

CLEAN TECHNOLOGIES: RENEWABLE ENERGIES AND ENVIRONMENT



"E Oficina de +D

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Relation of research groups:

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 Environmental Engineering (CI5) Contact: Taboada Castro, Javier 	
 Sonitum – Acoustic Engineering (SC9/C) Contact: Sobreira Seoane, Manuel; Pena Jiménez, Antonio. 	
 Energy Technology (GTE) Contact: Míguez Tabarés, José Luis 	
 Electric Engineering and Electric Nets (EÑ1) Contact: Garrido Suárez, Carlos 	
 Solar Energy and Refrigeration (MT1) Contact: Vázquez Vázquez, Manuel 	
 Energy Biomass Contact: Ortiz Torres, Luis 	
 Environmental Biotechnology and Soil Ecology (BA2) Contact: Domínguez Martín, Jorge 	
 Microbiology (MB4/A) Contact: Rodríguez López, Luis Alfonso 	
 Agro forestry Engineering (AF4) Contact: Valero Gutiérrez del Olmo, Enrique. 	
 Bioprocess (EQ3) Contact: Sanromán Braga, M^a Ángeles; Cameselle Fernández, Claudio; Longo González, M^a Asunción 	
 Comprehensive Processing of Lignocellulosic Biomass. Biofuels (EQ9) Contact: Garrote Velasco, Gil. 	
 Agrofood Biotechnology Team (EQ7) Contact: Domínguez González, José Manuel 	
 Environmental and Natural Resource Economics (ERENEA) Contact: Prada Blanco. Albino 	



Electric Energy Generation and Use

Electrical Engineering Department

Offer: R&D, Services, Training

- Transient model and study of electrical installations
- Electrical machines model in operational conditions
- Studies of the Power Quality Impact over the electrical machines/electric installations under operational conditions
- Specific studies for particular needs Technical assistance:
- Co-generation projects viability
- Power Quality problems: source identification and solution
- Energy efficiency
- Loads: optimal management
- Optimal tuning for ASD
- Reduction of PQ emissions
- Equipment PQ Immunity analysis
- Technical help
 Training:
- Electric Power Quality
- Automatic Speed Drives
- Renewable energies
- Motors, generators, transformers
- LV switchgear
- HV protections

Performed Research Projects

- Electric Power Systems. Optimization and re-engineering (SEPRO)
- Expert system for the detection and Analyses of the electric disturbances (PGIDIT)
- Independent Stand-alone renewable generator (XARIN)
- Intelligent Diagnoses of PQ problems in transport and distribution electric networks. (HEDICERTD)

Performed Works and R&D Projects for Companies and Other Entities

- PQ analysis and power factor compensation studies
- Report of the electric quality effects on AC motors behavior
- Report of flicker problems in a steel making factory
- Course on Power Quality in industrial electric installations
- Report of the impact over the network currents due to the connection of a wind farm



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Environmental Engineering Team

Engineering of Natural Resources and Environment Department

Offer: R&D, Services, Training

- Environmental impact studies
- Public and mining constructions restoration
- Terrain engineering studies
- Geotechnical studies
- Mineral deposits
- Stone buildings alteration
- Security and workplace risks prevention
- Water test drillings

Performed Research Projects

- Design of a remedial installation
- Risks analysis model in road goods transport
- Surfactants application to desalinization and prevention of stone patrimony alteration
- Sectorial plan for mining accidents prevention in Galicia
- Special plan of seismic emergencies in Galicia
- Study about bank block falls in rock

Performed Works and R&D Projects for Companies and Other Entities

- Study of granite blocks environmental and quality conditions
- Security for works in height which are carried out in a short period of time
- Environmental diagnosis front a possible installation of a recycling, treatment and production combustible plant from urban solid waste
- Environmental diagnosis front a possible urban solid waste transfer plant installation
- Environmental feasibility study of performance in a mine
- Geologic-mining research and assessment of an exploitable reservation in a limy dry goods quarry
- ESTREIA project: Technological diagnosis of 10 Galician mining companies
- Barren dumping in a slate exploitation
- Restoration plan of the Paramios slate concession
- Environmental dust study on a road
- Report about a bank collapse in a building work
- Declarations to the environmental impact assessment of a cement milling and put-in-sack project
- Report about stabilization measures of the quarry slopes
- Assessment of the withdrawal of dumped dry goods by a quarry
- Report about stability conditions of the resulting bank from a plot empting



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&D Team: SONITUM - Acoustics Engineering

Signal and Communications Theory Department

Offer: R&D, Services, Training

- Sound pressure level measurement, acoustic intensity, etc.
- Acoustic consulting on room acoustics, acoustic isolation, diagnose and noise control, acoustic pollution, associated laws, etc.
- Sound analysis, acoustic digital signal processing, transducers, etc
- Training, academic conferences, seminars, and courses organization, directly or indirectly related to sound, audio and acoustic issues.

Services and courses:

- Intercomparison exercise of measurement tests on acoustic insulation against airborne noise, promoted by Sonitum, with 12 measuring teams.
- Postgraduate course on applied acoustics.
- Training courses: building acoustics, environmental acoustics, accreditation of acoustic measurement companies
- Conferences: Acoustic isolation (2005), Environmental acoustics (2005).

Performed Research Projects

- SISPA LOCAL (Spanish Ministry of Environment, 2006-2008 (Ministerio de Medio Ambiente)) design and test for better local action plans for noise control.
- Sound source separation for acoustic measurements (Spanish Ministry of Education and Science, 2006-2009 (Ministerio de Educación y Ciencia)).
- Analysis and forecast of noise sources in cars, PROFIT, 2006 (Spanish Technological Research Promotion Programme)

Performed Works and R&D Projects for Companies and Other Entities

- Action plan to reduce noise pollution in the secondary and tertiary sector of industry (2000-2001).
- Analysis of road noise on a granite pavement
- Estimation of noise emission from stone cutting machines.
- Noise map of Vigo city (2006-2007)

Sonitum has made and currently develops other applied acoustics and noise control activities, but not directly linked with environmental noise control.



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Energy Technology Group (GTE)

Department of Mechanic Engineering, Machines and Thermal Engines and Fluids

Offer: R+D, Services, Training

- Renewable Energy (biomass) Biomass densification (pellets, briquettes) Biomass combustion Cofiring Pilot Plant of different bio-fuels
- Thermal Energy
 - Boilers and burners
 - Energetic processes optimization
 - Energy efficiency
 - Bio-fuel characterization (solids, liquids, gas)

Services:

- Emission Study and Monitoring Boilers, furnaces Marine engines
- Energy Audit
 - Saving and Energy Efficiency Studies and consultancy energy Energy rating of dwelling Good practice guide
- Analysis Techniques Simulation: Fluent, Ansys, Matlab. Thermography Didactic software development

Courses:

- Energy management
- HVAC
- Cogeneration
- Renewable energy
- Energy saving



Performed Research Projects

- An integrated European market for densified biomass fuels INDEBIF (European project)
- SAFEGAS (Safety training for natural gas users) (European project)
- Development, demonstration and assessment of energy production viability from energetic biomass cultivations in Spain
- Analysis and development of systems for lignocellulosic waste co-firing
- Analysis and improving of energy and environmental parameters in pellet boilers
- EGR (Exhaust Gas Recirculation) systems development for improving biofuels co-firing
- Energy primary saving by design and development of a motoheating
- Agroenergy Project: Characterization and behaviour in co-firing systems
- Simulation of the behaviour of densified lignocellulosic products combustion and design of a combustion control system for contaminants reduction and efficiency improving
- Production and study of combustible briquettes for energy use from forest, agricultural and wood industry waste

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Electrical Engineering and Electric Nets Team

Electric Engineering Department

Offer: R&D, Services, Training

- Impact of renewable energies in electric supply quality
- Influence of power quality in renewable energies based generation systems
- Impact analysis of renewable energies on electric network
- Study of wind and photovoltaic resources
- Essays of eolian and photovoltaic generation systems
- Energy efficiency
- Power quality
- Power network analysis

Performed Research Projects

- Windfarms probabilistic models for security risks and disruptions assessment in great dimension electric nets
- Windfarms Dynamic Modeling
- Strategies for improving the generated power quality in windfarms
- Impact of quality supply in wind, photovoltaic and fuel cell systems
- Wind power integration in the galician transmission network

Performed Works and R&D Projects for Companies and Other Entities

- Study and simulation of eolian generation systems in a windfarm
- Improved security in electric energy supply to maritime signals
- Studies of an island as an isolated system
- Manual of essay protocols and proceedings for testing photovoltaic equipments and validate them according to Spanish guidelines (RD 1663/2000)
- Equipments in plants up to 5 kw
- Power network capability to evacuate energy.
- Study of the voltage sag impact in the productive process.

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Solar Energy and Refrigeration Group

Department of Mechanic Engineering, Machines and Thermal Engines and Fluids

Offer: R+D, Services, Training

- Researches about available solar radiation. Assessment of solar resources
- Research in other climate energy variables
- Thermal solar technologies
- Photovoltaic solar Technologies Services:
- Energy Audit
- Feasibility studies
- Solar installations design Courses:
- Course of solar energy for technicians
- PhD courses in Renewable energies

Performed Research Projects

- Assessment of the available solar energy in Galicia. Preparation of a Solar Radiation Atlas of Galicia
- Research for the technological development and scientific validation of the electric service by means of micronets with solar hybrid generation (MGS) – Support to Azahar projects in Argelia and Morocco

Performed Works and R&D Projects for Companies and Other Entities

- Solar radiation study in an island for energy aims
- An innovative high energy efficiency solar thermal capturator design

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Team: Energy Biomass

Department of Natural Resources and environmental engineering

Offer: R&D, Services, Training

- Biomass energy definition:
 - Analysis

Physical analysis (%humidity) Elemental Analysis (%ash, %volatile, % fixed carbon) Heating values (HHVo, HHVh, LHVo, LHVh) Grain size analysis (partial curve, accumulated curve) Elemental analysis (% Carbon, % Hydrogen, % Nitrogen, % Sulphur) Ash composition analysis

- Densification experiments: Briquetting
- Densification experiments: Pelletazing
 Transportation, drying process, grinding, sifting, palletizing, sifting of pellets, cooling, packing
- Quality indicators of densified products Density, quality indicator and friability
- Costs and technologies evaluation Energy costs estimation Production technologies evaluation
- Specialization courses
 - Arc-view
 - AutoCad
 - Cartomap

Perfomed Research Projects

- Industrial waste production process optimization to its energy use and determination of the densified products quality indicators
- Design and construction of a wooden waste densification pilot plant for energy use
- An integrated european market for densified biomass fuels INDEBIF (European Project)
- Forest biomass utilization in forest-industry chain in Galicia, Spain.



Performed Works and R&D Projects for Companies and Other Entities

- Heating values studies to lignocellulosic wastes
- Design of modular education centre for sea survival
- Viability study for a thermoellectric cogeneration plant feed with forest wastes (As Somozas, A Coruña, Spain)
- Viability study for a briquetting pilot plant
- Technical and administrative conditions report for the dealership of public selective refuse collection service in Council of Vigo
- Heating value studies
- Biomass energy analysis
- Forest waste energy analysis
- Property register digitalization of the Pontevedra province
- Physical-chemical-energy description to waste biomass

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R&D team: Environmental Biotechnology and Soil Ecology

Department of Ecology and Animal Biology

Offer: R&D, Services, Training

Renewable energies and biofuels

- Determination of the potential of agricultural production of energetic cultivation for biofuels production
- Preliminary studies on the environmental impact for the exploitation of energetic cultivations and their transformation to biofuels.
- Associated social economic studies.
- · Laboratory tests.
- Organic waste treatment
 - · Development of new systems for organic waste treatment.
 - · Process optimization.
 - Analysis of process and implementation of improvements in industrial plants.
 - · Biotests on obtained products.

Performed Research Projects

- TRANSBIOCOMB project (about cross-border production of biofuels): development of necessary technical, economic and strategic studies for the determination of the potential of biofuel production in the South of Galicia and in the North of Portugal.
- Analysis of the potential of biofuel production in Galicia (Spain)
- Development of a numerical simulator for the composting process for its implementation for the optimization of mud composting and their mixture with other organic waste.

Performed Works and R&D Projects for Companies and Other Entities

- Composting: prevention and restoration. The project consists in the forest management and the treatment of pruning and cut-down rests. This material could be used for composting, which would incentive their removal from the land and the result will be a brown manure (compost) that could be used for the recovery of the zones affected by fires or as a improvement of the soil properties after a cut-down.
- Demonstration and investigation plant for the mud composting of the fishing industry.
- Supervision and control of the composting process in a process plant for urban solid waste treatment and others.
- Environmental management plan for a zoo. Implementation of waste management plan based on the 3 R strategy (reduce, reuse and recycle) was studied, trying the achieve of an exemplar of the consume of resources and energy, and the optimization of the treatment of produced resources.



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Microbiology Team (MB4/A)

Functional Biology and Health Sciences Department

Offer: R&D, Services, Training

- Water quality studies: microbiological analysis in drinking waters, industrial waters, urban waters, pool waters, well waters, thermal waters, irrigation waters and wastewaters
- Water Purification
- Legionella treatment: microbiological analysis of water from risk installations
- Waste Depuration
- Macrofites application in wastewaters
- Microbial ecology of aquatic environments. Bacterial survival studies in aquatic environments.
- Purine treatment with ozone
- Environmental microbiology: microbiological control of environments and surfaces
- Biocide effectiveness tests: disinfectants and fungicides assessment
- Microbial adherence studies in several materials
- Course: "Hygienic-health maintenance of Legionella risked installations"
- Course: "Analysis of microbiological and physicochemical parameters in waters"
- Course: "Pollution microbiological indicators"

Performed Works and R&D Projects for Companies and Other Entities

- Bactericidal ability assessment of an ozone system against different pathogens
- Study of the productive system evolution and its incidence in transversal competences of workplace risks prevention, environment and collective negotiation and its incidence on Formative itineraries in Food and Drinks sector of Galicia.
- Study of the productive system evolution and its incidence on the professional competences and the formative itineraries in aquiculture sector in Galicia and Andalusia
- Evolution of the productive system and its incidence on professional competences and formative itineraries for industrial quality on food sector in Andalusia and Galicia
- Quality control and advise about sewage treatment plants
- Microbiological analysis in project PROBE: "Improved for flatfish larval rearing through the use of probiotic bacteria"
- Microbiological communities control in a sewage treatment plant
- Microbiological quality control in Legionella risked installations
- Autocontrol of public drinking fountains
- Legionella control in residences and water potability
- Microbiological and physicochemical control in waters
- Waters autocontrol according to RD 140/2003
- Quality control in swimming pools
- Surfaces control



- Microbiological analysis of Legionella pneumophila in risk installations
- Microbiological control in waters from ranching, poultry, pork and bovine installations
- Microbiological and physicochemical analysis in spring water
- Use of ozone as fresh fruits disinfectant
- Development of new technologies for spa installations disinfection
- Microbiological efficacy assessment of the AIR KEEPER system for environmental quality control
- Microbiological control in cold stores surfaces and environment
- Microbiological and physicochemical analysis of wastewater and sludges
- Bacterial adherence tests in Glasliner material for food uses
- Global migration study in plastic cans

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Agroforest Engineering Team (AF4)

Department of Engineering of Nature Resources and Environment

Offer: R&D, Services, Training

Training in E-LEARNING:

- Environmental Observatory for Southern Galicia SME (OBSAM-SURGAL I, II, III, IV, V, VI)
- Environmental Observatory [portal]

On-line Courses:

- Countryside Elements Integration in Projects, Plans and Programmes
- Forest biomass energy applications
- Fundamentals on Management and Environmental Monitoring of Projects
- Renewable Energies and Sustainable Development
- Battle against Climate Change and Kyoto Protocol
- Geographic Information Systems (Advanced Course)
- Quality Management in handling of continental hunting and fish farming resources
- Environmental Integration in building and tourist sectors
- Integrated Systems: Prevention of work-related risks and Environmental: Workplace Safety, Industrial Hygiene, Ergonomics
- Environmental Integration of the following fields: automotive industry, fishing, shell fishing, natural stone extracting activity, tourist sector, building sector,...
- Quality Management Systems
- Environmental Impact Assessment for SME
- Management and Environmental Audit Systems
- Management and Treatment of Waste, Dumping and Emissions for SME

Performed Research Projects and Presentations

- Study of silviculture influence in CO² fixing of a typical Galician Eucalyptus plantation by means of the CO²fix Model
- Analysis and potential of eucalyptus plantations as MDL in Uruguay
- Assessment of the potential of Galician Eucalyptus plantation as Carbon Siks. An Approach using CO²fix and GORCAM Models.
- Carbon sinks effect of Eucalyptus plantations and their manufactured products (presentation).
- Influence of silviculture and product manufacturing in the carbon balance of a Galician Eucalyptus plantation using CO²fix model (presentation).
- Galician forest sector or the invent of the perfect machine
- Carbon cycle in the Forest sector (presentation)



Performed Works and R&D Projects for Companies and Other Entities

- Study of the potential of Acacia sp. as supporting of biomass in its energy transformation
- Legalization of a wood sawing industry
- Research about rolled wood performance
- Aspects of a woodland natural abiotic state
- Inventory of types and biomass management in woodlands
- Silvicultural strategies for mass management and valorisation of Quercus pyrenaica and Acacia dealbata
- Establishment of an information, formation and technology network transfer in the Rural Environment. EQUAL EC initiative. European Social Funds
- Report of the performance analysis carried out on the LEADER II Programme about Forest Development

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Bioprocess Group (EQ3)

Chemical Engineering Department

Offer: R&D, Services, Training

- Development of biotechnological process for treatment of wastewater from several industrial sectors (textile, forest, dye manufacture, ...)
- Lipase production and applications: selection of new sources (mesophilic and thermophilic microorganisms), production optimization, purification and characterization
- Enzyme immobilization
- Electrokinetic process development for recovery of soil polluted with heavy metals and organic compounds
- Electrochemical treatment of industrial waste effluents (xenobiotic and recalcitrant organic pollution)
- Agroindustrial residue revalorization
- Bioreactor design and development
- Biodiesel production

Services:

- Consultancy on chemical industry process (process design and optimization, innovation, integral management, ...)
- Advanced technologies for treatment and management of solid and liquid industrial wastes
- Utilization of biologic systems (enzymes, microorganisms) and electrochemical techniques for degradation of industrial pollutant compounds (organic dyes, heavy metals, ...)
- Industrial waste revalorization
- Application of waste materials from agro-food sector as raw materials in biotechnological processes
- Enzyme application to industrial processes
- Enzyme production (lipases, proteases, amylases) for utilization in several sectors (food industry, detergents, chemical or pharmaceutical products)
- Determination of adequate operating conditions to the use of commercial enzymes
- Biocatalysts immobilization techniques (enzymes and microorganisms)
- Wastewater characterization (DQO, pH, conductivity, solid content,...)
- Advanced analytical techniques (HPLC, FPLC, capillary electrophoresis...)
- Organization of training courses

Performed Research Projects

- Electrokinetic process development for recovery of heavy metal polluted soils
- Thermophilic lipases: production in bioreactors, purification and characterization
- Development of a novel integral treatment for removal of organic pollutants from soil
- Non-conventional bioreactors for thermophilic lipases production: scaling-up and application to biodiesel manufacture
- A novel proceeding for thermophilic enzymes-catalyzed biodiesel production, using waste frying oil
- Microbial biodiversity in Galician thermal springs: thermophilic enzymes of industrial interest



Performed Works and R&D Projects for Companies and Other Entities

- Study of operating conditions of a corn starch enzymatic hydrolysis process
- Characterization and efficiency of several swimming pool maintenance products
- Study on five industrial disinfectants: chemical analysis and efficiency
- Valorization and recovery of used solvents
- Viability of biodiesel production from animal and vegetable fatty acids
- Interactions between water for dialysis and disinfection and the materials and components of the dialysis ring
- Pollution and disposal from mining activities. Application of electrokinetic remediation in a copper mine (subsidized by The Spanish Agency of International Cooperation)
- Electrokinetic remediation of a contaminated soil. Optimisation and modelling (subsidized by NATO Programme Security Through Science).
- Revalorization of. agrofood industry waste for enzyme production processes (subsidized by The Spanish Agency of International Cooperation)
- Development technologies for agrofood industry waste revalorization (subsidized by The Spanish Agency of International Cooperation)
- Design and optimization of a membrane bioreactor for wastewater treatment
- Viability of biological degreasing in metal surface treatment

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Integral Processing of Lignocellulosic Biomass. Biofuels.

Chemical Engineering Department

Offer: R&D, Services, Training

- Utilisation of biomass and agricultural and forest residues.
- Biofuels production from biomass
- Biomass fermentation
- Biomass delignification
- Cellulosis pulp production using environmentally friendly technologies
- Techno-economic simulation of biomass fractionation processes

Performed Research Proyects

- Development and optimisation of new processes for cellulosic pulp production. II. Compost and prehydrolysis
- Production of bioethanol by environmentally friendly technologies
- Bioethanol production from abundant raw materials in Galicia

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Agrofood Biotechnology Team (EQ7)

Chemical Engineering Department

Offer: R&D, Services, Training

- Management, revalorization and utilization of liquid and solid viticulture pollutant wastes for the production of economic fermentative nutrients, tartaric acid recovery and fermentative media formulations.
- Use of lignocellulosic agrofood and industrial wastes as raw materials for their bioconversion into food additives (xylitol, vainillin, lactic acid, citric acid, biosurfactants, etc).
- Development of new biotechnological processes. Study of different fermentation conditions and techniques.
- Recovery of food additives from the exhausted media.
- Analytical techniques.

Performed Research Projects

- Use of viticulture pollutant wastes to obtain economic fermentative nutrients and food additives.
- Reduction of the environmental impact caused by waste and marc from viticulture industry by means of tartaric acid recovery and biosurfactants and compost production.
- Generation of biotechnological food ingredients from agroindustrial pollutant wastes.
- Competitive research consolidation and structuring programme.

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ERENEA: Environmental and Natural Resource Economics

Applied Economics Department

Offer: R&D, Services, Training

Assessment of environmental externalities (benefits/damages) from energy sources, and especially from biomass.

Performed Research Projects

 Economic - environmental assessment of the energy use of biomass in forests (Spanish Ministry of Science and Technology).

Contacto

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