING FILTERS
- BIO-SCRUBBERS

BIOGAS PURIFICATION

- WATER SCRUBBING
- CHEMICAL SCRUBBING
- PRESSURE SWING ADSORPTION

WATER & WASTEWATER TREATMENT TECHNOLOGIES FOR OIL AND GAS

WATER WALL SYSTEM

The Water Wall SYSTEM, in a preferred embodiment, is a two stage device designed to separate and remove non soluble oil, solids and entrained air from the oily water.

The system, which can process oily water at its rated capacity, is designed for continuous and intermittent operation without the need for chemicals or other additives. After the system has been started, it is capable of automatic operation. The complete train process may also include a stationary self cleaning filtration unit to provide the most efficient and effective means for separating oil from water recovering the suspended solids and eliminating the need to change or replace the separation media. The system design incorporates the "water wall" principle of separation: the fabricated vessel contain a series of membrane units which are fitted in vertical position to enhance solids removal.

Typical applications of the Water Wall® system are

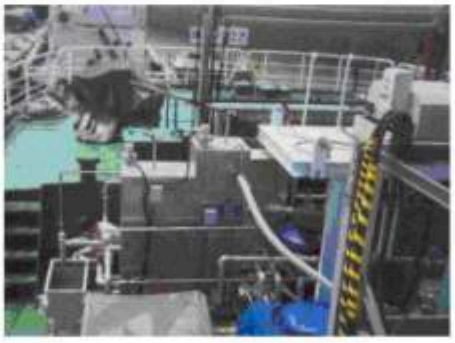
OIL & GAS PRODUCTION (onshore / offshore):
- production water (oil)
- condensate water (gas)
- deck washing

INDUSTRIAL USES:
- power plants condensate and cooling water
- petrochemical plants and refineries effluents
- rolling oil effluents from any rolling mill
- machine tool coolants
- oily wastewater from:
- chemical industry
- pharmaceutical industry
- food processing plants
- mining operation
- wool and textile industry
- mechanical industry

MARINE APPLICATIONS
- bilge water separation
- tank ballast water deoiling
- oil spill response
- sea water deoiling / desalinization plant protection

POLLUTION ABATEMENT
- surface water cleanup
- ground water cleanup
- storm water, rain water runoff cleanup

SEPARATION PROCESSES
- diesel / water
- kerosene / water
- benzene / water
- machine oil / water
- animal fat / water
- immiscible organic chemicals / water



Only with the Water Wall® technology, we can accomplish the most accurate purification of water from oil (and thus the possibility to reuse water in the productive cycle) with the need to handle a simple and inexpensive system.

FENIX ANAEROBIC DIGESTION AND BIOGAS PURIFICATION TECHNOLOGIES FOR INDUSTRIAL, DOMESTIC AND MUNICIPAL APPLICATIONS

Economically viable technology for BIOGAS is available, mainly in Europe, U.S. and India. Biogas is an important renewable and sustainable energy source. Ever-increasing price and depleting reserves of fossil fuel make biogas an important alternative source of energy.

Any organic waste can be converted to give biogas by anaerobic digestion in a bioreactor. The process is also called BIOMETHANATION. Typically biogas is a 40-60 mixture of carbon dioxide and methane saturated with moisture.

Fenix® has agreement with M/s CSIR-IICT for the design and development of tailor made Biomethanation and Biogas purification systems.

RANGE OF ANAEROBIC TECHNOLOGIES OFFERED

Anaerobic Technologies for Industrial & Domestic Waste Waters

Fenix-Structured Media Anaerobic Digester (Fe-SMAD)

- Fe-SMAD is an attached growth media reactor.
- Structured PVC media houses the large number of bacterial colonies in small volume.
- This enables Fe-SMAD to give better performance at smaller HRT.
- Fe-SMAD can handle very high COD.

Salient features

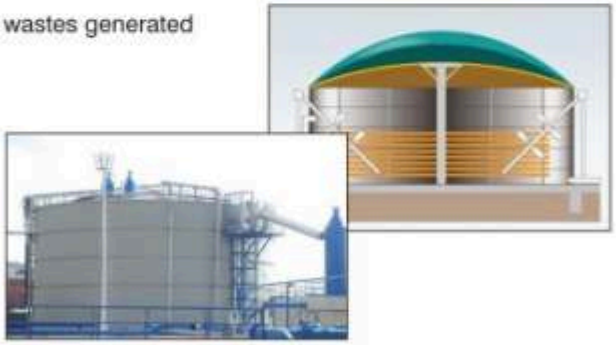
- Small foot prints.
- Self sustaining microbial growth.
- Equipped with structured media
- Specially designed to avoid clogging
- No moving parts inside the digester.
- No danger of short circuiting.
- Resistant to thermal and organic load shocks.
- Attractive payback period

Fenix-Stirred Anaerobic Digester (Fe-STAD)

Fe-SAD offers an economical system to treat the highly polluting wastes generated from distilleries, etc.

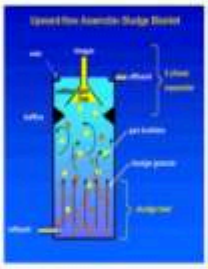
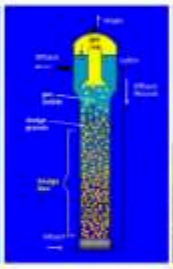
Salient features

- Down flow reactor
- Contains angled (Lateral) agitators for mixing
- Requires minimum foot print area
- Attractive payback period



Fenix-Upflow Anaerobic Sludge Blanket (Fe-UASB)

- Fe-UASB reactors designed to treat the low and moderately polluting wastes from various industrial segments.
- In built novel three phase separator
- It could be custom designed for sewage, low strength industrial wastewaters like dairies, breweries etc
- Available in different variants like EXPANDED GRANULE BED SLUDGE BLANKET RECTOR (EGSBR)
- INTERNAL CIRCULATION REACTOR (ICR)
- ANAEROBIC SEQUENCING BATCH REACTOR (ASBR)

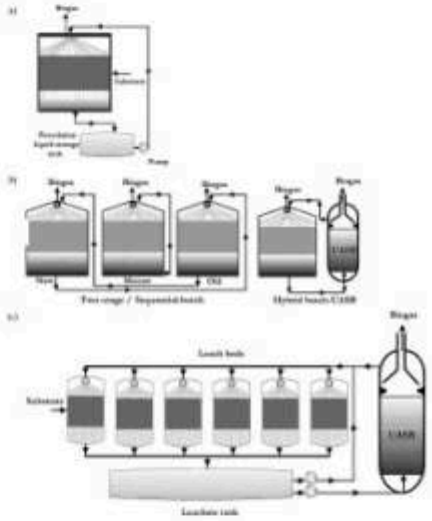



Anaerobic Technologies for Industrial & Domestic Organic Solid Waste

One-stage dry batch digester
- Stable system
- Low water requirement
- Less operational problems
- Suitable for grass and crops

Two-stage dry batch digesters
- Improved system
- Suitable for dry substrates
- Less water requirement
- Higher loading rates possible

Sequencing fed leach bed digesters coupled with UASB
- Modern system for the treatment of any type of solid
- Less HRT and high OLR in UASB
- It is a high rate biomethanation system with high gas yield



Anaerobic Rotating plug flow digester
- Digester rotates at low rpm
- Material moves automatically
- Material mixes well
- Excellent reduction of Volatile solids
- Suitable for any application

Anaerobic plug flow digester
- Material moves with screw feeder arrangement
- Material mixes well
- Excellent reduction of Volatile solids
- Suitable for any application

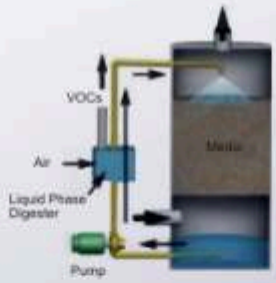
Bio-manure
- Biomethanation of solid waste generates bio-manure apart from biogas
- Bio-manure is highly valuable organic fertilizer
- Bio-manure is could be sold
- Bio-manure is better than inorganic fertilizer

Clean Environment: Controls VOCs & ODOUR

"For the first time in India Fenix™ has introduced BioClean™ Systems providing state-of-the-art solutions with performance assurance by offering a series of proven biological treatment systems for volatile organic chemicals (VOC) and odor control for the safe and effective destruction of a wide range of commonly used solvent contaminants and odoriferous compounds. Fenix has been successful in developing these four industrially important systems and introduce the technology in the Indian market through a collaborative research with premier Indian R&D organization.

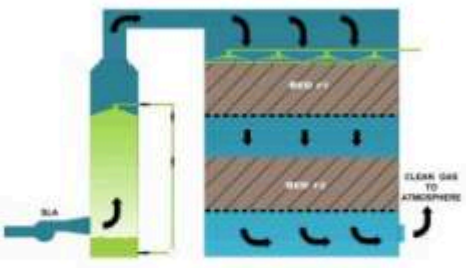
FXBioScrub™
Bioscrubber Technology

- Operational stability
- Good control of pH and nutrients
- Low pressure drops
- Addition of emulsifying agents (silicone oil, phthalate) help in better elimination of less soluble compounds



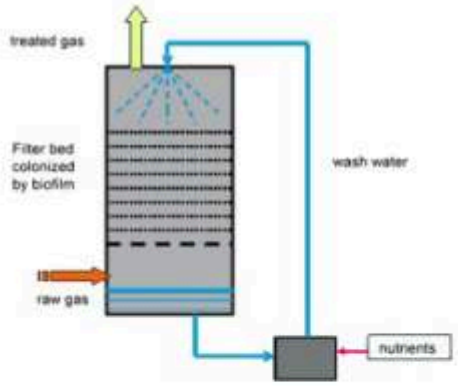
FXBioFilter™
Biofilter Technology

- Low investment & operational costs
- Convenient disposal of biodegradable components
- Low pressure drop and Less effluent water
- Little waste material (only replace filter material)
- Wide range of compounds can be treated



FXBioTrickle™
Biotrickling Filter

- Recirculation of liquid continuously
- Recirculating liquid controls
  - pH
  - Concentration of nutrients
  - Metabolic end-products
- Synthetic packing material provides surface for biofilm attachment



Pilot systems

- Operation of tailor made pilot plant
- Demonstration of Technology and process guarantees
- Proof of concept at site
- Design, erection and commissioning of full scale plant

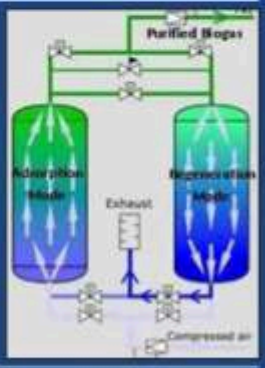
BIOGAS PURIFICATION TECHNOLOGIES OFFERED

Water Scrubbing

- Purification of biogas with water
- Desired methane content from 80 to 99% with pressure regulation
- Water can be recycled
- Option of stripping CO2 from water
- Complete removal of H2S, NH3, CO2 & moisture
- Compression of methane to make Bio-CNG

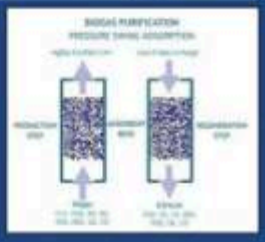
Chemical Scrubbing

- Caustic scrubbing
- Amine scrubbing
- Addition of glycols for arresting foam as per the requirement
- Complete removal of H2S, NH3, CO2 & moisture
- Compression of methane to make Bio-CNG



PRESSURE SWING ADSORPTION

- Highly purified methane
- Option of separation of CO2 for additional revenue
- Complete removal of H2S, NH3, CO2 & moisture
- Compression of methane to make Bio-CNG



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