INSTITUTO TECNOLÓGICO Y DE ENERGÍAS RENOVABLES S.A.

CABILDO DE TENERIFE

ITER 2006

General Information

ITER

Instituto Tecnol?gico y de Energ?as Renovables

P. I. de Granadilla E-38611 San Isidro

Canary Islands, Spain

Phone +34 922 391 000

Fax +34 922 391 001

http://www.iter.es

e-mail iter@iter.es

General Information

NTRODUCTION

In 1990 the “Cabildo de Tenerife”, the island's administrative authority, founded the Technological and Renewable Energies Institute, ITER. This centre was conceived as a pioneering project for the island of Tenerife, whose objectives were to encourage technological research and development related to the use of renewable energies and other aspects that contribute to the socio-economic development of our archipelago. In 1996 the Technological Institute of the Canaries was incorporated as a new shareholder with the acquisition of 28% of its capital. In 1997 ITER's share capital was increased, incorporating the banking group, Caja General de Ahorros de Canarias as a shareholder.

At the present time, the Institute has a multi-disciplinary team of more than 160 professionals, comprising of an administrative department and three R+D Divisions.

ACTIVITIES

a) Generation of electricity from wind energy

b) Renewable energy research projects

OBJECTIVES

a) The implementation and promotion of applied investigation in the fields of renewable energies.

b) Development of technological systems to make use of renewable energies

c) Coordination of R+D projects in the field of energy in the Canary Islands.

d) Creation of the necessary infrastructure for the development of engineering, local industry and research.

e) Development of results by local industry and exportation of know-how to other countries and archipelagos.

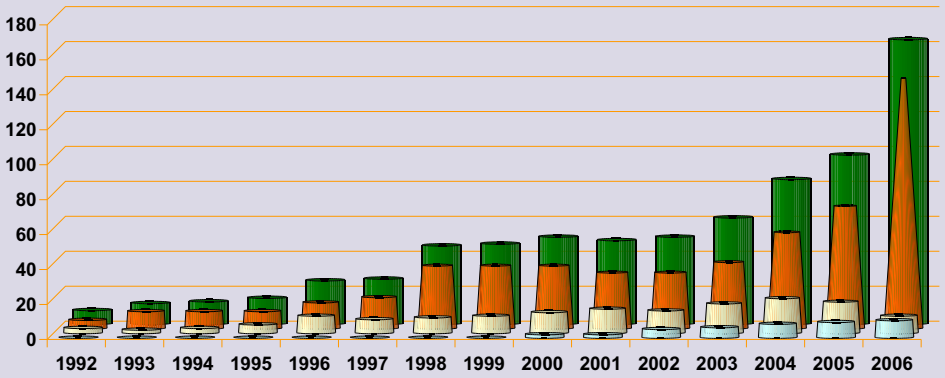
f) Stimulation of relationships with the scientific community at national and international levels.

g) Training of scientific personnel in all fields related to renewable energies.

These objectives are of the highest importance in insular regions such as the Canary Islands, where the lack of conventional energy sources increases dependence on exterior energy supplies for maintenance of economic development. Due to tourism, the Canary Islands are likewise obliged to advocate the use of renewable energies where ideal conditions exist in the archipelago for their development.

General Information

Personnel



Divisions and Departments

The Institute has a multidisciplinary team composed by more than 160 people, among research staff, maintenance staff and administration personnel. ITER is organized into three areas: Renewable Energies, Engineering and the Environmental Research Division.

Renewable Energy Division

Wind Energy Department

This department carries out the operation of the existing wind parks, the installation of new wind parks, projects related to wind energy and the operation of the wind tunnel. Moreover, this department is in charge of projects related to island territories and 100% RES Communities. An important effort has been put in the forecast of weather conditions, particularly wind speed and direction. This will make possible the estimation of the wind energy production in advance, one of the key aspects to get fully involved in the energy market. These forecasts, based on the model MM5, are being processed in a computer cluster owned by ITER.

Photovoltaic Department

Its main working areas are the promotion of PV related projects and studies, research, development and demonstration activities in hybrid systems and hydrogen, as well as water desalination and waste water treatment technologies.

This department takes charge of the SOLTEN project, which consists of the construction of a Photovoltaic Solar Platform in the lands of Granadillas Industrial Estate. This project has two phases. The first phase consists of the sold and installation of 130 photovoltaic plants, so that each plant of 100 kW belongs to one private investor.

Divisions and Departments

Engineering Division

The Engineering Division is divided in Information Technology and Electronics:

Information Technology Department

The IT Department provides support to ITER's internal structure, as well as support for the consortia of projects in which ITER is involved. Its main activities are: monitoring and control systems, Internet, Intranet, e-commerce, e-mail and web severs, local area networks, special applications and systems to client specifications, multimedia, systems for domotics integration with efficient energy management and bioclimatic, accessibility (development of software for disabled), dissemination (presentations, WEB design, electronic publications) and e-learning and tele-work projects. Moreover, it participates in international projects for the development and design of integrated telematic platforms.

Electronic Department

This department works mainly on the design of electronic equipment related to Renewable Energies. Its activity is focused on the design and manufacture of DC/AC converters for photovoltaic installations and microprocessors based systems for acquiring, storing, analysing, transmitting and monitoring data such as thermostats, meteorological stations, data logger etc.

The Electronic Department counts with one laboratory-workshop equipped with generic materials of measure and test. Works of maintenance are being done, but the main activity is the development of prototypes for specific applications.

The development is realized in every phase, from the conceptual design of the circuit and the obtaining of all the CAD-CAM data (drafts, circuits, forms,...) till the manufacture and programming of microcontrollers. For some prototypes it can be manufactured printed circuits, but with limitations. In case of the final prototypes or circuits in production, there are ordered to specialized suppliers.

The main activity turns around the development and production of inverters for the injection into grid in photovoltaic plants.

Environmental Research Division

The Environmental Research Division works in 3 scientific areas: Seismic-volcanic surveillance and prediction by means of the use of chemical and isotopic techniques, hydrogeology and hydrochemical of ground water resources in oceanic volcanic islands and environmental quality.

Seismic-Volcanic Surveillance

Ground fluids play a very important role when stress changes happen in the underground due to earthquakes or process of rising magma. Therefore, the monitoring and the measurement of chemical and isotopic parameters of gases dissolved in ground water or those emitted by the volcanoes thought the plumes, fumaroles or in a diffuse way will be very useful for seismic- volcanic surveillance and prediction programs.

Ground water Resources

The salination and residence time of ground water in oceanic islands, as well as the improvement of exploitation ways are the main course of research that the hydrogeology and hydrochemical area of ground water resources is developing.

Environmental Quality

ITER has an environmental mobile unit which allows measuring atmospheric pollution at different sites, as urban and industrial areas. In this field, research works related to biogas and other non-controlled emissions toxic gases to the atmosphere generated land fields are carried out in order to increase the extraction plants performance. The aim is to improve the environmental quality and to intensify the biogas controlled emission performance.

Dissemination Department

It is in charge of the organization of promotion activities, such as conferences, workshops, courses, and publications, as well as the managing of the ITER's dissemination installations, including Technological Walkway, 25 Bioclimatic Dwellings and the Visitor's Centre.

Facilities

The grounds of ITER are located in the Industrial Park of Granadilla, on the southern coast of the island. This land covers an area of 400.000 m2. ITER was conceived as an experimentation and dissemination area where various projects developed by the Institute are sited.

Wind Parks

There are three different wind parks functioning at the present time, the 2.86 MW wind park, the 4.8 MW and the 5.5 MW one. The generated energy is grid connected to the local utility, UNELCO.

Photovoltaic Solar Energy

A 28 kWp flat panel PV plant is located on the roof of the ITER's main building, facing South complements the EUCLIDES PV concentration plant consisting of a photovoltaic concentration grid connected power plant that was a pioneer project in the use of a parabolic trough mirror technology.

25 Bioclimatic Dwellings

This project aims to construct 25 single-family houses following bioclimatic criteria. Fifteen houses are already finished and the rest of them are being constructed. The foreseen date for the finalisation of the whole project is by end 2007.

Visitor's Centre

The Visitors Centre Opening was in 2004. It is also a bioclimatic building and its main characteristic is its integration into the surroundings. The exhibition contents pay attention to the energy concept: sources, transformation processes and final consummation.

Technological Walkway

This is an open-air ecological walkway dedicated to different aspects related to renewable energies and the environment.

Wind Tunnel

It is an aerodynamic tunnel for civil applications, having a closed circuit and test section, which improves the efficiency and versatility. Its applications are: agricultural R&D, civil applications, having a closed circuit and test section, which improves the efficiency and versatility. Its applications are: agricultural R&D, civil engineering, architecture, renewable energy, sport training, etc.

Chemical and Isotropic Laboratory of Gases and Groundwater

This analytical facility supports the chemical and isotropic characterization of gases and groundwater as well as other environmental matrixes. It has a wide variety of instrumentation: atomic absorption spectrophotometer (AES), induced-coupled plasma atomic emission spectrophotometer (ICP-AES), gas chromatography (GC), gas micro-chromatography (GC), mass-chromatography (GC/MS), quadruple mass spectrometry (QMS), ionic chromatography (IC), etc.

WIND ENERGY DEPARTMENT

Management of Wind Parks

ITER has three different wind parks: the Experimental Platform, the 4.8 MW wind park and the 5.5 MW one.

The 2.83 MW Experimental Platform was financed in collaboration with several institutions (ITER, Cabildo de Tenerife, Canary Government and European Commission) and has been installed with the aim of testing the performance of different wind turbines, regarding its precedence, manufacturing and technology. The total nominal power of the wind platform is 2.83 kWp. It has nine wind turbines, with output ranging from 150 to 500 kW.

In 1999, the 4.8 MW Wind Park was modified in order to improve efficiency and production. The former wind park consisted in 16 MADE AE-30 turbines placed in two rows of 8 machines each. With the aim of reducing noise impact and in order to increase production, the turbines were replaced with 8 MADE AE-46 600 kW rated power turbines.

The 5.5 MW Wind Park is an ITER self-financed project. The wind farm consists of 11 new 500 kW nominal power each ENERCON-40 wind turbines.

New Wind Parks

ITER presented several projects of wind parks installation to the Canary Islandꝺs Wind Power Assignment Contest. The different parks and the participation percentage of ITER were:

-One 20MW wind park consisted of 10 Enercon-70 of 2MW machines in Granadilla, with the 100% ITER participation.

-Two wind parks in Granadilla, each one of 10 WM, in association with Industrial Park and the city council of Granadilla (ITER has the 30% participation)

-One 20MW wind park in Arico, promoted by five companies of the Cabildo the Tenerife (20% ITER participation)

The Contest was suspended, and a new one is expected to be opened soon.

It is also expected to renew the existing wind parks during the next two years, increasing their power in half.

Management of Wind Tunnel

Several activities have been carried out in the wind tunnel during 2006. As main dissemination activity an “open-door day” was realized on the occasion of “Eolica 2006”. As investigation activities, the wind effect on the structure designed for the SOLTEN project was proved. These tests have been done to fix the best distance between ground and panels.

On the other hand the project “Design study for extremely large telescope” has started. The aim of this project is to develop ideas and validate the technologies needed to design and build an European extremely large telescope in the optic and infrared range, with a diameter between 50

and 100 meters. The aim of these tests is to get quantitative information about the wind load and characterize the turbulence that can affect the telescope optic. The test will have place under different telescope conditions, with wind protections or without them, so that it can be decided the better option to minimize the bad influence of the wind.

ERAMAC II

The activities carried out with the collaboration of the Insular Energy Agency of Tenerife are:

- Guide of bioclimatic acts in buildings and good uses of insulating material and one practical Guide of Bioclimatism.
- Leaflet about “Energy saving in the domestic sector” and sending to several neighbours associations of Tenerife.
- CD with different material for teachers of Educational Centres in Tenerife for the carrying out of Energy saving journeys in schools and high schools.
- “Energy saving and efficiency in the public administration” conference for the staff of the Cabildo Insular de Tenerife.
- Multidisciplinary study of 100% integration in the islands of Tenerife, Gran Canaria and el Hierro, taking into account the wind zonification, resources, energy sources diversification (wind energy, PV, continue and saving).
- Report of analysis of successful promotion and integration policies of renewable energies in other countries.
- Synthesis document of energy saving ordinances in municipalities of Spain.
- Rough copy of the Municipal ordinance of energy saving for the municipalities of Tenerife.

Courses, conferences and publications

During 2006 began the master's Degree on Renewable Energies, whose start-up and coordination of ITERs syllabus has been done by the Wind Energy Department.

The department is in charge of giving the four-monthly subject “Fundaments of the wind energy”, using the material elaborated in 2005 for the carrying out of courses.

It has been start-up the on-line course of “Wind energy and its uses”.

It was given a conference of wind energy during the Technological camps for girls and adolescent women, which formed part of the EQUAL-SEMILLA project; and the department take part as well in the fourth Meeting of the Iberian Network for Investigation and development of applications based on the MM5 atmospheric model.

Inside the activities of the ERAMAC II projects, it was given a conference of “Energy Saving and Efficiency in the public administration” aimed at the technicians of this corporation.

WIND ENERGY DEPARTMENT

2006 Publications:

- Presentation of two posters in the General Assembly of the European geosciences in Vienna: “A first view to the short-lived Hurricane Vince”, and “the wind field evolution at Tenerife islands during the Delta Tropical Storm”.
- Activation of the “tropical cyclone Bogussing” diagram and evaluation of the planetary limit layer (magazine of the meteorology amateur, Feb. 2006)
- Turbulence induced to low layers, associated with mountain waves (magazine of the meteorology amateur, Apr. 2006)
- Use of the meteorological model MM5 for the energy forecast in the wind park of ITER (XIXX scientific Conferences of the AME, Apr. 2006)

Extremely Large telescope Design Study

The ELT Design Study is a development program of technology carried out by several institutions and companies of Europe, Israel and Australia and is co-financed by the VI Framework program oh the European Commission.
The project began in 2005, and during 2006 took place the instrumentation of the first scale model, testing of the scale model in the wind tunnel of ITER, design of a second scale model and the development of software of data analysis and modification of the control software of the pressure scanner.

Acquisition of the measure points set for SOLTEN project

During 2006, there were acquired the electricity meters, as well as assembled and verified the first phases of SOLTEN project photovoltaic plants, in which the supply of 150 electricity meters was formalized.

Energy production prediction of wind parks and photovoltaic plants

During 2006 it was continued with the maintenance and improvement of the website of weather forecast for the Canary Islands, http://meteo.iter.es, based in the mesoscale model MM5. This website has reached about 30.000 visits, giving the possibility of registering as user with almost 400 registers so far.

The forecast model allows carrying out high resolution studies of wind in the surroundings of our wind parks, so that it can be make predictions about energy production in these wind parks. Likewise, it was implemented the prediction of global radiation in the model, so that it can be obtained the photovoltaic generation predictions related to the real production of the pilot plant and the whole Solten plant. It has been done several publications in different forums, like the General Meeting of the “European Geosciences Union”, XXIX Scientific conference of the AME, the 4th MM5 and RAM Iberian Network Meeting.

PHOTOVOLTAICS DEPARTMENT

This department now has a wider spectrum of activities, covering 4 main fields: PV, Hybrid Systems, Water Technologies and Hydrogen.

PV Activities

PV Test Plant

Testing and characterisation of PV modules

The geographical location of ITER facilities, on the Southern extreme of Europe, and the experience gained with the **PYTHAGORAS PROJECT**, has led to the establishment of a new line of activity in the department: the testing and characterisation of PV modules and systems. The Integration department is mainly involved in the assessment of the outdoors behaviour of thin film CIS and CdTe modules. Additionally, a two axis tracking system is currently being used for the assessment of mono-Si modules. In order to correctly analyse their performances, a weather station is under operation and maintenance, recording several wind, sun and temperature related magnitudes.

TECHNICAL ASSISTANCE TO THE EURO SOLAR PROGRAMME, Energy and Communications for Remote Areas in Latin America

EURO SOLAR programme has been funded by the European Union and has been proposed to supply services to a number of communities in 8 Latin American countries; Honduras, Guatemala, Nicaragua, Bolivia, Peru, Salvador, Paraguay and Ecuador.

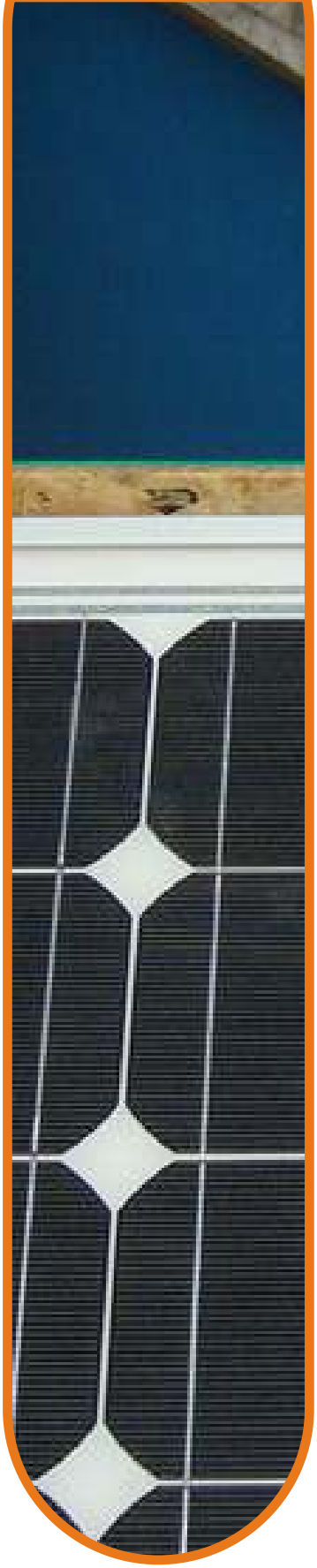
The emphasis is on the providing functionality rather than electrification; that is to say that the most important factor is to provide good quality, reliable services. The most innovative feature of the EURO SOLAR programme is the provision of Internet access and associated communication services to poor communities that are currently not electrified.

Medical, educational and social services are also to be included, the latter being an aspect that is often overlooked. Lighting would allow public buildings to be used for activities after dark.

ITER is in charge of the definition of technical specifications for the system, as well as giving technical assistance and monitoring of the installations.

28kW Photovoltaic Plant

The photovoltaic plant on the roof of the ITER main building was installed since more than 10 years and it is one of the most veteran of the Canary Islands in his class. The department makes the operation and maintenance of this plant.



PHOTOVOLTAICS DEPARTMENT

HYMAC Programme for the introduction of hydrogen economy in the macaronesia region

The main aim of this Project is to identify the production, storage and use of hydrogen technologies, either in a centralized or non-centralized form, in addition to terrestrial transport application, analyzing the disadvantages and problems of each of them, the challenges that they create, the investigation lines that are being developed, trying to reduce in the end the primary energy sources most adapted to every case, the awaited investment and operative costs, the predictable period of commercialization of these technologies as well as their impact in terms of CO emissions and, finally, the preparation of a public and private partnership that will allow these projects a gradual set in motion.

An ambitious "Perception Program" has been established within the Project, introducing several educational proposals (such as tutorial guides, CDs, presentations, disseminating videos, information leaflets, and so forth), aimed towards different audiences: primary and secondary school students, university undergraduates as well as broader audiences, with the purpose of disseminating into the society the concepts related to the introduction of the Hydrogen Economy within the Macaronesia Region. This program has been very successful in educative centres. So far, more than 700 students have taken part on it, while leaflets exceeding the number of 1000 have been given out among general audiences as well as commercial technicians.

SOLTEN

ITER is carrying out the construction of a Photovoltaic Solar Platform in the lands of the Granadillas Industrial Estate, in what is named SOLTEN project.

This project consists of two phases. The first phase is based on the installation of a 13 MW power solar platform divided up into 130 individual 100kWp plants. Each plant belongs to an individual investor with ITER acting as promoter, and carrying out installation of the plants. The project is located in the south of the island of Tenerife and occupies a total surface area of 150,000 m2. The installations have been offered to investors who are interested in this project, with very favourable returns due to the new tariffs established by the Spanish government for the sale of solar photovoltaic energy for installations under 100 kWp.

Given that in the lands, in which the Solar Platform is located, existed only one electrical installation of middle tension, it has been necessary to project and construct one infrastructure of lines and transformation centres that constitute the low tension distribution network. This network is necessary to connect all the plants that have being installed.

The organization of the plants is being carried out connecting one first group of 10 plants to a transformation centre of 1.000 kVA, being the rest set

around 6 groups of 20 plants connected to transformation centres of 2.000 kVA each one, until complete a total number of 7 transformation centres.

Each plant has been build using modules either form KYOCERA or from SOLARWORLD. The modules used for the installation have been both mono and polycrystalline ones, with nominal power between 165 and 175 W. Each plant is connected to its corresponding 100 kW inverter, which have been manufactured with ITER's own technology.

,Nowadays there are installed 9 MW (5MW grid-connected) of the 13MW that will have the Photovoltaic Platform, converting it in the biggest one of Spain and one of the biggest in Europe.

HYRESS, Hybrid Renewable Energy Systems for the Supply of Services in Rural Settlements of Mediterranean Partner Countries

The strategic objective of the proposed project is to remove the knowledge barriers against the installation of Renewable Energy Systems and creation of mini-grids. An efficient tool to apply and fulfil the strategic objective is the development, installation, testing and evaluation (technically and socially) of the performance of low-cost pilot hybrid renewable energy systems and mini-grids in selected remote sites far away from the grid, of Mediterranean Partner Countries. The hybrid systems will be consisted of photovoltaics, small wind generators, hydrogen subsystems and biomass combustion and-or solar heaters and they will be installed in selected areas of the MPC countries to set-up and provide energy and thus aid to the increase of the standard of living of these rural communities. The systems will be configured and sized after taking into account the local conditions. Three such systems will be installed in remote rural areas of Egypt, Morocco and Tunisia. The hybrid systems should fulfil criteria such as modularity, robustness, and simplicity in use and also require very low maintenance.

ITER, with the collaboration of ANME National Agency for Energy Conservation from Tunisia, are working in the design of the system of Tunisia. The village of Ksar Ghilene has been pre-selected which is located near an oasis, in the desert region of the country. In this village there are already PV systems supplying with electricity about fifty houses, a school and a community clinic. In this village there is also a PV pumping system as well as public showers equipped with solar- heaters. This village still remains very far away from the national grid. In the framework of the present project the existing RE installations will be enriched with a wind turbine (its size is to be determined within the project) and also set up a mini grid.

PHOTOVOLTAICS DEPARTMENT

DESALATION PLANTS

There are two sea water desalation plants in ITER, one produces 12 m^3 per day, while the other produces 70 m^3 per day. Both plants are based on the Reverse Osmosis technology, which consists on applying mechanical pressure to water flowing through a set of membranes in order to overcome the natural osmotic pressure and, therefore, allowing salted water to flow through these membranes towards lower salt concentration solutions, until reaching the desired desalted water.

Also, the plant with bigger nominal flow has an energy recuperation and velocity variation unit, which allows to maintain the production capacity while reducing the energy consumption to a half of the corresponding conventional one.

All the water daily produced is used entirely inside ITER's facilities. Desalted water is stored in two tanks, which feed ITER's fresh water pipe system, mainly bringing water for the irrigation of ITER's green areas and, to a lesser degree, to all ITER's facilities.

Agreement of collaboration between ITER and Cabildo de Tenerife for the development of Tenerife Local web portal and web sites of municipalities

ITER has recently reached an agreement with Cabildo de Tenerife in order co co-ordinate and develop the Tenerife Local web site, oriented to provide web presence and e-Administration capabilities to the municipalities of the island. This project lies within the framework of the PMC, a Plan for the Modernization of the Municipalities of the Island. The different webs will be created by means of a content management tool developed by the Spanish Federation of Municipalities and Provinces (FEMP), an open source tool that has been made available to all the Local Authorities of Spain.

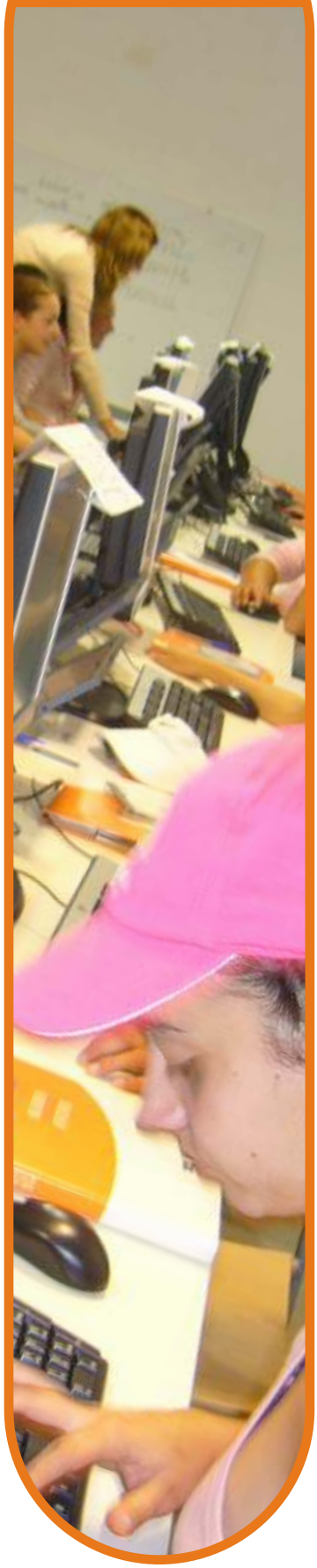
Agreement of collaboration between ITER and Cabildo de Tenerife for the development of activities D+R on information and communication technologies and for the development of applications on electronic administration.

During the collaboration established between ITER and Cabildo de Tenerife it has been explored different aspects of the development, installation and management of computing and communications services, as well as certain purely scientific research activities, like the development of a pc cluster as a supercomputer.

This has let us identify new fields of action and to establish a solid frame of multi annual collaboration that would establish targets of a longer term.

In the new agreement it is established the use of ITER as a platform of I+D en the field of information and communication that would allow to explore emergent technologies with a direct application on the development and improvement of the services offered to the citizens by the administration. Some of these services are: security at a physical level, taking the most of the possibilities that offers the ITERฺs alternative Data Process Centre; Electronic administration services, Wi-Fi communications; supercomputation and cluster of redundant equipment; administration application of the free software; Search of external financing for projects.

The agreement term was extended during 2005 and it has been insisted in the following aspects: activity concentration in the Development applications area, support of European projects presentation, and an extension of collaboration with other Cabildo areas like the agreement for the Connectivity of Youth houses.



INFORMATION TECHNOLOGY DEPARTMENT

Development of Computer Applications

During 2006, apart from the continuation of those existent projects, they have been carried out activities of computer applications development, as much as service to external organizations, and support of ITERđs internal projects.

All the developed applications have been directed toward providing services of

Internet, being based on architectures client/server, in which the interface of user is based on conventional web navigators.

Depending on the specific necessities of each application, different development environments have been used, such as PHP, ASP, NET, Ajax, JavaScript, etc.

Among the developed applications there are:

- web of ITER (www.iter.es). This page has been developed starting from a

Agent of denominated Contents Plone, based on Python. Its development allows the access to the modification of specific contents in different areas of the portal by different people..

- meteo.iter.es web: This web offers the results of the execution of the meteorological prediction models carried out by ITER, based on the MM5 environment. Also, it offers information about the different meteorological variables shown and images with prediction maps for each one of these variables in different areas.

- Agrometeo Application: This application, developed by order of the Agriculture Consejeůa of the Cabildo de Tenerife, is an improvement and an adaptation to the web environment of an existent application. Its mission is to manage the meteorological stations disseminated through the insular geography, the treatment of the stations data, and to carry out studies about this data offering a service of risk forecast to the islandđs farmers, inside the service Agrocabildo (www.agrocabildo.com).

- Management projectđs application: This application, directed to provide support to ITERđs internal activities, is in development phase, after being carried out the identification of functional necessities. With this application it is expected to provide the technicians of the ITER with a tool that allows to have a knowledge base of all activities carried out, as well as a help in the economic and technical administration of the developed projects.

- Management of the photovoltaic plants Application.

This application is a management tool of the photovoltaic plants that are being set up in ITER. It will allow the access to the installation and production data of these plants.

- Youth's web of the Cabildo de Tenerife.

- Adapted tools for distance training.

The projects in this area (Tepadis, SALAD and Semilla) have been done as a consequence of the partnership between ITER and SINPROMI. The activities that are being carried out are directed to develop a distance training tool through Internet, adapted to the necessities of people with disabilities or in situation of exclusion.

Management of telecommunications for Youth's, Women and Parents' Associations

ITER has been put in charge of manage the connection of several local associations of youth, women and parents of the whole island. These associations will be provided with an Internet connection as well as the computing equipment and software. This project is an initiative launched by Cabildo de Tenerife.

TARGET- People transport system using self guided vehicles with central traffic management

This project has as final goal the development of a system to guide and control of vehicles that, once installed, would allow having a fleet of self guided electric vehicles able to make different itineraries, dynamically computed, in a given environment.

Being as it is, a system of vehicles without driver, it is especially convenient for areas in which most of users are not familiar with the environment.

There has been a joint venture with the University of La Laguna for the development of a guidance system using virtual vision as well as the redesign and set up of the control circuits.

Project INFOBAND

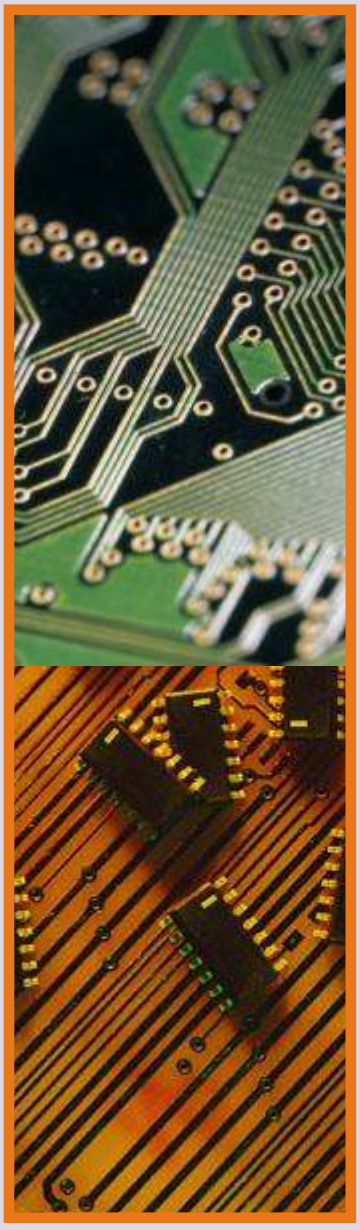
This project is financed inside the INTERREG IIIB - MAC initiative and is led by the Cabildo of Tenerife. It has as partners ITER and Madeira Tecnopolo.

The main objective of the project is to promote the infrastructures inside the one project “Internet Rural”, so that the number of offered services and user of the project can increased. For this aim several dissemination activities of the telecentres have been kept. Moreover, it has been done a seminar that had the participation of representative politicians and technicians of the program of different municipalities of the island.

At the present time there are more than 100 telecentres installed , waiting to reach a total of 138. Each one has a wireless net, computer equipment, printer, scanner and webcam.

Projects SALAD and Semilla

These projects have an encounter point in the application of new technologies for the support of people with disabilities and in social exclusion conditions. The main activity of ITER in the framework of both projects is centred in the development of communication tools, and in the training about the development of adapted web, applying the approach of "Design for all."



ELECTRONICS DEPARTMENT

The Electronics Department was created with the aim of satisfying the electronics needs of the rest of departments of ITER. In this way, the need of specialized personnel in order to provide technical support and advisement and also repair and maintenance services of electronic devices have been covered by this department.

Inverter of power production for SOLTEN project.

It is the production of an initial series of 150 three-phase inverter of power for injection in the electric net. The inverter designed for the integrated photovoltaic plants in the project SOLTEN is a modification of the previously inveter TEIDE, designed and manufactured by ITER. Fundamentally, the control is redesigned changing it from analog to digital that is easier to operate.

The phase of power and the filters are adjusted for their adaptation to 100kw.

It is an energetically efficient device so that it consumes the minimum possible energy.

This requires an electronic design of low losses. The control board of the system is very versatile, because it is valid to obtain different powers simply by changing the module of power and filtrate in the inverter.

Develop of a 100kw inverter for photovoltaic plant.

Project co-financed by ITER, Government of the Canary Islands and the European Social Fund (FSE) in the framework of the Operative program of the Canary Islands 2000-2006. The Department of Electronics collaborates with the Canary Islands Foundation ITER in this project.

The aim of the project is to develop an inverter dedicated to the production in the ITER and use in plants of photovoltaic generation up to 100 kW. During 2005 several prototypes have been done so that the initial design has been improved progressively. The first phase of this project is already finished and has move on to the production of one serie of the TEIDE100 inverter. 60 units of this inverter are already working in the SOLTEN fv modules.

System Investor of power (Inverter of 2kw for injection in net)

Project co-financed by ITER, Ministry of Industry, Tourism and Trade (National Plan of Scientific Investigation, Develop and Technological Innovation 2004-2007) and the European Fund of Development Regional (FEDER). It consists on the design of an inverter for domestic small grid connected plants. It is emphasized in the efficiency as well as in the size and weight reduction.

ELECTRONICS DEPARTMENT

Monitoring and display for the Ofra-Ingenieros Park

Custom electronic has been realized for several informative posters. It has been needed the measure and display of several physical parameters. LCD Numerical displays of great size have been designed and manufactured.

Monitoring of 25 bioclimatic houses

Register of environmental parameters in the bioclimatic houses. Temperature, humidity, and energy consumption data will allow evaluating the bioclimatic behaviour of the houses. An electronic system of measurement and register with connection to the net is being developed for this purpose.

It will be necessary to adapt the design for each case, because of the specials features of each house. The systems will be installed progressively till the complex is completed.

The Environmental Research Division at ITER is performing research activities on reducing volcanic risk, ground water resources in oceanic volcanic islands, geothermal resources in volcanic terrains, atmospheric pollution and environmental quality, and earthquake forecasting by means of geochemical methods since 1997.

2006 research projects

LANDFILLGAS

The goal of this project is to improve and optimize the methodology to estimate fugitive emissions of biogas to the atmosphere in landfills. Fugitive biogas emission in landfills has important implications for environmental and technical aspects. During the last year (2006) of this 3 years project, it has been conducted OP-FTIR measurements in Arico landfill to estimate fugitive CO_2 and CH_4 emissions. (MEC, Gov. Spain; 2004-2006)

CERRO NEGRO CO_2

The goal of this project financed by the Minister of Science and Education of the Spanish Government is to evaluate how much diffuse CO_2 emission is releasing to the atmosphere the most active volcano of the western hemisphere. In addition to this objective this projects will also evaluate the spatial distribution of diffuse CO_2 emission at Cerro Negro volcano, Nicaragua, Central America. (MEC, Gov. Spain; 2006)

GLOBAL CO2 VOLCANOES

The goal of this project is to re-evaluate the global CO_2 emission to the atmosphere by the subaerial volcanism. We believe this value, about 350 millions tons per year, is underestimated because diffuse CO_2 emission from active volcanoes has not been considered. Therefore, ITER volcano research group is planning to perform diffuse CO_2 emission at 25 different volcanoes from Papua New Guinea, Indonesia, Filipinas, Japan, Ecuador, Galapagos, Iceland, Nicaragua, and Chile. During the 2006 research work had been performed at Sierra Negra (Galapagos), Pululagua, Cuicocha (Ecuador), Hengill, Heimay, Krafla (Iceland), Apoyo and Jiloแ (Nicaragua) volcanic systems. (MEC, Gov. Spain; 2006-2008)

CANARIAS VOLCANO

The goal of this project is to carry out the discrete geochemical monitoring program for the volcanic surveillance in the Canary Islands. During 2006 diffuse CO_2 emission studies were carried out in El Hierro, Cumbre Vieja (La Palma), Timanfaya (Lanzarote), Dorsal NO Tenerife, Dorsal NE Tenerife, and Teide (Tenerife) volcanic systems. In addition to this gas geochemical work, fumarole gases were collected monthly at the summit crater of Teide volcano.

Evaluation of the chemical and isotopic signatures of the fumaroles is performed in collaboration with the University of Tokyo (Japan), the University of Florence (Italy) and the INGV-Palermo (Italy). Discrete hydrogeochemical monitoring is also a very important part of this program; therefore, a network of 19 observation sites of Tenerife's ground water system is being used to monitor physical-chemical parameters for the volcanic surveillance. (Gov. of the Canary Islands; 2006)

TEIDE 2006

The goal of this project was to carry out the continuous geochemical and geodetic monitoring program for the volcanic surveillance at Tenerife. Both networks have installed a total of 18 permanent instruments to monitor gas geochemical signatures and deformation. Continuous GPS monitoring is performed in collaboration with the University of Nagoya. (Cabildo Insular de Tenerife; 2006)

TENAIR 2007

The goal of this project was to provide values of emission rates of contaminants to the atmosphere by anthropogenic activities at Tenerife. In addition to this goal VOCs monitoring in the ambient air were performed at three different observation sites in the island of Tenerife. Optical remote sensing was applied to accomplish some of these goals. (Cabildo Insular de Tenerife; 2006)

MALPASO 2006

The goal of this project was to carry out the continuous geochemical and geodetic monitoring program for the volcanic surveillance at El Hierro. Both networks have installed a total of 4 permanent instruments to monitor gas geochemical signatures and deformation. Continuous GPS monitoring is performed in collaboration with the University of Nagoya. (Cabildo Insular de El Hierro; 2004-2006)

CARTOTENE

The goal of this project was to elaborate the volcanic hazard map for Tenerife Island in collaboration with the Geological Survey of Spain. (COTESA; 2006-2007)

International scientific assistance

ITER volcano research group did travel to Ecuador and Costa Rica to provide technical and scientific assistance due to the volcanic crisis of Tungurahua and Poás volcanoes, respectively. This assistance was requested by the Spanish Ambassador in Ecuador and by the University of Costa Rica.

In addition to this real volcanic crisis, ITER volcano research group was invited by the Italian Civil Protection to participate as a member of the international volcanological team for an emergency exercise of a potential reactivation of Vesuvio volcano.

2006 Defended Ph.D. and M. Sc. Thesis

Two Master Thesis were defended by research graduate students of the Environmental Research Division at the University of La Laguna during 2006.

* *Remote sensing of CO_2 and CH_4 measurements in landfills.* Research Student: Celeste Coello. Directors: Dr. Nemesio M. Perez and Dr. Susana Briz. October 2006.

* *SO_2 emission from industry and volcanic activity by means of COSPEC and miniDOAS.* Research Student: Jose Barrancos. Director: Dr. Nemesio M. Perez. October 2006.

2006 conferences and publications

Three papers of the *SCI* and 20 proccedings were published by this research group during 2006. In addition 30 abstracts were presented at International meetings.

Other research merits

The Director of the Environmental Research Division, Dr. Nemesio M. Perez, was the Chief Guest Editor of a Pure and Applied Geophysics Special Issue "TERRESTRIAL FLUID, ERATHQUAKES AND VOLCANOES: The Hiroshi Wakita Volume I. Edited by Nemesio M. Perez (ITER, Spain), Sergio Gurrieri (INGV, Italy), Chi-Yu King (ERP, USA) and Ken McGee (USGS, USA).

The Director of the Environmental Research Division, Dr. Nemesio M. Perez, was invited by the Indian Government to give a talk related to Earthquake Geochemcal Precursors in September 2006.

Popular Dissemination of nature risks

A way to reduce risks associated to nature dangers is to make the population aware of impacts that this kind of natural phenomenons can produce in a region. The aim of this weekly graphic bulletin PLANETA VIVO is to contribute to the citizens' awareness about these themes.

On the other hand, the Canary Islands archipelago is the only active volcanic region in Spain. It is a region that has experienced numerous eruptions through its geological history, but in some of its areas it has not been any eruption during a period equivalent to the average life time of its habitants. This gives a false sense of security about the volcanic phenomenon to the society.

Even though the volcanic risk is now higher than since 25 years ago, this is far away from being included in the list of the Central and autonomic Governments priorities related to problems of the people who live o visit the Canary Islands.

The aim of GUAYOTA is to give periodic information about the volcanic

activity in the islands to the residents of the Canary Islands. During 2006 it were published 156 weekly informative and 12 monthly ones.

ALERTA II

This program is the continuation of the ALERTA project. The aim of this project is to carry out the main recommended actions to reduce the risks asociated to volcanic danger in the Canary Islands and Azores. These actions are fundamentally three: (1) Development of maps of volcanic danger zones, (2) establishement of a multhidisciplinary volcanic watch program, to improve the systems of early-alert signals in volcanic in volcanic phenomenons and (3) elaboration of emergency plans that may be tried out by the population.

During 2005-2006 it has been strengthened the start-up of the isotopic geochemical laboratory and the permanent network of GPS for the volcanic surveillance in the Canary Islands. Furthermore, during 2006 it has been organized the international congress GARAVOLCAN 2006, in which participated about 100 Scientist of 26 countries. *(Interreg IIIB Azores-Madeira-Canarias; 240.000; 2005-2006)*

DISSEMINATION DEPARTMENT

25 Bioclimatic Dwellings

An international tender for preliminary projects for the construction of 25 independent one-family dwellings designated to take the utmost advantages of bioclimatic conditions. Also recycled and recyclabe materials will be used whenever possible.

At the present time, the project is in the construction phase. Fifteen houses are already finished and the rest is being constructed. The foreseen date for the finalisation of the whole project is by end 2007.

This is an unique project that will give the opportunity to show the potential application of passive and active solar energy for future buildings.

Visitors Centre

The building belongs to the complex of 25 bioclimatic dwellings. Its project has been carried out by the architect winner of the tender, as part of the prize. It is also a bioclimatic building and its main characteristic is its integration in the surroundings. The exhibition contents pay attention to the energy concept: sources, transformation processes and final consummation. Also to the environmental impact of the use of conventional energy sources is focused. The results of the monitorization of the 25 bioclimatic dwellings are presented at the Centre.

The Centre also have some facilities as a Conference room for 200 people, shop and restaurant.

Technological Walkway

This is an open-air technological walkway dedicated to the dissemination of renewable energy and environment.

With the incorporation of the Visitors Centre into the dissemination facilities, the walkway was enlarged and updated The 25 Bioclimatic Dwellings, Visitors Centre and Technological Walkway will constitute the tour make by the visitors.

Publications and dissemination activities

The department is in charge of the external publications, like the three-monthly LessCO2 bulletin and the organization of campaigns, seminars, courses, etc. directed to disseminate renewable energies and the ITER activities.