IBTech Mexico

CURRICULUM VITAE

Content

IBTech® is a 100% Mexican company with more than 22 years of experience, dedicated to the diagnosis, design, construction, start-up and operation of water treatment plants, as well as biogas generation plants and energy from biomass.

About us

Foundation

IBTech® was founded in 1995 with the participation of the private sector and researchers specialized in environmental technologies from the UNAM, an internationally recognized institution, with which is still holding collaboration until today, providing postgraduate workforce.

What we do?

IBTech® is a 100% Mexican company dedicated to the diagnosis, design, construction, and operation of water plants and wastewater treatment, as well as biogas generation plants and energy from biomass. The fundamental aim of the company is maintaining a leadership position in the market, especially in Latin America, through the application of advanced biotechnology concepts, engineering processes and all disciplines involved in the detail engineering, with innovative and efficient solutions but mainly sustainable in the social context of Latin America.

Mission

Promote and implement sustainable technical solutions in line with the needs and requirements of our clients.

Visión

To become a respected, recommended and a worldwide recognized company in the provision of services related to the treatment and sustainable use of water and biodegradable solid waste, even for the generation of renewable energy.

Clúster de biogás (CEMIE-Bio)

The Mexican Center for Innovation in Energy, CEMIE-BIO is a cluster made up of higher education units, CONACYT centers and companies linked to the most prestigious energy production and with the most experience in the area of biofuels. The aim is for cluster participants to cover the entire value chain, from the laboratory to the end users.

The CEMIE-Bio is made up of five clusters: solid biofuels, bioalcohol, biodiesel, biogas and bioturbosin. The objective is to carry out advanced research, technological development and innovation, as well as the use of waste for the decentralized production of energy from biomass in Mexico. With the CEMIE-Bio it is intended to achieve that 5% of the electricity generated in 2027 is from methane and hydrogen derived from the residual biomass. This would contribute to the efforts that are being made to reach the goal imposed by the government, which is that by 2027, 30% of the energy produced in Mexico will be generated based on renewable energies

As a member of the CEMIE-BIO Cluster, IBTech® collaborates in the following areas:

a. The construction and operation of biogas generation plants and use of biomass for power generation at pilot scale.

b. As intermediate stage or preliminary definition, the technical assistance in everything related to the generation of specifications of electromechanical equipment, instrumentation and control systems that have application on a pilot scale and even on a real scale, related to the generation of biogas and its later use for power generation, even scaling up to the completion of basic engineering projects with some detailed engineering elements that allow making estimates of investment or economic feasibility, at an order of magnitude.

c. Eventually, and if necessary, the development of complete engineering projects that can lead to a real-scale application of the results of the applied research that is generated by the academic participants of the cluster. That is to say, the elaboration of executive (constructive) projects, including their technical-economic feasibility analysis with a higher level of precision, for the real-time implementation of the technological developments generated by the cluster.

Principle declaration

The quality policy of IBTech® supports the following principles:

1. Comply with current environmental regulations.
2. Respect each signed contract.
3. Encourage innovation and creative work.
4. Offer the process that fits the best with client's needs
5. Commitments to specify processes or equipment that only suit a supplier or brand and not the end customer are unacceptable
6. Maintain customers relationships within an atmosphere of trust, respect, cordiality and honesty.
7. Always encourage teamwork.
8. Achieve sustained growth year after year regarding the number of projects executed, as well as the level of innovation and challenge in them.

Presence in Latin America

IBTech® has competitively entered in the Mexican market as well as in several Latin American countries: Argentina, Chile, Colombia, Costa Rica, Ecuador, Honduras, Nicaragua and Peru.

Services

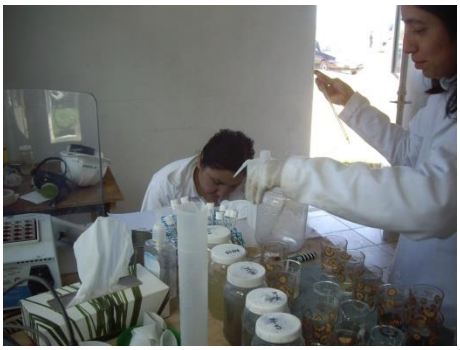
Consulting

IBTech® has the capability, experience and tools to provide consulting services that allow the customer to take better decisions. For example, in the suggestion of the most appropriate process in the construction of a WWTP or in the proposal of necessary adjustments and upgrades in operating plants.

Technical advice and diagnosis

Technical advice is provided in everything related to the start-up of wastewater treatment plants, water conditioning plants, biological treatment systems of malodorous atmospheres, as well as treatment and management of biogas.

In addition, IBTech® also performs technical diagnosis in wastewater treatment processes with operational deficiencies that do not fulfill the objectives under which they were conceived. Based on the diagnosis, the client is offered with the best alternatives for improvement or adjustments to the process.



Integral Sanitation Schemes

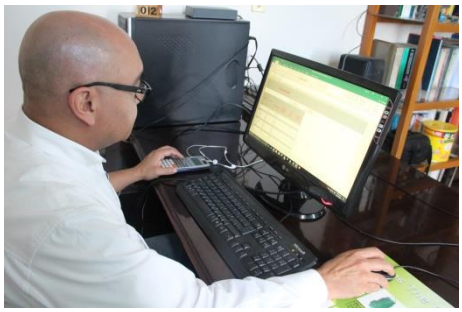
IBTech® also has experience in the development of integral schemes for the sanitation of watersheds and cities, offering technical-economic solutions to solve the problem at hand.

Technical-economic evaluation of projects

Support is offered to the client in decision-making to thoroughly evaluate the investment of a water, sludge and/or biogas project and determine its viability at a certain time. As well as, the analysis of the technical and economic factors that could affect its viability positively or negatively.

Process Simulation

IBTech® engineers use calculation memories, process simulators and data analysis to establish the operating conditions that must be controlled to optimize the process.



Projects

The company has properly trained staff to develop studies, engineering and field work required to install new modulated plants (or expand the actual ones) to increase their capacity in the future if necessary.

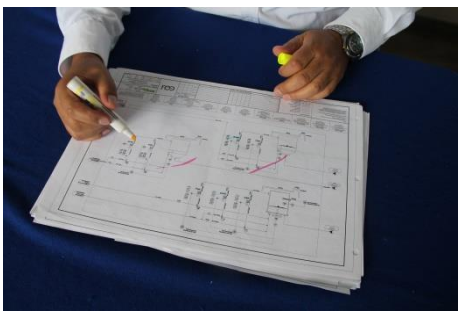
"Turnkey" Projects

IBTech® is qualified to accomplish a complete project, since the wastewater characterization, until the delivery of a stable-operating plant. The "Turnkey" projects include: basic engineering, detail engineering, equipment supply, civil works, electromechanical construction and assembly, pre-operational tests and finally, the start-up of the system. Under this modality, resources are optimized, allowing our clients to delegate the tasks inherent to the execution of the project, while actively participating.

Engineering

Executive projects (engineering only))

If the client decides to assume the tasks of procurement and construction, IBTech® can execute only some aspects of the project such as basic and detailed engineering. However, it is highly recommended that IBTech® carries out the start-up and supervision of the project, especially in anaerobic processes.



On field

Supervision of the work and commissioning

It is company policy to put into operation treatment systems under IBTech®s design, particularly in the case of anaerobic biological treatment, as it is the best way to ensure its correct operation in an optimal timeframe.

In addition, the company offers services for the biological (aerobic or anaerobic) plants commissioning, as well as operation and routine maintenance services of any WWTP.

Opertion of plants

IBTech® is an expert in problem solving related to the operation and stabilization of any kind of wastewater treatment plants, whether it is physicochemical or biological (aerobic and anaerobic). In any case, the company will always fulfill the water quality established in the legislation or the one which was internally established by the client.

Likewise, the company also offers advice and monitoring services for the operation of treatment plants.

Rehabilitation of existing plants

Any necessary work can be done to rehabilitate, modernize or increase the capacity of already built plants, regardless of the process for which they were designed.


Pilot plants

IBTech® has extensive experience in designing and operating pilot plants, which reduce the risk associated with the construction of large-scale plants, if they have been designed and operated properly. The decision to install a pilot plant to experiment with different design and/or operating conditions must meet, preferably, the following requirements:

a) Be a manageable and operable installation to carry out tests with ease, without the complexity and cost of an actual installation and without the simplicity of laboratory experiments.
b) Be a flexible installation.
c) Be a lasting installation.
d) Be a reliable installation.
e) Be a representative installation of the kinetic, mass and energy transfer and hydraulic conditions of the real installations
f) Be a movable and easily transportable installation
g) That its design allows to save time in the data and results acquisition
h) That its design allows to minimize the risk of failure in the operation of the plant.


Training

Promoting sustainable technical solutions is part of IBTech®s mission; so for the company, training is a key activity in order to disseminate and generate skills in companies, water operator agencies and independent consultants on foundations, concepts, case studies, design, applications and/or laboratory techniques used on wastewater treatment, water conditioning for first use and biogas utilization. The above, oriented to the design and operation of physicochemical, anaerobic, aerobic biological and for nutrients removal systems as well as the process control elements.

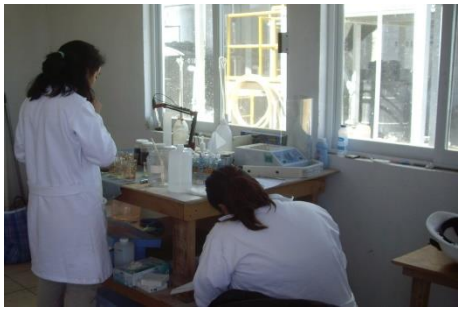
For more information visit the page www.ibtech.com.mx/capacitación

Others

Water characterization

The sampling, laboratory and analysis of results services are essential for the commissioning and monitoring of wastewater treatment and biogas conditioning plants. IBTech® can support in the implementation of characterization campaigns that include specialized laboratory analysis such as:

- Physicochemical and microbiological analysis
- Test of methanogenic activity in sludges
- Toxicity tests
- Tests for the treatability and biodegradability of liquid effluents, by physicochemical, aerobic or anaerobic.
- Laboratory-level tests.



Supply of granular anaerobic sludge

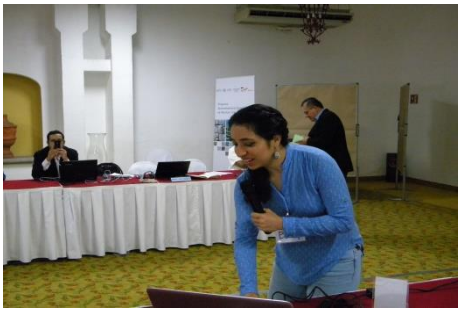
Having an inoculum of granular anaerobic sludge in excellent conditions with high methanogenic activity is essential to start efficiently reactors UASB, EGSB or other anaerobic systems. IBTech® can handle the transport, supply and loading to the biological reactor of the sludge and even the start-up of the biological reactor.

Training

Promoting sustainable technical solutions is part of IBTech® mission; so for the company, training is a key activity in order to disseminate and generate skills in companies, water operator agencies and independent consultants on foundations, concepts, case studies, design, applications and/or laboratory techniques used on wastewater treatment, water conditioning for first use and biogas utilization. The above, oriented to the design and operation of physicochemical, anaerobic, aerobic biological and for nutrients removal systems as well as the process control elements. All the necessary teaching material is provided.

The company is adapting to the needs of the client. The courses can be:

- Full diplomas (180hrs) or just some modules of them (short courses)
- They can be face-to-face or online
- The issued certificate can have official validity if requested



Training topics

The IBTech® courses may fit the profile of the participants, whether operators, plant managers, designers, officials or recent graduates. The subjects taught are the following:

General water treatmen

- Basic concepts of water
- Introduction to the wastewater treatment
- Hydraulic and thermodynamics
- Pumping and energy efficiency
- Unit operations for wastewater treatment
- Stabilization and management of sewage sludge
- Integration of treatment plants
- Technical-economic evaluation of projects
- Sanitation of river basins and natural systems built
- Life cycle analysis applied to wastewater treatment

Anaeobic treatment of wastewater and solid waste with use of biogas

- Anaerobic wastewater treatment
- Anaerobic digesters for sludge, solid agricultural residues and OFMSW
- Management, storage, safety and disposal of biogas
- Gas treatment for energy use

Aerobic treatment of wastewater and sludge with nutrient removal

- Aerobic processes for wastewater treatment with nutrient removal
- Compact technologies for wastewater treatment
- Mathematical modeling of biological processes
- Aerobic digestion

Water treatment for first use (human consumption or industrial use)

- Water treatment for human consumption
- Water treatment for industrial use and reuse

Diplomas and courses with official validity

The National Association of Water and Sanitation Companies (ANEAS in Spanish) is launching a series of courses and diplomas in conjunction with prestigious and worldwide-recognized universities and research institutes, such as the National Autonomous University of Mexico (UNAM) and the National Polytechnic Institute (IPN). In order that training is the most practical, useful and grounded to the real needs of the operating agencies, these diplomas have been importantly supplemented by IBTech®:

In classromm or On-line (180 hrs)
Aerobic treatment

In classroom or On-line (120hrs each one)
Aerobic/anaerobic treatment

CONOCER/SEP Certifications

IBTech® offers trainings that meet the guidelines of CONOCER (SEP), as our instructors are certified under the competency standards of the SEP for teaching and design of courses (EC 217 and EC 301 respectively). Diplomas offered by this company are scarce in the market as they are taught by full-time trainers; our instructors are experts in wastewater treatment with practical experience in the field and before groups of research and postgraduate studies at UNAM.

Experience

In addition to the training provided when delivering the installed plants so that the client can operate them correctly, at the customer´s request, IBTech® has provided specific courses for staff of:

- Private companies

- Institutions and guilds

Certifications

What are the competitive standards (EC)?

The competitive standards (EC in Spanish) are the definitions of the knowledge, skills, abilities and attitudes required for a person to perform any productive, social or government activity with a high performance level, which are defined by the sector. The competitive standards that have been developed in the country are registered within the National System of competences that promotes the National Council for Standardization and Certification of Labor Competencies (CONOCER).

The CONOCER is a parastatal entity sectorized in the Secretariat of Public Education with a tripartite government body, which is chaired by the Secretary of Public Education and also has the participation of the Secretariats of Labor, Economy, among others by the federal government, as well as various business and labor councils such as CCE, COPARMEX, CONCAMIN, CROC, CTM and Labor Congress.

CE in which we are certified

IBTech® offers trainings that meet the guidelines of CONOCER (SEP), as our instructors are certified under the competitive standards for the design and teaching of courses (CE0301 and CE0217 respectively) by the SEP.

EC0301

"Design of training courses of human capital in group on site, their evaluation instruments and Course Manuals"

Brief description:
It refers to all the activities that a person carries out during the design of human-capital training courses; the courses are designed to be held on site. The following activities are carried out: preparation of the descriptive sheet, selection of instructional techniques, design of evaluation instruments for face-to-face training courses, as well as design of instruments to evaluate the satisfaction of the course, development of participant and instructor manuals.

EC0217

"Teaching courses on human-capital formation in group on site"

Brief description:
The competition standard "Teaching of courses on human-capital formation face-to-face in group provides the substantive functions of preparing, conducting and evaluating training courses". The next activities should be carried out: session planning, checking the existence and operation of the required resources, leading the session by realizing the frame, the development and the closure of the course. For the above, instructional and group techniques are carried out to facilitate learning. Further, the evaluation of the learning before and during the end of the course must be done.

EC that we have developed

The Program "Use of Urban Waste in Mexico (EnRes)" running the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German Development Cooperation/GIZ) in collaboration with the Secretariat of Environment and Natural Resources (SEMARNAT) and the Secretariat of Energy (SENER) as counterparts, is driving the development of standards of competence related to the biogas sector within the framework of the current Competency Management Committee of Renewable Energy and Energy Efficiency.

To develop a standard of competence, the Committee of Competence Management is supported by technical expert groups. Given the experience and profile of IBTech® in the biogas sector in the country, our engineers are participating in the development of the competitive standards of the Biogas Sector in Mexico, which do not have precedents in the country and is expected to promote and develop the capabilities of the guild.

Competitive standard 1 biogas (in preparation)

Name: "**Review of projects for the generation of biogas from biomass**"
Profile: People linked to the specification, design, development and/or revision of engineering projects of generation plants, handling and/or use of biogas.

Competitive standard 2 biogas (in preparation)

Name: "**Physical operation of systems for the generation of biogas for use**"
Profile: Operators, heads of operation of plants with generation and/or management of biogas (from different substrates).

Soon available to the public

Technologies

High rate anaerobic processes

Upflow Anaerobic Sludge Blanket (UASB)

The UASB reactor (Upflow Anaerobic Sludge Blanket) has been used extensively in Europe, Asia and Latin America, especially in Brazil. In Mexico, there are 20 plants for industrial water treatment; likewise, there are 14 municipal and domestic plants that use UASB reactor with our technology.

Due to metabolism of the microorganisms involved, anaerobic processes do not demand oxygen (electrical consumption for aeration is not requirred). Besides, the smallest amount of sludge (solid waste) is generated in a water treatment system, and a by-product with high added value is obtained: biogas, capable of being taken advantage of.

The UASB is particularly suitable for treating industrial wastewater with high concentration of biodegradable organic matter; however, it can also be applied in diluted wastewater, as municipal effluents. Among the diverse anaerobic technologies for wastewater treatment, the UASB reactor has the highest acceptance due to the lower investment costs and its compact facilities.

Upflow Anaerobic Sludge Blanket -Packed (UASBP)

It has the same principle as the UASB reactor; however, it includes a packing bed above the sludge bed to have an UASB operation with greater organic load. It is particularly suitable for treating water with a high content of suspended biodegradable solids.

Expanded Granular Sludge Bed reactor (EGSB)

The EGSB reactor represents a modification in the design of a UASB reactor, so that by promoting better mass transfer the same amount of contaminant can be treated in a very small volume.

With IBTech®'s technology, the EGSB reactor has a slim figure because the tank has a height of at least 10 meters which occupies a very small area (small footprint). The reactor is capable of operating with higher volumetric organic loads up to 20 kgDQO/m3/d.

This reactor is characterized by the generation of exclusively granular sludge with very high sedimentability. This allows the biomass to be retained although the water velocity and the upward flow of the biogas are considerably high. The secret of IBTech®´s design is the phase separator which is located on the top of the reactor; the patent is in process.

Conventional anaerobic processes

Anaerobic Lagoon

Anaerobic lagoons are often used to treat wastewater with a high content of organic matter, usually wastewater from industries located in remote rural areas. These lagoons are, generally, covered with a floating geomembrane to improve anaerobic digestion. It also allows the reduction of odor from anaerobic activity and the collection of methane gas to be used as fuel.

These lagoons can treat wastewater with a BOD concentration of 400 to 5 000 kg/m3, the effluent can have a BOD reduction greater than 90%. The retention time is 4 to 20 days. Mechanical action is required only at the beginning to supply residual water to the lagoon and, in addition, the overflow of water is allowed.

EGSB Aerobic reactor

UASB Anaerobic reactors

Anaerobic lagoon

Aerobic/anoxic processes

Conventional system

Activated Sludge (AS)

The Activated Sludge technology is one of the most worldwide spread since 1914 when it was developed. It is used for the treatment of both industrial and municipal effluents.

The process consists of an aereation tank with complete and continuous mixing provided by diffusers or mechanical aerators. The "sludge" (biomass) feed and grow from the organic matter of residual water. The sludge grows in the form of clots that settle when passing through a secondary clarifier.

The clarified water overflows on the top of the tank, while the concentrated biomass is recirculated back to the aereation tank or it's sent to the sludge treatment system.

Systems for nutrients removal

Activated sludge for the removal of nitrogen and/or phosphorus

Its configuration is like a conventional activated sludge process, but with an anaerobic and/or anoxic selector prior to aeration tank.

This system is used when it is necessary to remove not only organic matter but also residual water nutrients, such as nitrogen and/or phosphorus. The microorganisms are developed and adapted to achieve the biological removal of nutrients.

The nutrient removal of residual water is required when the treated water will be discharged into water bodies, this is to avoid eutrophication in rivers, lakes or the sea.

The Modified Luzdack Ettinger (MLE) is a widely used configuration to remove nitrogen. However, apart from this, IBTech® evaluates different types of configurations depending on the characterization of the water influent and the required quality of the effluent.

Anaerobic- Anoxic- Aerobic System (Triple A)

This process is designed for the elimination not only of organic pollutants, but also of ammoniacal nitrogen in a small space.

The system is formed by three modules: an UASB reactor, a denitrification upflow sludge bed reactor (anoxic), and a nitrification attached growth reactor (submerged filter). Also, there is a recirculation stream from the nitrification reactor to the denitrification one. At the denitrification reactor, the oxidized nitrogen is transformed into molecular nitrogen (N2) which is harmless to the environment, and is vented to the atmosphere, thus its removal from the water.

Sequencing Batch Reactor (SBR)

The Sequencing Batch Reactor is a system that operates in stages. In each stage, a different process is carried out that together removes organic matter, as well as other pollutants such as nitrogen and phosphorus. Furthermore, this reactor has the advantage that everything happens in the same tank, including sedimentation, which represents a considerable saving in space.

The operating stages of the SBR reactors are:

1. Filling stage in which occurs the denitrification process (anoxic stage);
2. Reaction stage in which the degradation of soluble organic pollutants as well as nitrification of ammoniacal nitrogen are carried out;
3. Sedimentation step in which oil is separated from the biomass of the treated water; and finally
4. Decanting stage in which the clarified water is discharged, excess of sludge is purged, and biomass is retained for the next batch.
5. Dead Time, which is an additional stage which serves to prevent deviations or variations to the process by giving a certain margin of maneuver.
6. The treatment cycle is repeated

The reactor has control mechanisms that allow constant online monitoring and with historical record of events. This allows the user to make quick (preventive and corrective) decisions and have total control of the process.

Biofilm reactors

Submerged Aerated Filter (SAF)

The Submerged Aerated Filter consists of a packed tank with an inert and resistant material, which provides the area for the adherence of the microorganisms (fixed biomass) responsible for the degradation of the organic matter contained in the wastewater. The oxygen is incorporated into the water through air diffusers placed at the bottom of the tank.

The microorganisms adhered in the packing stabilize the organic matter while the residual water comes in contact with it.

- The biofilm can remove nitrogen because it favors the growth of long-term generation bacteria such as nitrifying bacteria.
- A spread spectrum of pollutant removal can be carried out due to the existence of more species of organisms compared to the suspended biomass processes.
- Treatment capacity per volume unit is larger than in processes of suspended biomass, what makes it a compact system.

Trickling Filter (TF)

The Trickling Filter or biofilter is a process widely used for the wastewater treatment. The biological filter is a process designed to put the wastewater in contact with the biomass adhered to a fixed support medium, which constitutes a bed of biological oxidation.

The objective of a trickling filter is to reduce the organic load existing in domestic or industrial sewage. It consists of a natural or synthetic bed above which the wastewater is applied and where the microorganisms grow as a biofilm or bed.

The organic matter present in the wastewater is absorbed and decomposed by the biomass attached to the filter medium.

Each filter has a bottom drain system to collect the treated wastewater and biosolids that emerge from the medium.

Moving Bed Biofilm Reactor (MBBR)

The Moving Bed Biofilm Reactor has the same principle as the Submerged Aerated Filter or the Trickling Filter as to the type of microorganisms that grow in the tank (those that form a biofilm on a support medium). The difference is that, in this case, the support is a set of carriers that move freely in the aeration or anoxic tank. The MBBR is used when the wastewater does not have a very high concentration of pollutants but requires a high quality of treated water and there is a strong restriction of space.

Membrane reactors

Membrane Biological Reactors (MBR)

The Membrane Biological Reactors have the same principle as conventional activated sludge systems. However, the sludge is separated by the water filtration in membranes, instead of being separated by a settler as in the activated sludge process. This allows a significantly more efficient liquid-sludge separation.

The MB reactors are recommended when there is a strong space limitation and, the treated water quality is highly strict because of its utilization in direct-contact activities with humans.

Sequencing Batch Reactor (SBR)

Interior of aerobic reactor

Sequencing Batch Reactor (SBR)

Sequencing Batch Reactor (SBR)

Small and medium scale systems

Microplant for house room

The microplant has a prefabricated package-type arrangement and it is designed to treat small wastewater flows. Can be used at homes, offices, buildings, toll highways, etc.

The plant consists of an anaerobic filter and a sequence of submerged aerated filters that together accomplish the removal of organic matter and nitrogen from water. This combination of systems allows treating domestic wastewater with variations in flow, concentration and types of contaminants, aspects that make a difficulty treatment through conventional biological processes.

The unique necessary equipment with moving parts is a silent 60 kW compressor that provides the required oxygen to degrade organic matter, nitrify and execute internal recirculation of water.

In this way, the treated water has a quality that can be reused for irrigation of green areas, floor washing, ornamental fountains, car wash, etc.

Package Plant for domestic water with a capacity of up to 100 m3/d (IBPak®).

The package plants are designed to treat small and medium flows. They have the same processes required in conventional treatments (Pre-treatment, biological process, disinfection and filtration) with the advantage of a compact, modular and prefabricated design, which allows an easy installation.

They are adaptable to user requirements, have reliable and robust mechanical equipment that require minimum maintenance and sludge disposal; also, smells or noise are not generated. Besides, they can be installed in houses and housing developments, sports clubs ang gyms, small businesses and stores, medium industry, as well as medium-capacity hospitals and hotels.

The treated water complies with the norm NOM-003-SEMARNAT-1997, so it can be used for irrigations of green areas, unloading in toilets, washing of cars and streets, ornamental fountains, fire protection systems and soil infiltration.

Version	*Treatment capacity (m^3/d)*	*Average population served*	*Number of houses*
IB-PAK 5	5	29	6
IB-PAK 15	15	88	18
IB-PAK 30	30	176	35
IB-PAK 50	50	294	59
IB-PAK 100	100	588	118

Wetlands

A wetland consists of a low-rise tank that is packed with gravel and rock, in which plants are sowed. The wastewater flows in a sub-surface way.

The pollutans are removed by the joint action of several physicochemical, biological and microbiological processes used in conventional wastewater treatment plants (sedimentation, filtration, ion exchange, chemical oxidation and reduction, conversion and biological degradation, etc.) or by the plant kingdom organisms that specifically perform the removal (photosynthesis, photo-oxidation, incorporation of matter and nutrients, etc.).

The root bed systems are environmentally friendly, they do not present fly problems or bad odors, the construction is simple, and the operation does not require mechanical or electrical equipment, they have a large buffer capacity that supports a wide range of operating conditions and wastewater composition, operating and maintenance costs are almost zero and, additionally, the effluent quality can comply with NOM-003-SEMARNAT-1997.

Package Plant for domestic water with a capacity of up to 100 m3/d (IBPak®)

Wetland

Microplant for house room

Interior of microplant for house room

Solid waste and sewage sludge

Anaerobic digester sludge

Anaerobic digestion is one of the older processes used for sludge stabilization. In this process, the decomposition of organic and inorganic matter occurs in the absence of molecular oxygen.

In anaerobic digestion, the organic matter contained in the mixture of primary and secondary sludge is converted biologically (under anerobic conditions) into methane (CH4) and carbon dioxide (CO2). The digestion is carried out in mesophilic (35°C) and thermophilic conditions (55°C).

The process is performed in a fully closed reactor; the sludge is introduced continuously or intermittently and is retained in it for variable periods of time.

The stabilized sludge that is continuously and intermittently extracted is not putrescible and its content in pathogenic organisms is low.

Currently, there are two types of digesters: low and high load. In the process of low-load digestion, the content of the digester in not heated or mixed, generally. The retention time varies between 30 and 60 days.

On the other hand, in the high-load digestion, the content of the digester is heated and completely mixed. The required retention time is 15 days or less.

The main applications of the anaerobic digestion are still being the stabilization of concentrated sludge produced in wastewater treatment and of certain industrial waste. However, it has recently been demonstrated, that diluted inorganic waste can be treated anaerobically.

Anaerobic Digester of urban solid waste

Since the last century the demand for energy has been increasing due to the progress and excessive demand of resources by humanity. For this reason, alternatives for obtaining energy have been searched like anaerobic digestion of solid waste (DARSO). Likewise, due to the great problem that countries face due to the disposal of solid waste, alternatives have been sought to accelerate its processes of degradation and stabilization and thus reduce environmental risks.

Anaerobic digestion is a process that takes place naturally at solid waste disposal sites. However, it is a slow process, therefore, anaerobic digesters are necessary to allow the loading and unloading of materials, as well as having a device for the collection of the gas produced, which can be stored in a gasometer to be used or burned in an incinerator.

The main characteristic of a digester is its size, which is determined by three independent variables, 1) concentration of unpleasant solids, 2) feed rate of solids and 3) Retention time of the solids in the digester.

Urban solid waste

Solid waste

Gases

Treatment and use of biogas

Projects oriented to the generation of energy using anaerobic digesters with generation, cleaning and safe use of biogas are offered.

Biogas, which is a product of the anaerobic degradation of the organic matter of wastewater, is an effective source of alternative energy. Before being used, biogas must be treated to remove particles of solids, moisture, H2S and even CO2 (depending on the case). Biogas can be used to generate electricity and/or heat.

IBTech® has its own technology for the integration of biogas cleaning and reuse systems based on biological and/or physicochemical processes.

Compost biofilter for odor control

The generation of odors is one of the main problems associated with wastewater treatment plants and in some cases, is decisive to close or prevent their installation.

The source of these odors is related to the generation and treatment of solid waste as biological or chemical sludge, likewise to the wastewater handling itself and to the degradation of the organic matter inside the plant, so that it is difficult to avoid their generation.

There are several methods for odor control. One of the most efficient and cost-effective is the compost biofilter, which is based on the interaction gas-organic medium. The organisms that live and develop in the biofilter degrade bad odors.

The main component of the biofilter is the biological filter media (mixture of natural materials), which has the necessary surface to carry out the absorption and adsorption of odor-causing compounds. The bad odors and the nutrients of the media will propitiate the growth of a biofilm, which as it develops and by effect of its metabolic activity will leave the gas free from bad odors.

Scrubber

The scrubber is used to remove contaminants from gaseous emissions. For this, contaminated gas is introduced through the lower part of the column and circulated towards the upper part. On the other hand, the washing liquid is introduced at the upper part and it is distributed over the column to absorb the contaminants and thus wash the contaminated gas.

To carry out the above, the column has a packing where chemical reactions occur. In other words, it is where the contaminated gas receives treatment and pollutans are removed. The purpose of the packing is to ensure a large contact area to allow a high rate matter transfer while maintaining a minimum pressure loss and fouling.

Packing selection depends on several factors, both technical and economical in which the best price/performance ratio is desired

The packing should be selected for a particular fluid, gas load and elimination rate desired. In addition, the packing height should be carefully calculated based on the treatment goal.

The packing material can be ordered or random; besides, it can be plastic, metal or ceramic.

The gas scrubber has several applications, among which are:

- Odor reduction
- Elimination of hydrogen sulfide (H2S)
- Elimination of toxic gases
- Elimination of ammonia (NH3)

System for washing biogas

Scrubber and compost biofilter for odor control

Biogas burner

System for atmospheric treatment

Clients

Thanks to the good development of our projects we have had the satisfaction of working for several clients, both national and foreign: in food, chemical and pharmaceutical industry, as well as in urban developments, municipalities, government agencies, vacation centers, restaurants, toll booths, among others; always proposing the best option and adapting to the demands of the market, fully meeting the expectation of quality of our customers.

IBTech® has dabbled in a competitive way, both in Mexico and in several countries in Latin America: Argentina, Chile, Colombia, Costa Rica, Ecuador, Honduras, Nicaragua and Peru.

¿Qué residuos tratamos?

- Agua residual municipal
- Agua residual industrial
- Residuos sólidos
- Gases

¿Qué tipo de proyectos podemos realizar?

- Consultoría
- Proyecto ejecutivo
- Proyecto llave en mano
- Operación
- Rehabilitación y/o ampliación de plantas
- Plantas piloto
- Microplantas
- Cooperación

¿Qué tipo de tecnología ofrecemos?

- Procesos anaerobios de alta tasa
- Procesos anaerobios convencionales
- Procesos aerobios/anóxicos
- Sistemas para pequeña y mediana escala
- Procesos para residuos sólidos y lodos
- Procesos para gases

¿Dónde hemos realizado proyectos?

- México
- Chile
- Colombia
- Argentina
- Costa Rica
- Ecuador
- Honduras
- Nicarágua
- Perú

¿Quiénes han sido nuestros clientes?

- Industria

- Gobierno

- Academia

- Cooperación interna

NO	CLIENT	ACTIVITY	LOCATION	YEAR	DESCRIPTION
1	Grupo Industrial Bimbo (Ricolino)	Baking/confectionery	San Luis Potosí, Mexico	1997	Turnkey project/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
2	Tereftalatos Mexicanos (Grupo Petrotemex)	Chemicals	Veracruz, Mexico	1997	Engineering/ Installation&Start-up superv./ Industrial ww/ Anaerobic lagoon/
3	Quechultenango	Municipal water	Guerrero, Mexico	1997	Turnkey project/ Municipal ww/ UASB/ Biogas handling/
4	Colotlipa	Municipal water	Guerrero, Mexico	1997	Turnkey project/ Municipal ww/ UASB/ Biogas handling/
5	Compañía Cervecerías Unidas	Brewer	Temuco, Chile	1999	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
6	UNAM - Instituto de Ingeniería - Dirección General de Obras	University	Mexico City, Mexico	1999	Engineering/ Odours control/
7	Cervecería Cuauhtémoc Moctezuma	Brewer	Baja California Norte, Mexico	2001	Consultancy/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
8	Grupo Industrial Bimbo (Barcel)	Baking/fried foods	Durango, Mexico	2001	Turnkey project/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
9	Compañía Cervecerías Unidas	Brewer	Santa Fé, Argentina	2001	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Biogas handling/
10	Grupo FEMSA, Coca Cola de Mexico	Soft drinks	Chiapas, Mexico	2001	Consultancy/ Industrial ww/ Aerobic treatment/
11	Grupo FEMSA, Coca Cola de Mexico	Soft drinks	Estado de Mexico, Mexico	2001	Consultancy/ Industrial ww/ Aerobic treatment/
12	Grupo FEMSA, Coca Cola de Mexico	Soft drinks	Tabasco, Mexico	2001	Consultancy/ Industrial ww/ Aerobic treatment/
13	Boehringer Ingelheim Promeco	Pharmaceutical	Mexico City, Mexico	2002	Turnkey project/ Industrial ww/ Anaerobic lagoon/ Aerobic treatment/
14	Compañía Mexicana de Aguas	Municipal water	Estado de Mexico, Mexico	2002	Consultancy/ Municipal ww/ UASB/ Aerobic treatment/ Biogas handling/
15	Aguas Tratadas del Potosí	Municipal water	San Luis Potosí, Mexico	2002	Consultancy/ Municipal ww/ UASB/ Aerobic treatment/ Biogas handling/
16	Cervecería Cuauhtémoc Moctezuma	Brewer	Guadalajara, Mexico	2003	Turnkey project/ Upgrading and rehabilitation/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
17	Cervecería Cuauhtémoc Moctezuma	Brewer	Estado de Mexico, Mexico	2003	Consultancy/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
18	Laboratorios PISA	Pharmaceutical	Mexico City, Mexico	2003	Consultancy/ Installation&Start-up superv./ Industrial ww/ Aerobic treatment/
19	Comunidad Económica Europea	International cooperation	Mexico City, Mexico	2003	Consultancy/ Pilot Plant/ International Cooperation/ Industrial ww/ Anaerobic digester/ Aerobic treatment/
20	Casa-habitación en Valle de Bravo	Municipal water	Estado de Mexico, Mexico	2003	Turnkey project/ Micro-P16plant/ Municipal ww/ Aerobic treatment/ Odours control/
21	Sistema de Agua Potable y Alcantarillado de León	Municipal water	Guanajuato, Mexico	2004	Engineering/ Municipal ww/ Aerobic treatment/
22	Cervecería Leona	Brewer	Tacancipá, Colombia	2004	Consultancy/ Industrial ww/ UASB/ Biogas handling/
23	Gran Flamenco Xcaret	Tourism/municipal water	Quintana Roo, Mexico	2004-today	Turnkey project/ Operation/ Upgrading and rehabilitation/ Municipal ww/ Aerobic treatment/
24	Cervecería Cuauhtémoc Moctezuma	Brewer	Puebla, Mexico	2005	Turnkey project/ Upgrading and rehabilitation/ Industrial ww/ UASB/ Biogas handling/
25	Cervecería Cuauhtémoc Moctezuma	Brewer	Estado de Mexico, Mexico	2005	Consultancy/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/

NO	CLIENT	ACTIVITY	LOCATION	YEAR	DESCRIPTION
26	Frigorífico y Empacadora de Tabasco	Livestock	Tabasco, Mexico	2005	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
27	Casa-habitación en el Pedregal	Municipal water	Mexico City, Mexico	2005	Turnkey project/ Micro-P16plant/ Municipal ww/ Aerobic treatment/ Odours control/
28	Cervecería Cuauhtémoc Moctezuma	Brewer	Baja California Norte, Mexico	2006	Engineering/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
29	Buenaventura Grupo Pecuario	Livestock	Chiapas, Mexico	2006	Engineering/ Installation&Start-up superv./ Industrial ww/ Solid waste/ UASB/ Aerobic treatment/ Biogas handling/
30	Sistema de Agua Potable y Alcantarillado de León	Municipal water	Guanajuato, Mexico	2006	Engineering/ Industrial ww/ UASB/ Anaerobic digester/ Aerobic treatment/ Biogas handling/
31	Boehringer Ingelheim Promeco	Pharmaceutical	Mexico City, Mexico	2006-2009	Operation/ Industrial ww/ Anaerobic lagoon/ Aerobic treatment/
32	Hotel Allegro Cozumel	Tourism/municipal water	Quintana Roo, Mexico	2006-2013	Turnkey project/ Operation/ Upgrading and rehabilitation/ Municipal ww/ Aerobic treatment/
33	Roma Stronger	Municipal water	Veracruz, Mexico	2007	Engineering/ Municipal ww/ UASB/ Aerobic treatment/ Biogas handling/
34	FYPASA Construcciones	Water sanitation company	Guanajuato, Mexico	2007	Turnkey project/ Pilot Plant/ Industrial ww/ UASB/ Anaerobic digester/ Aerobic treatment/ Biogas handling/
35	Ingeniería y Equipos para Aguas S.A.	Water equipment supplier	Mexico	2007	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Biogas handling/
36	EcoRed S.A.	Consultancy for sustainable development	Mexico City, Mexico	2007	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Biogas handling/
37	Universidad Autónoma de Chapingo	Institution of higher education	Estado de Mexico, Mexico	2007	Engineering/ Municipal ww/ UASB/ Biogas handling/
38	Frigorífico y Empacadora de Tabasco	Livestock	Tabasco, Mexico	2007	Operation/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
39	Grupo Industrial Bimbo (Marinela)	Baking	Mexico City, Mexico	2008	Turnkey project/ Upgrading and rehabilitation/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
40	Probiomed S.A. de C.V.	Pharmaceutical	Estado de Mexico, Mexico	2008	Turnkey project/ Industrial ww/ EGSB/ Aerobic treatment/ Odours control/ Biogas handling/
41	Restaurante SUD 777	Restaurant	Mexico City, Mexico	2008	Turnkey project/ Municipal ww/ UASB/ Aerobic treatment/ Odours control/ Biogas handling/
42	Grupo Pepsico (a través de Veolia Water Mexico)	Soft drinks	Chiapas, Mexico	2008	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
43	Nestlé Querétaro	Food and beverage	Querétaro, Mexico	2008	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Biogas handling/
44	BEFESA CTA	Metal waste	Managua, Nicaragua	2008	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Biogas handling/
45	BEFESA CTA	Metal waste	Managua, Nicaragua	2008	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Biogas handling/
46	Comisión Europea para América Central PNUD	International cooperation	Tegucigalpa, Honduras	2008	Consultancy/ International Cooperation/ Municipal ww/ Anaerobic digester/ Biogas handling/
47	Sistema Ambiental Nacional	Water management	Mexico City, Mexico	2009	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Anaerobic digester/ Biogas handling/
48	Tequila Sauza/PTAR Tequila	Spirits idustry	Jalisco, Mexico	2009	Consultancy/ Industrial ww/ Anaerobic digester/ Aerobic treatment/
49	Industria Licorera de Caldas (Colombia) Licores y destilados	Liquor and spirits	Manizales, Colombia	2009	Consultancy/ Industrial ww/ Anaerobic digester/ Aerobic treatment/
50	SODES Mexico S.A. de C.V.	Dairy waste consultant	Hidalgo, Mexico	2009	Consultancy/ Industrial ww/ Solid waste/ UASB/ Anaerobic digester/ Biogas handling/

NO	CLIENT	ACTIVITY	LOCATION	YEAR	DESCRIPTION
51	Compañía Cervecerías Unidas	Brewer	Santiago, Chile	2010	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Odours control/ Biogas handling/
52	Bacardí	Liquor industry	Estado de Mexico, Mexico	2010	Consultancy/ Industrial ww/ Anaerobic digester/ Aerobic treatment/
53	LALA Aguascalientes	Dairy products	Aguascalientes, Mexico	2011	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Biogas handling/
54	Atlatec Grupo Mitsui	Water sanitation company	Querétaro, Mexico	2011	Consultancy/ Municipal ww/ Anaerobic digester/ Aerobic treatment/
55	Productora Nacional de Alimentos PRONACA	Food	Ecuador	2011	Consultancy/ Solid waste/ Anaerobic digester/ Aerobic treatment/
56	Schwager Energy (Chile)	Mining	Purranque, Chile	2011	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
57	Schwager Energy (Chile)	Mining	Puerto Octay, Chile	2011	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
58	Jugos del Valle	Beverages	Estado de Mexico, Mexico	2011	Turnkey project/ Micro-P16plant/ Municipal ww/ Aerobic treatment/
59	José Cuervo/PTAR Camichines licores y destilados	Liquor and spirits	Jalisco, Mexico	2012	Consultancy/ Industrial ww/ Anaerobic digester/ Aerobic treatment/
60	Polímeros y Derivados (León Guanajuato)	Chemical industry	Guanajuato, Mexico	2012	Consultancy/ Industrial ww/ Aerobic treatment/
61	Instituto de Ingeniería UNAM	University	Mexico City, Mexico	2012	Turnkey project/ Micro-P16plant/ Municipal ww/ Aerobic treatment/
62	Instituto de Ciencias del Mar y Limnología UNAM	University	Campeche, Mexico	2012	Turnkey project/ Micro-P16plant/ Municipal ww/ Aerobic treatment/
63	Grupo FEMSA, Coca Cola de Mexico	Soft drinks	Mexico City, Mexico	2013	Turnkey project/ Odours control/
64	LALA Aguascalientes	Dairy products	Aguascalientes, Mexico	2013	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/
65	Luz Ecológica de Juárez SELICSA	Organic waste collector	Chihuahua, Mexico	2013	Engineering/ Solid waste/ Anaerobic digester/ Aerobic treatment/
66	CONAGUA Subdirección General de Agua Potable, Drenaje y Saneamiento	Ministry of water management	Varias localidades de Mexico	2013	Consultancy/ Municipal ww/
67	Cervecería Cuauhtémoc Moctezuma / Heineken	Brewer	Puebla, Mexico	2014	Engineering/ Installation&Start-up superv./ Upgrading and rehabilitation/ Industrial ww/ UASB/ Aerobic treatment/ Biogas handling/
68	Cervecería Cuauhtémoc Moctezuma / Heineken	Brewer	Estado de Mexico, Mexico	2014	Engineering/ Installation&Start-up superv./ Upgrading and rehabilitation/ Industrial ww/ Aerobic treatment/
69	Grupo FEMSA, Coca Cola de Mexico	Soft drinks	Veracruz, Mexico	2014	Turnkey project/ Odours control/
70	Empaques Modernos San Pablo (Papelera)	Paper mill	Mexico City, Mexico	2014	Turnkey project/ Upgrading and rehabilitation/ Industrial ww/ UASB/ Aerobic treatment/ Odours control/ Biogas handling/
71	Tereftalatos Mexicanos (Grupo Petrotemex)	Chemicals	Veracruz, Mexico	2015	Consultancy/ Industrial ww/ UASB/ Biogas handling/
72	Vicunha Textil LTDA	Textile industry	Quito, Ecuador	2015	Engineering/ Installation&Start-up superv./ Upgrading and rehabilitation/ Industrial ww/ Aerobic treatment/ Odours control/
73	UNAM - FES Acatlán	Institution of higher education	Mexico City, Mexico	2015	Engineering/ Installation&Start-up superv./ Municipal ww/ UASB/ Aerobic treatment/ Odours control/ Biogas handling/
74	Tereftalatos Mexicanos (Grupo Petrotemex)	Chemicals	Veracruz, Mexico	2016	Consultancy/ Industrial ww/ UASB/ Biogas handling/

NO	CLIENT	ACTIVITY	LOCATION	YEAR	DESCRIPTION
75	Instituto de Ingeniería UNAM	University	Mexico City, Mexico	2016	Turnkey project/ Pilot Plant/ Biogas handling/
51	Compañía Cervecerías Unidas	Brewer	Santiago, Chile	2010	Engineering/ Installation&Start-up superv./ Industrial ww/ UASB/ Aerobic treatment/ Odours control/ Biogas handling/
76	Aquainnova S.A.	Consultant for solid waste	Hidalgo, Mexico	2016	Consultancy/ Solid waste/ Anaerobic digester/ Biogas handling/
77	Programa WaCCliM/Cooperación Alemana GIZ	International cooperation	Morelos, Mexico	2016	Consultancy/ International Cooperation/ Municipal ww/ UASB/ Biogas handling/
78	Programa EnRes/Cooperación Alemana GIZ (Akut Partner)	International cooperation	Mexico City, Mexico	2016	Consultancy/ International Cooperation/ Municipal ww/ Solid waste/ Anaerobic digester/ Biogas handling/
79	Tereftalatos Mexicanos (Grupo Petrotemex)	Chemicals	Veracruz, Mexico	2017	Consultancy/ Industrial ww/ UASB/ Biogas handling/
80	Secretaría de Marina - UNAM	Maritime administration	Mexico City, Mexico	2017	Turnkey project/ Pilot Plant/ Treatment of combustion gases/
81	Biogas Roadmap/ Agencia Danesa de Energía (COWI)	International cooperation	Varias localidades de Mexico	2017	Consultancy/ International Cooperation/ Solid waste/ UASB/ Anaerobic digester/ Biogas handling/
82	Aguas Tratadas del Valle de Mexico	Municipal water	Hidalgo, Mexico	2017	Turnkey project/ Sand of municipal ww/

Case study:

Buenaventura Livestock Group,

Chiapas, México. 2006.

In 2005, Buenaventura Livestock Group (BGP in spanish) had a WWTP whose capacity was insufficient to treat the wastewater of the poultry processor due to inadequate design.

In addition, there was a program to increase production and go from 75,000 to 150,000 slaughtered birds per day. Due to the above, the pressure to rise the wastewater treatment capacity increased.

On the other hand, BLG wanted to reuse the treated water to decrease the first-use water supply problem; likewise reduce the high cost of pumping that goes from a stream to the poultry processing plant.

Client problem

The wastewater discharged by the processing plant had a high concentration of polluting material:

- Thick solids
- Chemical Oxygen Demand (COD)
- Biochemical Oxygen Demand (BOD)
- Total Suspended Solids (TSS)
- Fats and oils
- Ammoniacal nitrogen

IBTech®'s solution

IBTech® proposed a physicochemical process to reduce the turbidity in first-use water coming from a stream. It consisted mainly of a clariflocculator tank and a high rate sedimentation tank.

For the wastewater treatment, IBTech® proposed a process, a high-level treatment, which involved purifying the treated wastewater. The stages of the process were integrated as follows:

- Pretreatment, screen and press for feathers, screen for viscera and fine screen
- Primary treatment, equalization tank and dissolved air flotation (DAF)
- Secondary biological treatment, UASB reactor (4 modules to have a flexible process), followed by two SBR reactors with control algorithm designed for water polishing and nutrient removal.
- Advanced tertiary treatment, using ozone system, sand and activated carbon filters and disinfection with sodium hypochlorite.

Results Once the project was completed, the following was achieved:

- Compliance with water quality requirements for discharge
- Contamination of soil and aquifers was avoided
- Sources of infection and proliferation of pests were avoided
- Potabilization of treated wastewater to be reused in carrying activities of blood, feathers and viscera of the processing plant, as well as for green-areas irrigation.
- Mitigation of water demand from the stream for washing floors and boxes.

UASB anaerobic reactors

Sequencing Batch Reactor (SBR)

Filtration system

Sludge decanter

Case study:

Compañía Cervecerías Unidas

Santiago, Chile. 2010.

The Chilean company producer of beverages "Compañía de Cerveceras Unidas (CCU)" decided to start its own project to build a wastewater treatment plant (WWTP) for its industrial effluents to avoid fines for the discharge of industrial water to the new municipal WWTP built by the Chilean government to clean up the Mapocho river.

Client problem

The plant had an ineffective system to treat its effluents, with the following problems:

- Manual screening of coarse solids, which had continuous obstruction of the grids.
- Neutralization and pH adjustment. It presented a poor pH control at high discharge flows.
- Submersible aerator for the mixing of the pumping pit, which presented deficient aeration causing bad odors and poor mixing.

IBTech®'s solution

The integral proposal included:

- Basic and detail engineering
- Procurement of equipment
- Automation of the WWTP
- Project Management
- Technical supervision of work
- Start-up

IBTech® considered the use of biogas, byproduct of the treatment, for energy saving in the factory. The biogas would be used to replace part of the natural gas in the boilers of the factory, thereby reducing the operating cost of the WWTP.

Resultados

Once the treatment plant was completely built and in operation, the quality of the treated water complied with Chilean regulations (DS 90).

During the development of this project, an important linkage with the Metropolitan Autonomous University, Unit Iztapalapa (UAM-I) was kept in order to develop the system of washing of biogas, as this institution is a pioneer in the field of flue gas desulfurization.

WWTP Compañías Cerveceras Unidas

Biogas washer system

Biogas washer system

Biogas burner

UASB anaerobic reactors

Case study:

LALA

Aguascalientes, México. 2011.

Client problem

The dairy company Grupo Lala (LALA) operates a factory in the state of Aguascalientes in Mexico. Until the year 2013, the wastewater from the factory was treated in a wastewater treatment plant (WWTP) with a physicochemical process based on dissolved air flotation (DAF), chemical oxidation and filtration. Due to a wrong selection of the unit processes, the WWTP did not consistently comply with the quality required by LALA in the effluent.

IBTech®'s solution

- Modification of the treatment train configuration.
- Incorporation of an anaerobic biological reactor type UASB into the existing process, which was located after the DAF.
- Wastewater cooling before entering the UASB reactor, through an induced flow cooling tower.
- The existing chemical oxidation was used as a polishing phase of the UASB reactor effluent.

Results

- Nowadays, the LALA Aguascalientes WWTP has enough infrastructure to treat its wastewater optimally.
- The treated water meets the required quality by LALA.

UASB anaerobic reactors

Biogas burner

Output of biogás from UASB anaerobic reactors

Pretreatment

Línes for biogas

Biogas burner

Case Study:

FES Acatlán UNAM

State of México, México. 2015.

Client problem

Based on its commitment to the conservation of the environment and in its role as an international leader in the field of education and research, the authorities of FES Acatlán (Institute for Higher Education of the National Autonomous University of Mexico -UNAM-) determined to carry out the construction of a wastewater treatment plant (WWTP) within its facilities with the purpose of:

- Have a considerable reduction in discharge of untreated wastewater generated by the student community.
- Decrease the use of potable water for green-areas irrigation. Instead, use treated wastewater.
- Have demonstration treatment facilities for academic purposes for the student community of the University Campus and for another UNAM units.
- Have an adequate management and disposition of the byproducts (sludge and biogas) generated by the operation of the WWTP.
- Have facilities that can be complemented to study energy sources (biogas).
- Use the treated sludge for soil improvement of green areas.

IBTech®'s solution

- Construction of the WWTP with the unit operations needed to meet the requirements. The maximum capacity of treatment is 7.5 lps (27 m3/h)
- The heart of the process is an UASB reactor.
- Implementation of biofiltration systems (compost) for odor control in the homogenization tank and in the UASB reactor.
- Treatment and dewatering of sludge for a safe disposal.

Results

- Nowadays, FES Acatlán has enough infrastructure to treat its wastewater optimally and fulfilling the objectives for which the WWTP was designed.
- The biogas and sludge produced in the WWTP, byproducts of wastewater treatment, are properly handled. The biogas is safely disposed in a burner and the sludge meets the standard to be used as a soil improver.
- The WWTP has its own laboratory equipped to determine the required parameters for good control of the process.

WWTP general view

WWTP general view

Biogas burner

Compost biofilter for odor control

Contact tank with chlorine

Filtration system

Case study:

GIZ (German Development Cooperation)

Programa EnRes, México. 2016.

Background

In the framework of technical cooperation between Mexico and Germany, the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German Development Cooperation/GIZ) in conjunction with the Secretariat of Environment and Natural Resources (SEMARNAT) and the Secretariat of Energy (SENER) are executing the program "Energy use of Solid Urban Waste in Mexico (EnRes)" from 2014 and until 2019.

The sludge generated in wastewater treatment plants (WWTP) is waste with clear potential for power generation. For that reason, the GIZ hired the German company Akut Partner, which along with the Brazilian company Rotary do Brasil and the Mexican company IBTech® are advising the GIZ to develop the line of work for the utilization of WWTP sludge from the EnRes Program.

EnRes program objective

Introduce the use of energy as an option for waste management in Mexico.

Specific activities about sludge topic

1. Accompaniment of demonstration projects:
   - Identification of demonstrative plants, technical-economic review, advice, accompaniment in implementation and operation, as well as assurance of an economically sustainable operation.
2. Strengthening of financing instruments:
   - Identification of financing options, Economic feasibility study, project evaluation model

3. Support for knowledge exchange and capability development:
   - Support professional training, technical guide for biogas use, provide technical support, promotion of cooperation between water operator organisms, promote dialogue

4. Technical advice to partners:
   - Awareness, establishment of working groups, review and proposals for improvement of norms and standards, systematization

Resultados of the advice

1. Agreement with ANEAS-GIZ to introduce the issue of energy use of biogas in WWTP.
2. Nine (9) municipal WWTPs visited with potential for energetic use of sludge, which derived the elaboration of four (4) technical-economic evaluations of biogas reuse projects carried out to support the search for investment funds.
3. Accompaniment to the demonstration project "WWTP León" (Mexico) for the start-up of the biogas desulfurization system (in process).
4. Development of "Technical Guide for the management and use of sludge in WWTPs", published by GIZ, SENER, SEMARNAT, ANEAS and CONAGUA, with feedback from experts in the sector.

5. Participation in the group of experts who are developing two (2) Competition Standard (CONOCER/ SEP) related to the biogas sector (in process).
6. Development and delivery of three (3) courses to develop skills in the biogas sector.
7. Organization of two (2) exchange meetings per year within the biogas sector. The aim of theses exchanges is to discuss common problems and share solutions between water operator organisms and concessionaires of WWTP.
8. Results presentation at the annual conventions of ANEAS.

Work team for the integration of the Technical Guide for the use of biogas in wastewater treatment plant

Courses

Group dynamics during the courses

Visits to WWTPs during the courses

Case study:

Ricolino S.A. de C.V.

San Luis Potosí, México. 1997.

Client problem

Ricolino is a food company belonging to the Industrial Group Bimbo which produces candies and chocolates in different presentations. The manufacturing process generates highly concentrated wastewater in biodegradable organic matter, which was discharged to the Españita river without any treatment.
Faced with this situation and in response to the request of the authorities to comply with the quality parameters established in the NOM-001-ECOL-1996, Ricolino decided to build a WWTP.

IBTech®'s solution

Project under the "Turnkey" scheme in which a train of treatment was designed with the following processes:

- Pretreatment. Static screen with self-cleaning, degreasing, homogenization tank
- Secondary treatment. UASB reactor and activated sludge, followed by a disinfection with sodium hypochlorite
- Filtration
- Sludge dewatering in filter press

Results

Once built and started-up, the plant achieved the following:

- UASB anaerobic reactor with removal efficiencies of above 95%, activated sludge reactor in extended aeration for polishing.
- Discharge of treated water to the Españita river with the fulfillment of the quality required by the Mexican norm NOM-001-ECOL-1996 (discharge to river for agricultural irrigation).
- Due to the effluent quality was much higher than required by the regulations, Ricolino decided to separate its piping system to reuse the treated water for irrigation of green areas and use in toilets.

WWTP general view

WWTP geneal view

Case study:

Modern Packing San Pablo

State of Mexico, Mexico. 2014.

Client problem

Modern packaging San Pablo (Empaques Modernos San Pablo -EMSP- in Spanish) is a Kraft paper factory. Wastewater generated in its production is treated in a WWTP built in 2008, which is based on an anaerobic-aerobic biological process.

- Initially, the WWTP fulfilled intermittently with the aim of treatment defined by the related Mexican regulations.
- After operating for 5 years, the PTAR began to present operation problems as well as deterioration of their physical structures due to the high salts content (calcium and magnesium) that caused severe fouling, particularly in the pre-acidification tank and the anaerobic reactor (EGSB reactor, modality IC®). For this reason, the operation of the WWTP was stopped and major maintenance was carried out.
- Some modifications to the process aimed to reducing salt fouling were performed, which consisted of a strict pH control and the IC reactor was re-started.

IBTech®'s solution

Rehabilitation of the WWTP, which consisted of:

- Cleaning and dredging of the pre-acidification tank and the anaerobic reactor IC®
- Supply of equipment, instruments and accessories specifically for the needs of the treatment process.
- Correction of biogas lines and modification of discharge pipes of the IC® reactor
- Modification of the control program (SCADA and HDMI)
- Supply of a treatment system for odor elimination based on a physicochemical/ biological process (IBTech® design)
- Start-up of the WWTP

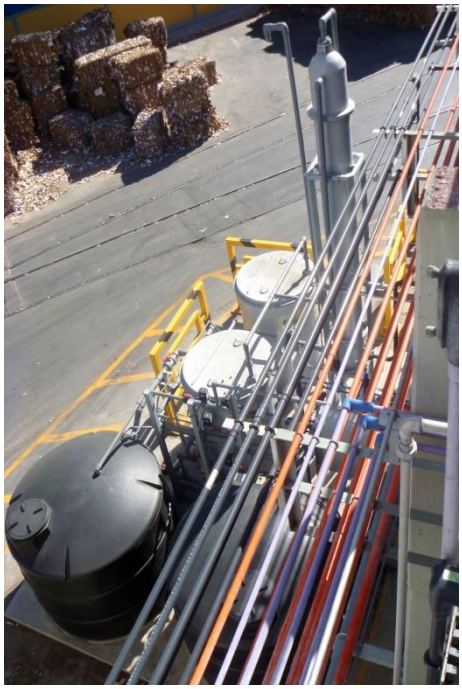
Results

- Start-up of the WWTP complying consistently with the water quality established in Mexican regulations. Specifically, the IC reactor reached an average efficiency of 76%, which in the five years prior to this project, had never reached more than 43%.
- Odor treatment system that operates properly fulfilling the purpose for which it was designed
- The "bioenzymatic nutrient" previously recommended by a third party was discontinued, which substantially reduced the operating expenses of the WWTP.

Scrubber and compost biofilter for odor control

Scrubber and compost biofilter for odor control

Biogas burner



Scrubber and compost biofilter for odor control

CONAGUA
COMISIÓN NACIONAL DEL AGUA

Case study:

THE NATIONAL WATER COMISSION

México. 2015.

Client problem

IBTech® collaborated with the Institute of Engineering of the UNAM (II-UNAM) in the project called "Evaluation of the physical and operating conditions of municipal wastewater treatment plants with a capacity of less than 100 L/s and formulation of the strategies to optimize its operation" for the National Water Commission (CONAGUA).

The project consisted in visiting a sample of 234 WWTP nationwide to carry out a technical diagnosis about the state of preservation of their facilities as well as the suitability of the process and technologies used in the treatment plants. Additionally, both in the influent and in the effluent, physiochemical parameters were evaluated to corroborate on site, compliance with Mexican regulations for discharge and/or water reuse.

For the case of processes like: activated sludges, facultative lagoons and oxidation ditches, the parameters dissolved oxygen, oxide-reduction potential and suspended volatiles solids were determined for further evaluation.

IBTech®'s solution

- Development of a format to collet the information related to the plant facilities and their process.
- Development of a general evaluation matrix (MEG in spanish) which granted a score on a scale of 0 to 100, based on the information collected on site.
- Elaboration of a process simulator to corroborate the convenience and sufficiency of the design in accordance with the original design criteria and the current situation. The above, based on the reported dimensions (those obtained on site contrasted with those provided in dimensional drawings).

Evaluation of the physical conditions of 234 WWTPs with capacity less than 100L/s

Evaluation of the physical conditions of 234 WWTPs with capacity less than 100L/s

Results and proposals

- Proposal for a new legal framework, since the Law of National Waters does not meet the existing needs in the country.

- As a conclusion, it was recommended that the legislation promotes:

  - Action under international standards of quality and transparency
  - Quality services, efficiency and sustainability
  - Incentives for the use of treated water and restriction of the demand for drinking water in activities that they can use treated water
  - Specialized staff.
  - The selection of technologies for wastewater treatment, considering technical, economic and environmental.

- Follow up on federal programs (APAZU OR PROTAR), which grant economic resources for operation and maintenance of the WWTP in exchange for good water quality.

- Creation of a federal entity that is responsible for:

  - Develop a National Plan for the development of national technology and highly trained human resources.
  - Support water operating organizations with operation and maintenance of water systems.
  - Establish a government inventory of the totality of the WWTP in the country.
  - Establish a national training program for operation and maintenance of the WWTP.
  - Define projects for management of river basins and sub-basins for reuse.

Evaluation of the physical conditions of 234 WWTPs with capacity less than 100L/s

Analysis of samples of 234 WWTPs with capacity less than 100L / s to determine the efficiency of the same.

Contact us

IBTech® is a 100% Mexican company with more than 22 years of experience, dedicated to the diagnosis, design, construction, start-up and operation of water treatment plants, as well as biogas generation plants and energy from biomass.

Contacto:

ibtech@ibtech.com.mx

+52 (55) 5619 4216

Encuéntranos en:

www.ibtech.com.mx

Síguenos:

IBTech
@IBTechMx