



Parque Tecnológico, Edificio 202 - 48170 Zamudio - BIZKAIA - SPAIN - Ph.: 34 94 600 23 23 - Fax: 34 94 600 23 24 - e-mail: mark@gaiker.es

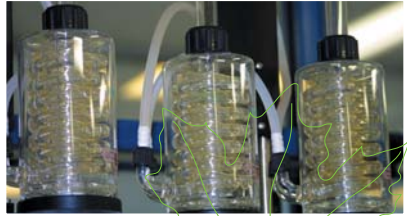
w w w . g a i k e r . e s

ENVIRONMENT



**GAIKER**

TECHNOLOGY CENTRE



## Customised solutions on Environment

GAIKER's activity in the environmental sector tries to answer all needs, of both technological and advanced services, which are detected in companies with environmental issues, service companies (engineering companies, consultancy companies, eco-industries) and public organisms (City Councils, communities, autonomous and national governments and authorities, etc) with activities in this field. Day by day, we investigate and develop technologies friendly to the environment in order to avoid further deterioration and find solutions to reduce existing pollution as much as possible.

After more than 12 years of experience in the market, GAIKER sees the environmental actions under the following aspects:

- **Assessment and control of environmental quality** through the development and application of analysis techniques which will allow for the improvement of contaminant detection levels and the correct assessment of the risks to human health and to the environment.
- **Technologies for the protection and rehabilitation of the environment** according to the preventive environmental policy, such as clean technologies and waste prevention and solutions at the end of the process that help companies comply with laws in force.
- **Tools for sustainable management**, encouraging the development and application of Life Cycle Analysis (LCA), Eco-design, promotion of Eco-industries and Lyfe Cycle Costing and in general, innovative tools that will enable competitive industries to integrate environmental protection issues in their products and processes, as well as recent policy trends such as Integrated Product Policy (IPP).

Protection and rehabilitation of the Environment by means of clean technologies and waste prevention



## TECHNOLOGICAL offer

### SOILS AND CONTAMINATED SEDIMENTS

#### SOIL CHARACTERISATION

In GAIKER, we tackle the analytic characterisation of contaminated soils and sediments with **qualified staff** supported by **advanced equipment**. Thus, we analyse all kinds of present micro-contaminants in specific samples and develop full campaigns to define and establish the contamination level of landfills or industrial sites, having actively participated in the "**Committee for the elaboration of chemical analysis methodology in the investigation of soil contamination**", included in the Soil Protection Act of the Basque Country.

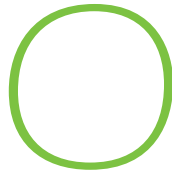
From GAIKER we help determine the quality of the soil and the impacts which can derive from the "lack of action".

GAIKER provides various engineering, construction and consultancy companies, as well as the public authorities, with analytical assistance in their studies.



We help determine the quality of the soil and the impacts which can derive from the "lack of action"

## TREATABILITY OF CONTAMINATED SOILS



Our more than 12 years of wide experience in characterisation and treatment technologies, enables us to carry out technical studies on the treatability of contaminated sites which determine the solution according to the actual soil's characteristics and the type of contaminants. These studies allow for a substantial reduction of the global sanitation costs, guaranteeing its success.

The most developed technologies in GAIKER are the **bio-treatments** for those soils or sediments contaminated with organic substances (creosotes, gas oil, mineral oils, etc.), as a low cost impact solution compared to incineration or solidification. The combination of biological techniques with others of extractive kind, for example those of **solvent extraction**, is taken into account in this type of treatment. These treatment lines are complemented with other technologies such as the ones focussed towards the **contention and isolation of contaminants** and/or **soil washing** of contaminated sites, as a low-cost alternative which allows for the re-use of materials.

All experiences of treatment for contaminated soils, are developed in close collaboration with engineering and consulting companies, as well as with the actual public authorities responsible for environmental management.



Our treatability studies determine the best solution according to the actual soil's characteristics and the type of contaminants



## RESIDUAL WATERS

### QUALITY OF WATERS



In GAIKER, the combination of sampling systems and analytical techniques, allows us to tackle properly the characterisation of liquid effluents of diverse origin, which makes much easier the task of industry control, treatment plants, landfills, etc. Besides the classic physio-chemical determinations, we also have **advanced instrumental techniques** of analysis for the detection of micro-contaminants (ICP-AES, HRGC/MS, HPLC, HRGC/ECD, FT-IR, TOC) of the toxicity in waters by standardised methods- (Microtox) and others in development (industrial effluent toxicity measurement on activated sludge: respiration inhibition through electrolytic respirometry) and of the presence of pathogenic micro-organisms (PCR).

In order to preserve the quality of processing waters, we indicate and recommend the most adequate **biocides** for each process in order to avoid the appearance and growth of micro-organisms which obstruct pipes, reduce the effectiveness of heat exchangers, provoke the corrosion of metal elements, the stiffness of the machines or the contamination of the product, and specially, to minimise the biological risk for workers.

Currently, we find ourselves in a unbeatable situation to favour the industry and the administration in their adaptation to new legal demands and implementation of technologic purification improvements, as well as the new conception of the water as a reusable resource.



GAIKER has teams experienced in the most advanced treatment techniques

## BIOLOGICAL TREATMENTS OF RESIDUAL WATERS

The management of biodegradable effluents (urban and industrial) is tackled through aerobic and anaerobic technologies.

Within the aerobic **processes**, basically we work with laboratory systems and semi-pilot of **activated** sludge complemented with **electrolytic respirometry** to carry out tests on the treatability of effluents (biodegradability and toxicity) which allow the detection and diagnostic of problems in the design and posterior operation of treatments according to each kind of waste, in collaboration with specialised engineering companies.

Equally, our centre takes part in the **development of bacterial starters**, ideal for specific biological treatments and instrumental improvements.

We evaluate the level of application of **anaerobic processes** for residual waters with high levels of organic charge, analysing the effect of the variation in composition and quantity of the effluent and the presence of substances and inhibiting or toxic facts on the system's performance. In order to do this, apart from the characterisation of the different streams to be treated, we also evaluate the **methanogenic activity** of anaerobic sludge and of the study water through proper test methods (biodegradability tests, inhibition and toxicity) to later proceed to the simulation of the treatment in laboratory and semi-pilot systems **UASB**.

## PHYSIO-CHEMICAL TREATMENT OF WATERS

In GAIKER we have conventional and advanced physio-chemical technologies for the conditioning and treatment of waters from different sources (water supply, waste waters, etc.). Also, apart from **conventional processes** (precipitation, clotting/flocculation, flotation, chemical oxidation, adsorption in active coal, etc.), the centre has bet for **innovative systems** such as **membrane technologies** (microfiltration, ultrafiltration, nanofiltration, pervaporation) to treat liquid streams, making possible the recovery of compounds and the reuse of waters. These treatments are based on advanced **oxidation processes** (photocatalysis, ozone) for the elimination/modification of toxic compounds and recalcitrant agents in industrial waste waters. To check the viability of these processes, we possess different laboratory and pilot systems that can act by themselves or combined.

We apply common membrane technologies at different levels

## CONVENTIONAL TREATMENTS

With the aim of supporting the industry that applies this type of treatments, GAIKER carries out tests that allow us to offer solutions and improvements to companies without great investments.

## COMBINED TREATMENTS

Apart from a low-scale simulation of full treatment trains for effluents, the centre has bet for new compact high performance developments, such as the **Membrane Bioreactor**, for the urban and industrial residual waters that generates an effluent of high quality, susceptible to be reused for farming (irrigation), industrial (refrigeration) and urban purposes (irrigation of public parks and gardens, golf links, etc.)

## MINIMISATION OF WASTE

We have proved experience in the studies of minimisation of effluents in production companies from diverse industrial sectors (food and agriculture, chemical, automotive, etc.), favouring the reduction in water consumption, the minimisation of polluting load and volume of effluents, the recovery of potentially reusable compounds and the reuse of waters in process. We encourage pollution **reduction strategies in origin** in order to simplify or avoid the final treatment of waste waters.

GAIKER has proven experience on effluents of general industrial sectors such as food and agriculture, chemical, automotive, etc.

# WASTES and BY-PRODUCTS



## WASTE CHARACTERISATION

The equipment and qualification of the staff in GAIKER makes possible the characterisation and classification of waste, both industrial and of massive consumption from the legal point of view, identifying the management ways required depending on the type of waste (dangerous, inert or general), or under other types of considerations, like the determination of impurities which condition the posterior treatment or reuse of the actual waste in the market.

The activity in this field is fundamentally focused on the characterisation, minimisation and treatment of industrial and food and agriculture waste, emphasising those of mostly organic composition or coming from the big waste flows in the XXI century

## TREATABILITY OF WASTE

GAIKER's vast experience in solid matrix materials treatment technologies allows us to develop studies of treatability of industrial waste. We select the best technologies available for each case until the performance of scale tests to measure the waste's treatability through the technologies that have been selected.

The main waste treatment technologies tackled by GAIKER include biological treatments (land farming, compost, etc.) and diverse extracting/separating techniques such as the extraction by solvent, by supercritical fluids (SFE), distillation, precipitation and others.

The employment of waste has become a new source of business for our industries. Our objective is to support them in their development so that the applied technologies boost sustainable development, minimising waste, dumping and emissions, favouring at the same time economic profitability of the actual company.

## FOOD AND AGRICULTURE BY-PRODUCTS

In GAIKER we possess a wide experience on development of projects aimed at the utility of by-products, both in food production companies and in companies that recover waste. We have achieved products of high added value through new technologies targeted at the use of food and agriculture by-products, which can be applied to the actual food sector or to other sectors such as the dietetic, cosmetic or pharmaceutical.

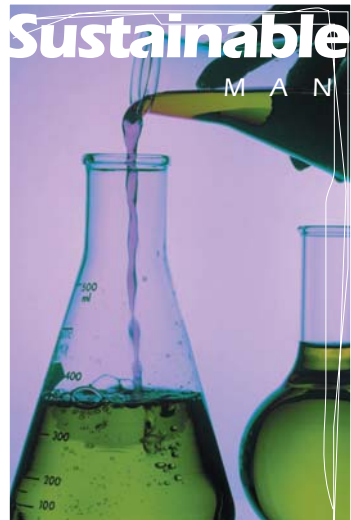
The task carried out in the different food sectors (fish transformation, vegetal tinned food, etc.) allows us to have a perfect knowledge of the different by-products extracted in the production processes, as well as a knowledge of the application of the most innovative technologies (extraction through supercritical fluids, extraction phase solid-liquid, membrane technology, etc.) for the correct exploitation and minimisation of generated subproducts.

GAIKER possesses the ideal equipment and staff to determine the critical points in the generation of the by-products, develop the design, as well as the ideal strategies for the exploitation and recovery of compounds of high added value (omega 3, colourings, flavourings, protein hydrolysates, enzymes, etc.) and for the disposal and performance of a secure management of non-reusable fields (biological treatment, physio-chemical, oxidation, mix treatment, etc.).



The acknowledgement of GAIKER's vast experience over the last few years has made it possible for us to lead forums and thematic networks for the exploitation of food and agriculture subproducts, both at national and European levels **(AWARENET)**





## M A N A G E M E N T

"Managing today's resources without compromising the development and growth for future generations".



We support companies in the adaptation of their production systems to sustainable development

# T

he enforcement of specific directives for the prevention and control of pollution (IPPC) and the implementation of environmental management systems in companies, following rules such as the **ISO 14000**, are the consequence of the increase in business awareness regarding the environment over the last decade. GAIKER has also faced this challenge, supporting companies in the adaptation of their industrial processes via the implementation of clean technologies based on the **minimisation of waste in origin**.

Additionally, from GAIKER new elements capable of encouraging sustainable development are discovered. But where? On those areas on which we have vast experience, that is, on the environmental component, developing new exchange models between companies, eco-design guides and assessment of the "lack of costs in eco-design"...



# GAIKER

## CLEAN PROCESSES FOR INDUSTRIAL PRODUCTION

Taking advantage of our experience in the development and optimisation of production processes and starting from a minimisation in origin, we carry out **technological diagnostics** from the environmental point of view. **We implement viable clean technologies** in the production process emphasising, for instance, the closing of water circuits, control systems and control of cut fluids, design of products for a viable recycling, chemical catalysis processes more suited with the environment, introduction of biotechnological processes, etc.

Regarding these clean technologies, GAIKER is making the effort to develop applications that can substitute for polluting processes, such as the application of supercritical fluids to substitute for solvents in various industrial processes.

In the case of **biotechnological processes**, in which we have vast experience, enzymes or micro-organisms do intervene in exchange of some conventional organic chemical catalysis processes, which allow for a higher reduction in energy and raw materials, thus softening the impact on the environment.

## CYCLE OF LIFE ANALYSIS

In GAIKER we estimate **environmental impacts related to a process, product or activity**, in all of their cycle of life stages, from extraction and achievement of raw materials, through their processing, transportation, use and reuse, to their final disposal as a waste, either through recycling, dumping or incineration. All raw materials and energies used, solid, liquid and gas waste issued to the environment, throughout the product's cycle of life are identified and quantified, and the real environmental impact of products, processes and activities is assessed. This assessment, combined with a study of the use stage and, of course, the recycling stage, allow us to offer companies precious information in the product conception stage (**ECO-DESIGN**).



We implement viable clean technologies in the production process