ITER

INSTITUTE OF TECHNOLOGY AND RENEWABLE ENERGIES

ITER

ACTIVITIES AND MANAGEMENT REPORT

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1.

INTRODUCTION

1 INTRODUCTION

The Technological Institute of Renewable Energies, ITER S.A., was founded twenty years ago by the Cabildo Insular de Tenerife, the island's administrative authority. It was aimed to cover the need of starting a new research field in the islands in order to reduce the dependence from the exterior energy supply and to allow a cleaner and sustainable development.

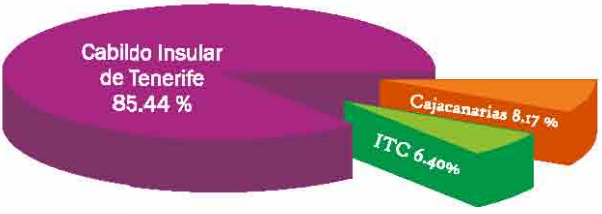
To fulfil this aim, its objectives are to promote research activities and technological development related with the use of the renewable energies, as well as other interests aspects for the regional social-economical development: subterranean hydro resources, seismic-volcanic prediction and surveillance, environmental control, and development of communication and information technologies.

Since the beginning, the Institute counts with two main action lines: electricity generation with renewable energies and the execution of investigation projects related with renewable energies, environment and engineering. Within these lines, the activities developed in the Institute can be classified within these action lines and are specially entrusted in its social purpose:

a) To implement and promote renewable energies applied researches.
b) To develop technological systems for renewable energies uses.
c) To coordinate energy R & D projects in the Canary Islands.
d) To create the needed infrastructure for the development of local research activities, engineering and industry.
e) To develop results for the local industry and export the know-how to other countries and archipelagos.
f) To promote the relation with the scientific community at national and international level.
g) Scientific personnel training in all renewable energies fields.

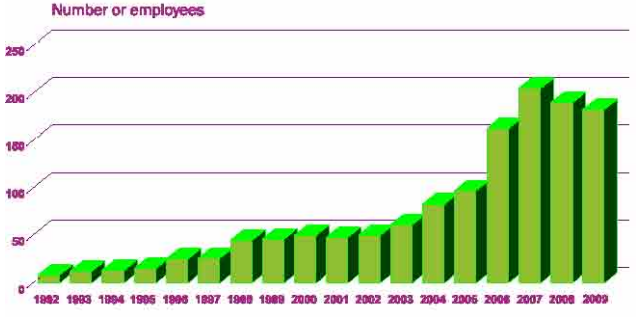
Shareholders

After several additions of shareholders, ITER´s capital share is divided as follows:



Staff

At the present time, the institute has a multi-disciplinary team of more than 232 professionals, comprising of three R&D areas such as Renewable Energies, Engineering and Environmental Sciences, which are complemented by a Diffusion Department. The staff has been increasing exponentially since the Institute started with its activities.



Organization Structure

The Institute is organized into three areas: renewable energies, engineering and the environment research Division. It counts as well with a Diffusion Department that gives support to all of these departments.

Renewable Energies Area

Wind Energy Department

The Wind Energy Department takes over the management of the three wind farms existing in ITER, as well as the proposals for the installation of future wind farms.

It develops investigation projects related with wind energy, the design and management of the wind tunnel and the meteorological forecasting of the MM5 model.

Bioclimatism Department

Investigates and develops architectural techniques that allow the design and construction of buildings according to the climate, geomorphology of the territory, vegetation and water, so that there can be a decrease in energy use and an increase in the thermal comfort. Furthermore, the Bioclimatism department offers and supplies technical advice in other projects and activities developed by the Institute.

Photovoltaics Department

Manages and carries out the maintenance, operation and invoicing of photovoltaic plants both of ITER and of private investors.

Submits proposals and projects for the installation of new photovoltaic plants. Manages the installation and implementation of the assembly PV panel plant of ITER. Studies and develops projects in the field of photovoltaic solar energy in hybrid systems and hydrogen.

Environmental Area

Reduction of Volcanic Risks

Works on the two major scientific and technical actions recommended by the international scientific community for reducing volcanic risk. The elaboration of volcanic hazard maps, useful to perform a better plan for the use of the territory; establishment of a multidisciplinary approach for the volcanic monitoring program to strength the early warning system.

Underground Water Resources

Researches to improve the knowledge about the way the underground water systems work to improve the management important economic and natural resource for sustainability in ocean volcanic islands.

Environmental Quality

Develops measurement systems based in remote optic sensors to improve the estimations of atmospheric contamination emissions from natural and anthropogenic sources.

Engineering Area

Information Technology Department

Provides support in the implantation of Information Systems both to ITER departments and the consortiums in which it is involved.

Conducts research, development and dissemination projects in the field of Information Technologies.

Participates in International projects with the design and development of telematic platforms.

Electronics Department

Researches and develops electronic equipments for renewable energies, mainly inverters and regulators applied in photovoltaic energy, microprocessors for the control and regulation of systems, programmable robots, thermostats and meteorological stations.

Gives support for activities of other ITER departments and projects, for example, the development of acquisition and monitoring systems in bioclimatic houses, or the help during the installation and start off and maintenance in SOLTEN plants.

Transversal Area

Dissemination Department

Coordinates the diffusion activities that take place at ITER, such as conferences, workshops, courses or publications, along with the training activities of the institute.

It manages ITER Diffusion facilities, such as the Technologic Walkway, the Visitors Centre, and the 25 Bioclimatic Dwelling.

Gives basic assessment about installation companies, courses and other information of interest related with the activities of the Institute.

.2.

INFRASTRUCTURES

Visitors Centre

Technological Walkway

Wind Tunnel

Photovoltaic module Factory

Chemistry, Gas Isotope and Ground water Lab

Electronics Laoratory

ITER Headquarters

Ecocar: Environmental Mobile Unit

Electric Substation

Generation Control Centre Connected with Spain Electric Grid, for Energy Generating Installations in Special Regime

The High-Availability Data-Processing Centre is framed within ALIX initiative promoted by the Cabildo Insular de Tenerife

2 INFRASTRUCTURES

ITER´s terrains are located in the Industrial Estate of Granadilla, in the southern coast of the island of Tenerife, covering a total of 400.000 m^2. ITER was thought as an experimental and dissemination area, where the Institute has carried out several projects that will be described below.

TER is in continuous growth to support and encourage the R & D activities it develops. The subsequent management of new infrastructure is vital for the development of research, engineering and industry.

Visitors Centre

The Visitors Centre is a project of the architect César Ruiz Larrea, winner of the 25 Bioclimatic Dwelling contest which is, together with the Technologic Walkway part of the Dissemination's facilities of ITER.

The architect was entrusted to design this bioclimatic building which should serve as a welcoming place for the visitors of the complex as well as a place where some of the projects of the International Contest of the 25 Bioclimatic Dwellings for the Island of Tenerife are exhibited along with their monitored results, once they have been made.

With the goal of maximizing the educative efficiency of the Visitors Centre, it counts with an exhibition tour which hopes to attract the visitor's attention on energy matters, their most common sources, their impact in the environment, their limited characteristic, as well as the alternative use of the renewable energies.

The centre also counts with a conference room with capacity for approximately 200 persons, two polyvalent rooms, a shop with materials related with the activities of the institute and a cafeteria.

Technological Walkway

This installation is an initiative designed, promoted and made by ITER and the Cabildo of Tenerife. It is an outdoor technological walkway, integrated into the ravine that crosses the Industrial Estate of Granadilla, next to the main building of ITER. It was inaugurated in November 1998, and since then it has received more than 8000 visitors per year among students and general public.

It is an outdoor technological walkway dedicated to the different kinds of renewable energies and topics related with the environment.

The main objective of the walkway is to make the public known the renewable energies and other related concepts, such as energy saving and resources rational use. Each exposed element is surrounded by green areas that supply protection against the sun, and a stream of water runs through the walkway refreshing it.

It is one-way route, so that anyone can see each of the areas that compound the walkway and can follow it without a guide, but guided tours are also available.

The different elements exposed along the Technological Walkway are distributed in thematic areas, which are divided according to the different type of renewable energies. The visit follows an order with an educational aim, beginning with a general introduction of the energy problem, conventional and renewable sources, and continuing with the different renewable energies. The walkway ends with a module dedicated to the involvement of the citizenship in the resolution of the energetic problem.

Wind Tunnel

The Wind Tunnel is an installation provided with a test section in which a rectilinear uniform flow of air with a constant speed can be obtained. Inside the ITER´s Wind Tunnel's test section, real objects and scaled models are located to observe the real effect of the wind over them, so that it can be studied. The test section has been built in a modular and exchangeable manner, so that it can be perfectly adapted for the requirements of each and every test.

The innovations in its construction, power plant and control, make the tunnel extremely competitive in terms of costs and features as well as suitable for a wide range of applications, such us: Agricultural R+D, civil Engineering, architecture, renewable Energies, sports Training. The tunnel has recently been modified and has been laminarized to carry out aeronautical tests.

With the aim of carrying out tests of the aeronautical profiles and of the solar plane prototype model, the quality of the vein in the aerodynamically tunnel has been improved with the installation of grids in the settling chamber. Also for the solar plane prototype, ITER has designed, manufactured and calibrated a Pitot tube in order to measure the fluid flow velocity of the tunnel.

The outstanding features of the aerodynamic tunnel for Civil Tests are: closed circuit, test room with 2x2 m^2 of section and 3m long, 56 m/s maximum speed of operation, nine fans of 22 kW each one, controlled by a frequency converter.

PV module Factory

The creation Project of a PV module factory in ITER installations was originated by the need of covering all the PV module requirements of the Institute and to continue and extend the investigations that have been going on in this area through the past years.

The Project included a warehouse 125 meters long and 20 meters wide divided in three sections, one assigned to the storage of raw material, the second one assigned to module manufacturing and the third one assigned to the storage of PVmodules. It covers a total area of 2500 square meters in which 1000 are dedicated to the manufacturing zone with two assembly lines.

Each line consists of two cell soldering machines (Stringer machines), one cell positioning robot, layout glasses tables, module checking tables and one laminator to shape the modules. Both lines converge in a module testing and classifying machine. After that, modules go trough the frame assembly tables and packing zone.

In 2008, this PV module factory was brought into operation in ITER installations. The operator's experience and the familiarization with the machines have allowed an increase in the production to 200 kW each month.

In 2009, ITER officially certified its modules after being tested in Italian laboratories. In these tests, not only did the modules pass every exam they were subjected to, but also passed with excellent results the demanding tests of power output capability against thermal cycles tests, temporal tests and aggressive atmospherical tests.

Nowadays, ITER has the capability to produce 30 MW of PV modules with full quality warranties not only in its production lines, but also in the final product.

On the other hand, ITER has also evolved in the area of photovoltaic integration. ITER has been able to produce a high quality double glass PV module prepared to be installed in future constructions. This prototype will be installed in one of the bioclimatic houses to analyze and to collect information about its power output and its behaviour against atmospherical agents.

Chemistry, Gas Isotope and Ground water Lab

ITER counts with a very well equiped laboratory where the environmental area develops several activities in this laboratory, such as the chemical and isotopic characterization of gases and ground water and the determination of other environmental parameters.

It´s provided with a wide variety of instrumentation such as: spectrophotometer of atomic absorption (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), high-performance liquid chromatography (HPLC), alpha spectrometer, UVA spectrophotometer, NDIR spectrophotometer, cromatografía iónica (IC) y líquida.

Electronics Laoratory

ITER also counts with a laboratory for the design and development of prototypes and electronic systems.

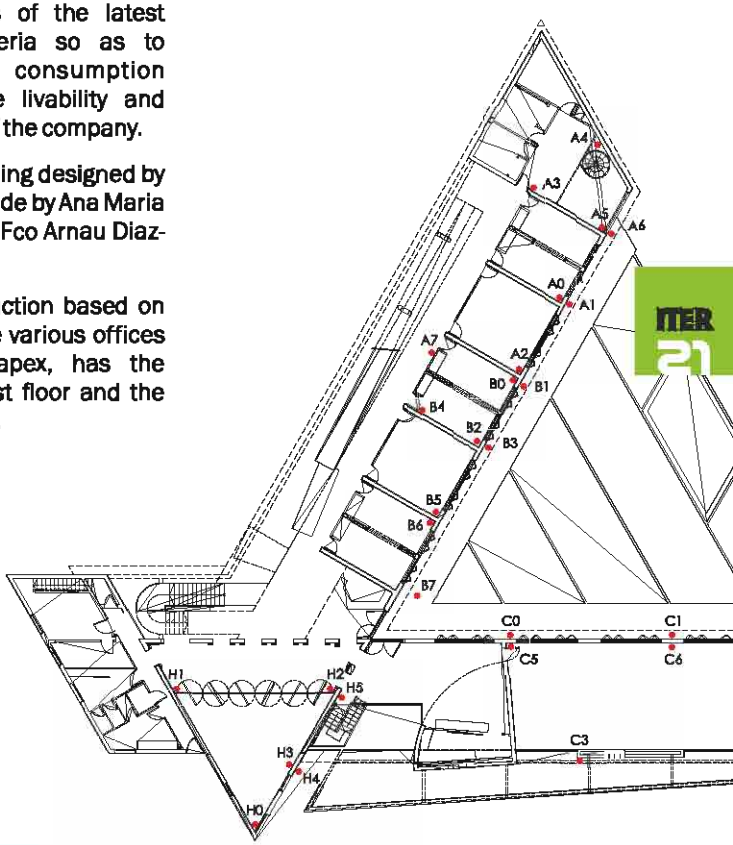
The equipment includes: Equipment for the assembly of prototypes in both insertion and SMT (paste dispensator, Pick and Place, firing process oven). Equipment for the assembly of prototypes in both insertion and SMT (paste dispensator, Pick and Place, firing process oven). Machinery for the realization of prototype printed circuit boards (PCB). Instrumentation for general use in Electronics (logic analyzer, oscilloscopes, waveform generators, frequency, power supplies, etc.).

ITER Headquarters

The headquarters of the Institute of Technology and Renewable Energy was designed on the basis of the latest bioclimatic design criteria so as to minimize the energy consumption required to ensure the livability and comfort of the facilities of the company.

This is a bioclimatic building designed by the team of architects made by Ana Maria Zurita Exposito and Jose Fco Arnau Diaz-Llanos.

It is a triangular construction based on two wings containing the various offices and facilities. At its apex, has the manager post on the 1st floor and the auditorium at the bottom.



Ecocar: Environmental Mobile Unit

The Ecocar is a mobile unit that measures environmental pollution periodically in several points of the island, such as urban and industrial areas.

It´s equipped with a meteorological station, and continuous sensors of ozone, sulphur dioxide, nitrogen oxides, carbon monoxide and carbon dioxide.

Electric Substation

This substation allows the access to the transmission network to 66KV. Its construction has been necessary to overcome the limitations of available capacity distribution lines from the electric company and to evacuate the energy generated by the 7MW and 4MW PV plants and the power for the remaining projects to be developed in the area and even those made previously.

The 66/20kV transformer substation 50 MVA, is connected to the existing substation through a line of high voltage and the photovoltaic plants through MT underground lines that connect the existing transformation centres at the head.

Generation Control Centre Connected with Spain Electric Grid, for Energy Generating Installations in Special Regime

Electricity generating installations in special regime must be appointed to a Generation Control Centre (CCG). The centres must guarantee a secure live dialogue with Electric Grid and its functions 24 hours a day, 365 days a year.

ITER´s Wind Energy and Information Technologies departments are ultimating the details of the control centre associated to the wind and photovoltaic plants that it will manage.

In order to adapt the measurement equipments of the three parks, the let meters were substituted for ones owned by ITER, with the sensibilities required by the regulations, along with their telemetar equipments.

The High-Availability Data-Processing Centre is framed within ALIX initiative promoted by the Cabildo Insular de Tenerife.

This infrastructure will enable the location of the computer and communication equipment that Tenerife needs to become a base for technological companies, which could offer services, both within the archipelago and abroad, to Europe, Africa and America.

The building of the Data-Processing centre will be built in ITER facilities, in Granadilla's Industrial Estate located in the South of Tenerife. The building has been designed as a basic and modular structure, so that construction will be carried out in 4 phases, replicating the initial model.

The first phase, which execution will take place during the year 2010, will have a final built area of 4498.87 m2, of which 1500 m2 will be used for the location of computer and communication equipment, and the rest for auxiliary facilities.

This infrastructure will provide service's levels comparable to those established in a facility with Tier IV classification, as established by the TIA (Telecommunications Industry Association). This classification is based on the high availability of power supply, air conditioning and access to communications with the exterior, from N +1 or 2N +1 redundancy's levels. As an example, the facility will have fuel tanks that would allow the non-stop operation of the installations without external power supply during period of 6 days.

Furthermore, and as other TER facilities, the roof of the building will be equipped with a 400 kW photovoltaic system.

3.

PHOTOVOLTAIC INSTALLATIONS

ITER´S INSTALLATIONS

Finca verde 9MW

Finca roja 3.6 MW

SOLTEN I (13 MW)

SOLTEN II (7+4 MW)

Mercatenerife 100kW

THIRD PARTIES INSTALLATIONS

Metropolitano Tenerife

Mercasa 100 kW

80 kW photovoltaic plant in Valle Guerra

Casa del Ganadero project

FUTURE INSTALLATIONS

900 kW solar photovoltaic installation in TITSA

Regional Winery of Tacoronte (200kW + 100 kW)

1.4 Finca Roja

3 PHOTOVOLTAIC INSTALLATIONS

ITER´s Installations

Since 2007, ITER has devoted great efforts to promote the implementation of PV plants in Tenerife. It has specialized in promoting and implementing projects and in the maintenance of these.

This activity has been slowed down with the recent change in legislation, but the Institute continues to work in this field, researching to improve the process especially in the management and control to achieve a better performance.

9 MW Finca Verde

During the year 2008 this 9MW photovoltaic plant with connexion to medium voltage grid has been installed in Finca Verde, in the location known as "Las Esquinas", in the Municipal Term of Arico. This installation is owned by a unique holder, EVM 2 Energías Renovables S.L., a trading company shared by ITER among others.

This PV plant consists in ninety 100kW units. These plants have been installed with a 10° inclination and S-SW orientation. Each 100kW unit consists of 648 modules with a 23x28 geometry. The solar module used for this project is the model ST 162 P, manufactured by the Japanese company Sharp for ITER.

The inverter used for the connexion to the grid is TEIDE 100 model, designed and manufactured by TER and has already been used in previous projects. Generated energy is evacuated to grid through four transformation centres of 2 MVA and one of 1MVA.

The plant includes a complete control and monitoring system, also designed and implemented by ITER. Monitoring is remote from ITER installations in Granadilla.

The plant was finished in August 2008, and finally obtained in September the definitive description in Administrative Register of Installations in Special Regimen.

3.6 MW Finca Roja

Finca Roja Project was installed in the year 2008, consisting in its first stage in a 3.6 MW photovoltaic plant with grid connecting system of medium voltage. Stage two is a 1.4 MW plant, making the whole plant 5 MW in total. The plant is located in the 204 plot of the area 7 of Arico in a place known as "Las Esquinas".

This installation belongs to one unique holder, EVM 1, Energía Verde de la Macaronesia S.L., shared by ITER among others.

The installation is made up of 36 photovoltaic plants of 100kW, with a southern orientation, above a 10º inclined aluminium structure.

The technology used is the same as in Finca Verda, located in the plot next to it and described before.

The installation of the first stage of the plant ended at the beginning of September, and the final registration in the Administrative Register of Installations in Special Regime was obtained during the same month.

SOLTEN I (13 MW)

SOLTEN I is a photovoltaic solar platform installed in the terrains of Granadillas Industrial Estate. The platform consists of 130 PV modules of 100kW connected independently to the low tension electric grid. Each 100kW PV plant is owned by different holders and ITER acts as executor and manager of the entire installation.

The 100kW PV plants of SOLTENI are south-oriented and have an inclination of 10°, which are connected to one transformation centre in groups of twenty.

This installation has used two different providers of PV panels, which give rise to varied plants geometry and different installed peak powers.

The 100kW inverters used in the installation are the model TEIDE 100 and are designed and manufactured by ITER.

The aluminium support structure has been designed and installed by ITER and is very light, totally modular and can be dismantled. It is composed of pillars, girders and straps, by means of aluminium sections, concrete foundations and galvanized steel strap. The unions are done with screws and stainless steel accessories.

The structures were installed adapting the pillars to the topography of the terrain, so that very little clearing works were needed. Furthermore, the installations were done with the minimum height required, taking into account the measures for the landscape integration.

SOLTEN II (7+4 MW)

SOLTEN II is made up by three installations which make a total of 11MW nominal power. This photovoltaic platform, located in Granadilla Industrial Estate, is constituted by one PV plant of 7MW and two of 2MW.

The 7 MW installation is organized in units of 100kW, each connected to the mid tension electric grid and located in the same plot of SOLTEN I in Granadilla Industrial Estate (at 1.5 kilometres away from ITER). Each 100kW unit occupies 800 m^2 and is composed by PV panels assembled on a light aluminium modular structure. The 70 units that make up this project are connected to the medium voltage connection point of the electricity distribution company, UNELCO-Endesa, being the plant only connected to one medium voltage meter.

The 4MW installation is divided in two areas: 2MW above the ITER´s warehouses, and 2MW ground-mounted, made up of twenty 100kW units each, bound for electric energy generation, through a medium voltage electric grid connexion.

The photovoltaic 7MW installation was already finished in the year 2007(seventy 100 kW units), located in the lands of the industrial estate next to SOLTEN I, obtaining the Final Administrative Register of Installations in Special Regime in the month of September.

The installation of the 4MW photovoltaic plants was finished during the year 2008 (2MW and 2MW), obtaining the Final Administrative Register of Installations in Special Regime in the month of September, too.

Mercatenerife 100kW

ITER has carried out the installation of a photovoltaic plant of 100kW in Mercatenerife.

The 100 kW, which is located on the roof of the warehouse number 1 of Mercatenerife is made of polycrystalline silicon panels of model KC175 of the Japanese manufacturer Kyocera, with a power peak of 107.8kW.

The installation covers an area of 786.69 meters square and the technology used in this project is the same as in those carried out by the Institute, with modular aluminium structures and TEIDE100 inverters both developed and manufactured by ITER.

Third party PV Installations

ITER not only implements projects in which he is the promoter but also carries out such projects for other entities.

80 kW Photovoltaic Plant in Valle Guerra

Photovoltaic installation in the roof of a building bound for agriculture use in Valle Guerra, in the Municipality of San Cristóbal de la Laguna.

This 80 kW powered plant connected to low tension grid, is made up of 504 panels of the model CS170 manufactured by ITER, distributed in 28 lines of 18 panels, so that the peak power is 85.680 Kw.

The inverter used is the three-phase TEIDE 80 model and the panels are mounted in a light aluminium, wholly modular, and removable structure, both designed by ITER. The installation covers a total surface of 940m^2 on the roof.

ITER has taken part drafting the project and installing the plant, being the Orchid Lycaste the company holder.

Casa del Ganadero project

Photovoltaic plant with a total power of 17.670 kW installed in the roof of the Casa del Ganadero which belongs to the Cabildo Insular of Tenerife, in the Municipal Term of San Cristobal de La Laguna. The Cabildo subscribed an agreement with ITER for the construction and exploitation of the photovoltaic installation.

This plant is made up of 114 photovoltaic modules of crystalline silicon, bound for electric energy generation. The installation covers a surface of 148m^2, and the panels are mounted in light aluminium, wholly modular structures designed by ITER.

The plant is distributed in six groups of nineteen panels each, which are manufactured by SolarWorld. The inverter installed has been designed and manufactured by ITER and the installation is connected to the low tension grid.

Metropolitano de Tenerife

ITER has developed and executed the project of a photovoltaic installation on the roof of the workshops and depots of the Metropolitan, in the Cardonal, owned by the Metropolitan Society of Tenerife.

The system covers an area of 4.700 square meters and produces 644 kW of peak power.

The plant is made up of 3.680 solar Shangai Chaori modules, distributed along 20 rows in 6 groups of 100 kW of nominal power each. These solar modules are mounted on a light aluminium structure designed by ITER.

Six Teide 100 three-phase inverters of 100 kW have been used in this project. The photovoltaic plant has been connected in mid tension to the electric grid, injecting the electricity produced into it. The necessary modifications have been carried out in the Distribution Centre of the Electric Company Unelco-Endesa.

This installation was finished in September 2008, obtaining the final register and was completed with 280kW more. This enlargement was finished in January 2009.

100 kW Mercasa

ITER has carried out the installation of a photovoltaic plants of 100kW in Mercatenerife.

The 100 kW, which is located on the roof of the warehouse number 2 of Mercatenerife and is made of polycrystalline silicon panels of model KC175 of the Japanese manufacturer Kyocera, with a power peak of 107.8kW each.

The installation covers an area of 786.69 meter square and the technology used in this project is the same as in those carried out by the Institute, with modular aluminium structures and TEIDE100 inverters both developed and manufactured by ITER.

IITER, participated as the installer of the project, being Mercasa the owner.

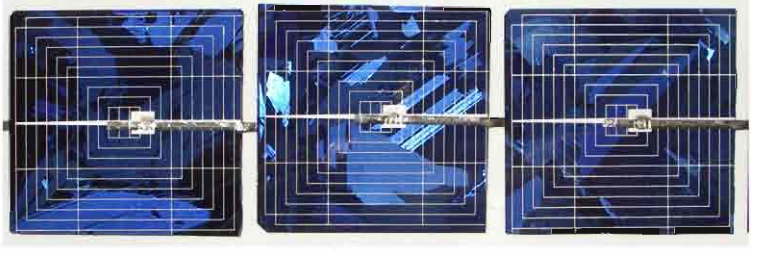
Future installations

900 kW solar Photovoltaic Installation in TITSA

This facility will be located on the roof of the building of the depot TITSA S.A., occupying about 5,706.36 m^2 of the 9,909 m^2 surface available. The facility will consist of 5544 modules, each unit of plant being formed by 616 modules manufactured by ITER. The installation is divided into 9 units of 100 kW, and the technology used is the same as in previous projects of the Institute.

Regarding the administrative handling of this facility, the grid connexion point has been designated, and the Administrative Authorization and the inclusion in the Special Regime obtained, while waiting for the Classified Activities License and the Minor Works License. Once these documents are obtained, the pre-inscription in the power allocation register will be requested.

In turn, the necessary modification works have been handled with the electric company, to change the distribution centre which will host the subsequent connection of the PV system.



Photovoltaic Installation of 200 kW of nominal power. Regional Winery of Tacoronte.

This facility will be located on the building of the Regional Winery of Tacoronte, occupying approximately 1,583.4 m^2 of the 2,477 m2 surface available. The facility will consist of 1,218 modules, each unit of the plant being formed by 609 modules manufactured by ITER. The installation is divided into 2 units of 100 kW and the technology used is the same as in previous projects of the Institute.

The procedures for this installation are already underway, at the moment waiting for a grid connection point from the Unelco-Endesa electricity company and for the pre-registration in the power allocation register.

1,4 MW Finca Roja

The installation of the second phase of the Finca Roja project of 1.4MW is planned to be executed soon and complete the 5 MW. In total the photovoltaic plant will have 5 MW that will be located in the 204 plot of the area 7 of Arico in a place known as "Las Esquinas".

This installation belongs to one unique holder, EVM 1, Energía Verde de la Macaronesia S.L., shared by ITER among others.

Photovoltaic installation of 100 kW nominal power. Regional Winery of Icod.

This facility will be located on the building of the Regional Winery of Icod, occupying approximately 846.67 m^2 of the 1,342.58 m^2 surface available. The facility will consist of 609 modules distributed in a single unit of 100 kW and the technology used is the same as in previous projects of the Institute.

During the year 2008 started the formalities for installing a photovoltaic solar plant with a total power of 100 kW nominal for the production of electricity on the roof of the building of the Regional Winery of Icod.

Currently, the request for the grid connection point from the Unelco-Endesa power company is in process, so as the drafting of the execution project to subsequently apply for the Administrative Authorization and Building License, to obtain thereby the pre-registration in the power allocation register.

4.

WIND ENERGY INSTALLATIONS

2,83MW Experimental Platform

4,8 MW Wind Farm

5,5 MW Wind Farm

New Wind Farms

4 WIND FARMS

ITER´s Installations

ITER counts today with three active wind parks: the Experimental Platform of 2.86 MW, the 4.8 MW Park, and the 5.5 MW one.

As a whole, these three Wind Parks have an energetic production of 36.764 MWh per year. This avoids the consumption of 3.169.100 kg or 3169.1 Equivalent Tons of oil, which would be needed to generate the same amount of energy by the conventional way. The atmospheric emission of 29.411 Tons of CO_2, 198.5 Tons of So_2, 73.5 Tons of NO_x and 4.4 tons of CO are annually avoided.

2.83 MW Experimental Platform

The experimental Platform was financed with the cooperation of several organizations (Cabildo de Tenerife, the Canary Islands Government, UNELCO and the European Union).

It was installed with the aim of testing the performance of different wind turbines, regarding their origin, manufacture and technology.

Each wind turbine uses a different technology: horizontal and vertical axis turbines, fixed and variable pitches, synchronous and asynchronous generators. They show outstanding differences in diameter and height as well: diameters between 25 and 40 metres and heights between 25 and 42 metres.

On the whole, this Farm has a 2.83 MW nominal power.

ITER and ECYR have singed a cooperation agreement for the re-powering of the above mentioned wind turbines. The re-powering will allow the maximization of the wind's potential in the area by substituting the obsolete technology for new one, installing one 200 kW wind turbine ENERCON E-70.

4,8 MW Wind Farm

The 4.8 MW Wind Farm was installed in 1996 by "EÓLICAS DE TENERIFE", a partnership shared by ITER (50%), MADE and UNELCO. It was subsidized by MINER.

At the beginning, it consisted of 16 MADE AE-30 wind turbines, each one with 300 kW nominal Power, the Farm having a total power of 4.8 MW and an energy production of 11 GWh. This model of turbine was one of the tested ones in the Experimental Platform.

Eólicas de Tenerife AIE has requested the administrative authorization and approval of the project for the Re-powering of the Granadilla III Wind Farm, by means of replacing the existing wind turbines for 4 wind turbines ENERCON E-82.

5,5 MW Wind Park

This Farm, installed in 1998, was self-financed by ITER. It consisted of eleven 11 ENERCON E-40 turbines with 500 kW of nominal power with a transformation station each. The estimated annual energy production is of 16, 5 GWh.

The Decree 53/2003 of 30 April, which regulates the installation and operation of wind farms in the area of the Canary Islands, established in Article 7 of the conditions necessary for the repowering of existing wind parks. According to this article, one can increase the unit capacity of wind turbines by replacing them by new ones, which have not previously been put into production. In that case, the power may be increased up to a limit of 50% of the total power of the wind turbines replaced.

A new Wind Farm of 9, 75 MW (5 ENERCON E-70 of 2 MW each one) is planned to be installed in Granadilla industrial estate.

New Wind Farms

A public contest was announced on May 4th 2007 to assign power in the category of new wind farm installations appointed to pour all their energy in the Canarian insular electric systems, as stated in the Order of April 27th of the General Directorate in Industry published in the BOC89.

ITER presented three wind farms to this contest:

- Wind Farm of the Environmental Complex of Arico, with a power of 18.4 MW, to de installed in the Municipal Term of Arico, promoted by ITER.

- La Roca Wind farm with 18,4 MW, to be installed in the Municipal Term of Granadilla, promoted by the Economic Interest Group "Parques Eólicos de Granadilla", of which ITER is part.

- Areté Wind farm, with 18,4MW, to be installed in the Municipal Term of Granadilla, also promoted by the Economic Interest Group "Parques Eólicos de Granadilla".

The assignment of wind power for the island of Tenerife was resolved with the Order of the 15th of June 2009, where the Environmental Complex Windfarm Arico and the wind farm The Rock gained power. This publication opened a deadline for the replacement reports. Due to the score of the three parks submitted by ITER was reduced by the Ministry, appeals were lodged concerning the three parks. Those appeals were resolved by Order 960/09, dated December 14, 2009. On January 14th, 2010 the final power allocation for the island of Tenerife was published, where ITER got the following parks:

- Wind Farm Complejo Medioambiental de Arico de 18,4 MW.

- Wind Farm La Roca, de 16,8 MW.

- Wind Farm Areté, de 18,4 MW.

.5.

SERVICES

Wind tunnel test of "Overall efficiency of the solar plane prototype Engine"

Project writing for renewable energy installations

Photovoltaic Test Platform

Connectivity Project for AMPAS (Parent-student associations), youth associations and women associations in Tenerife

Development of the Tenerife Local websites and web pages of the municipalities

ITER Photovoltaic Module

Manufacturing of the TEIDE 100 Inverter

5 SERVICES

In order to transfer the technology and knowledge acquired by the ITER along its existence, the Institute has implemented a range of services. These services are available to businesses and other institutions both nationally and internationally.

The services offered by ITER involve from writing projects, to the use of laboratories and infrastructures. Among them are also services related to new technologies or manufacturing on demand of various components for photovoltaic systems.

Wind tunnel test of "Overall efficiency of the solar plane prototype Engine":

The whole solar plane propulsion system is made up by the battery, the inverter, the engine, the reductive and the propeller. Since the propeller has been designed specifically by ITER for the project, studies in the wind tunnel to determine the overall efficiency at different speed and power inputs have been required in order to know the behaviour it will have in real operating conditions.

The test consisted in measuring the thrust of the whole system with a load cell, so as the revolutions of the propeller. The tests were made at different wind speeds and power inputs of the inverter, within the expected range of operation of the airplane.

Proyect writing for renewable energy Installations

The experience in renewable energy facilities acquired in the past two decades makes ITER an expert in project in drafting and subsequent implementation.

ITER drafts projects both for PV installations, as for wind farms, counting with three executed wind farms, the approval of several projects to repower the parks and more recently the approval of three projects submitted to the last contest of power allocation Canary Islands Government.

In the area of photovoltaic ITER has been responsible for the installation of over 45 MW in the last five years.

Enhance renewable energy installations on the islands and therefore the increase in the percentage of energy generated from renewable energies is one of the main objectives of ITER.

Photovoltaic Test Platform

ITER lends its lands to carry out PV platform tests, as for example the installation and monitoring of a Sharp Photovoltaic Concentrator.

Fulfilling with an agreement signed between the SHARP Company and ITER S.A. at the beginning of the year 2008, a prototype of a photovoltaic Concentrator was installed in the tryout camp for Renewable Energy Mechanisms which was developed by the Japanese company.

The prototype consisted of 27 modules, each articulated in 10 high efficiency cells of triple union, with a concentration optics type Fresnel and a passive system of heat evacuation.

The set goes mounted on a two axis supporter, which allows a maximum exposure to solar radiation during the whole year.

The concentrator's power is of 2,922 kW and to have a reference system, a photovoltaic plant was installed on a fix structure oriented 21° south, made up of 19 conventional photovoltaic modules, achieving a 2.916 kW power.

Both mechanisms, the concentrator and the conventional plant, were provided with the same type of inverter, a Sunplug model SPO 3000, along with a monitoring system developed ex profeso by ITER, which automatically connects with ITER meteorological plant and to a ftp server entitled specially for this.

This monitoring system allows the working parameters of the mechanisms involved to be stored and sent in real time to Japan with the meteorological conditions of the moment.

Connectivity Project for AMPAS (Parent-student associations), youth associations and women associations in Tenerife

Cooperation with the Youth, Education and Women Area, in the development of a concession of internet broadband connection program for associations of youth, women and AMPAS of Tenerife. ITER has been providing assistance for years to these associations in Tenerife. After defining a connectivity model which did not depend of its physical location, a connection system through mobile telephone 3G HSDPA technologies was chosen.

Development of the Tenerife Local websites and web pages of the municipalities.

ITER has reached an agreement with the Cabildo de Tenerife to develop and coordinate the Tenerife Local website, focused in providing more web presence to the municipalities of the island, within the website (www.tenerifelocal.es), as well as to increase the electronic administration abilities.

This project lies within the framework of the PMC, a Plan for the Modernizarion of the Municipalities of the island. Within the agreement,a selection of portal development tool based on open source applications has been carried out.

Up till now, the development or technical support for thefollowing municipal websites has been performed: Santiago del Teide, Buenavista del Norte, San Miguel de Abona, Los Silos, Garachico, El Sauzal, Arafo.

ITER Photovoltaic Module

ITER manufactures photovoltaic modules both for itself and on request. The technology designed by the Institute makes possible the production of Multicrystalline solar cell modules exceeding 16% conversion efficiency.

The cell circuit is laminated using E.V.A. (ethylene-vinyl acetate) as encampsulant in a group made of a tempered glass on its front surface and a plastic polymer (TEDLAR) on its back surface that provides of resistance to environmental aggressive agents and electric isolation. The laminated end product is fitted into an anodized aluminium structure.

The characteristics of this module will give a great versatility, being the ideal candidate for grid-connected photovoltaic applications, as well as isolated photovoltaic installations.

These photovoltaic modules are designed and certified according to rules IEC61215, IEC61730-1, IEC61730-2, CE.

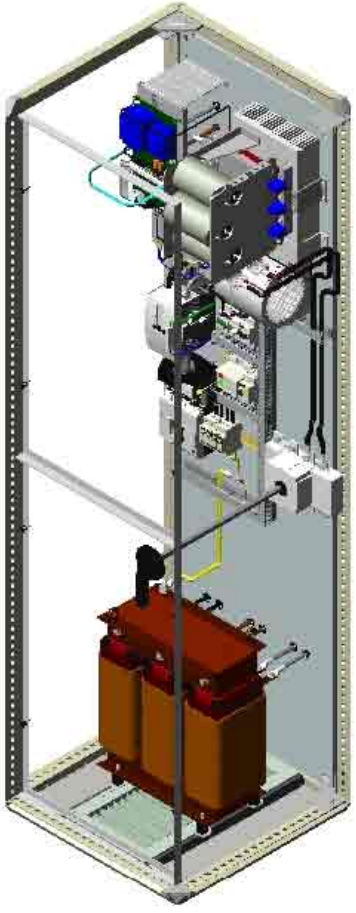
Manufacturing of the TEIDE 100 Inverter

The TEIDE 100 inverter, designed and manufactured by ITER, is a 100kW triphase Power Inverter for grid connection.

It has all the electrical safety devices required by Article 11 of the royal decree 1663/2000, dated 29th September, on the connection of photovoltaic installations to the low voltage grid. For nominal power above 30%, the measured efficiency was 98.5%.

TEIDE 100 inverter is able to communicate with a control PC through the MODBUS protocol by means of a RS-485 interface. Management software makes possible to monitor the inverter's operation, and to control them if necessary,

Besides, the inverter has gotten the CE marking and has successfully passed the electrical safety and electromagnetic compatibility tests proposed by the UNE-EN 50178 and UNE-EN 61000 standards.



R&D

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EURO-SOLAR programme

HYRESS project

ORECCA project

Participation in the initiative Tenerife with Senegal

Feasibility study to develop a solar plane and manufacture its first prototype

Weather forecast

Development of an Inverter for Energy Storage in New Generation Batteries

CO_2 diffuse emissions of the Timanfaya volcano, Lanzarote, Canary Islands

Teide 2010

Co_2 diffuse emisions in Decepcion volcano, Antartica

Tenair 2009

Geothermal exploration by application and use of geoquimical methods in Ruanda, Africa

Seasonability of meteorological processes responsible of atmospheric pollutants REGional TRANSport - TRANSREG

Iberoamerican Vulcanology net

Fumes and volatiles geochemical prospection in the superficial atmosphere of Garehagua grid (Tenerife) for geothermal exploration

Live monitoring of CO_2 diffuse emissions in Izu Oshima volcano, Japan

Strengthening the prompt warning systems facing the volcanic phenomena in Nicaragua, Philippines and Cape Verde

Development of a Self-guided Vehicle for the Transport of People in ITER's Bioclimatic Dwellings

6 R & D

One of the main activities carried out by ITER is the development of R&D projects in all of its working areas. A big amount of these projects are focused in improving the technologies and processes to obtain energy from the main renewable energy resources.

Although each Department carries out its own projects, it is in this activity line where the synergy between all ITER's departments acquires greater importance.

Euro-Solar Programme

The EURO-SOLAR Programme is a pioneering initiative from the European Commission's EuropeAid Cooperation Office at world level. The main goal of the Programme is to foster the use of renewable energy as a driver of human development in Bolivia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Paraguay and Peru, the eight poorest countries in Latin America. The Programme involves the installation of 600 generating kits using 100% renewable energy sources. The equipment consists of photovoltaic panels and, in some cases, a back-up wind generator.

ITER has taken part in the project's actions since the initial phases, in which the Program was still being defined by the EC, and it provides technical support to the administrative services of the EC. Its functions are:

- To assist the EU with the technological design of the renewable-based electricity generating systems that are going to be installed in the selected areas.

- To participate during the bidding process, providing technical support to the EC during the offers' evaluation and carrying out the evaluation of the prototypes installed by the bidders.

- To develop software for the installations' management and communications, in order to handle the registration and receipt of the 600 installations in the beneficiaries' countries.

- ITER participates in the provisional acceptance procedure (PA), where both remote and in-situ verifications are carried out. This procedure has been developed in conjunction with a web application in order to ensure both transparency and traceability either of all actions and all actors involved in the process (Companies, ITER, Technical Assistance, EC, Communities).

- To monitor and track the installations, obtaining information about the operating status of the equipment and use of the installations from the persons responsible for in each of the communities

- To participate in the coordination of the Program's activities, in the periodic meetings with the EC services and the company responsible for the technical assistance in the beneficiaries countries.

- The Diffusion and technological visibility of the Program through the exhibition of the prototype installed at ITER and the submission of papers.

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

The HYRESS Project (Hybrid Renewable Energy Systems for the Supply of Services in Rural Settlements of Mediterranean Partner Countries), is a project financed by the 6th Framework Programme (FP) of the European Commission, International co-operation (INCO) inside the specific measures in support of international cooperation involving Mediterranean countries (MPC). This project which started in the year 2006, aims to design and install small electric grids that will supply energy to the selected isolated rural populations in countries of northern Africa.

Several meetings have been held with the National Agency for Energy Conservation in Tunisia during the past years, along with a variety of visits to villages in order to strengthening the coordination activities. The Ghilène Ksar village is one of the enclaves in which one of the facilities is expected to be carried out, as is the village of Lkaria, where a "mini-network" combining electricity generation and the generation of potable water will be installed.

These meetings are used to confirm the life and working conditions in the Sahara, in order to reinforce the starting data and optimize the installation's design.

One of the project's meetings was held in Alexandria in May, 2009. This meeting was complemented with a visit to the Wadi El- Natroon settlement, where an installation of a mini network powered by a PV and wind hybrid system had been carried out. The energy generated will be used to supply electricity both to the settlement's houses as for the desalination plant for the production of fresh water for human consumption and for irrigation. A workshop on mini networks aimed at students and professionals of the area took place at the same time.

Also performed along with the project's schedule, the installation of the system was carried out in Ksar Guilene (Tunisia). This system combines wind and photovoltaic energy for central electricity production in this rural settlement, where some 50 families live. In addition, small communal facilities such as schools, mosques, public baths and health centre were also connected to the network. Shortly they will begin monitoring the system and conduct new surveys among villagers to analyze the evolution of the solution.

The project also has been presented at the 24th European Photovoltaic Solar Energy Conference and Exhibition held in September 2009 in Hamburg (Germany) and the Symposium Small PV-Applications - Rural Electrification and Commercial Use, held in Ulm (Germany) in May of the same year.

ORECCA Project

The ORECCA Project is a project financed by the 7th Framework Programme (FP) of the European Commission coordinated with the Fraunhofer IWES Institute. It counts with 28 different members form Germany, Spain, Italy, Norway, Portugal, United Kingdom, Holland, Ireland, Denmark, Belgium, Canada and the United States.

The main goals of the ORECCA Project, which started during the first trimester of the year 2010, are to create a frame where to exchange knowledge and develop a work plan to carry out investigation activities within the context of renewable energies off-shore. In particular, this project will promote the collaboration in investigation activities that aim innovation, (technical, economic and environmentally), of off-shore platforms of renewable energy conversion, both in combined use as in complementary use as for example in agriculture.

The project's activities will favour the dissemination of knowledge, focussing in three groups: the industrial investors and technology suppliers, investigation organizations and technology developers and the responsibles for energy policies, including the European Community.

The project, which will last 18 moths, will aim the development of the ocean's energy sector in a sustainable and non damaging manner for the marine environment. The project aspires to overcome the technical knowledge fragmentation in Europe and promote its transference between the different investigation organizations, in the industrial sector and politicians.

Participation in the initiative Tenerife with Senegal

This initiative has been launched by the Cabildo of Tenerife in order to develop different cooperation projects with public entities of Senegal, supporting the implementation and improvement of diverse economic sectors.

Regarding ITER, the participation focuses on making the most of the experience gained during the development of the EURO-SOLAR program, with the installation of a test plant in a school with renewable energy supply in a village in the region of Ranerou, in the northeast Senegal.

Feasibility Study to develop a Solar Plane and manufacture its first prototype

This study takes place within the financial frame of the Aerospace Subprogram in the frame of the National Plan of Scientific Research, Development and Technological Innovation. Along with the study, the prototype has been manufactured parallel to the development of the results of the research. This way the company can apply to the results of this investigation line and be competitive,

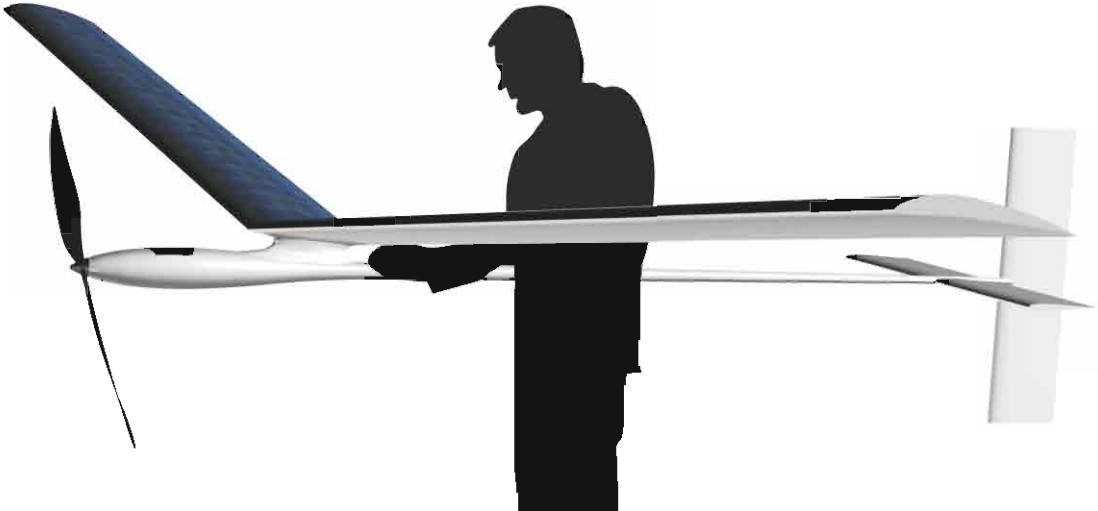
The ultimate goal of the project is to build a non polluting plane with Earth observation and vigilance applications.

In order to develop the prototype, the Agencia Canaria de Investigación, Innovación y Sociedad de la Información will help within the call to carry out R+D projects for companies and research groups.

The prototype, that is now being developed, is 6.3 meters wide and the photovoltaic cells laminated over the wings provide a total power of 400 watts. The fuselage of the plane was built in epoxy resin and Kevlar fibre, thestructure of the wings and tail will be made out of Fiberglas and carbon fibre with a structure of balsa wood and Styrofoam. Both wings on the bottom, as the whole tail, will be covered with transparent polyester film.

The aircraft is equipped with an autonomous navigation system so as to be capable of maintaining both a predefined path and take the most appropriate strategies for flight with the energy available, depending on the environmental conditions of solar radiation. The navigation system receives data from various inputs: GPS, available power, gyroscopes, accelerometers, etc.

From this information, the aircraft will undertake the necessary actions to maintain stability and direction. This navigation system is also equipped with a telemetric radio link, so that the flight parameters can be tacked from a ground station, indicating changes in them if necessary.



Weather Forecast

Weather forecasting is a very inportant tool when dealing with renewables, therefore, ITER has continued working to improve the Institute's weather forecasting system. Changes were made so that now the forecasting is done with the WRF model ("Weather Research and Forecasting Model") that has updated applications with more efficient tools for the selection of domains, prediction of wind, etc.

Nowadays, the department is in process of programming the model to make local and regional forecasts and to develop an online service of weather information. The first data on wind predictions and solar radiation is being collected and compared with the real data from ITER weather station, to verify its accuracy and correct the possible deviations.

ITER 60

Development of an Inverter for Energy Storage in New Generation Batteries

This project counts with a grant from the Ministry of Industry, Tourism, Commerce, and its aim is to support renewable energies in its penetration in the electrical system, which implies the need of an energy of high-capacity storage system, thus eliminating the significant impact on the operation of the electricity network these sources of renewable generation are increasingly present.

This project is the first step in the evaluation of the capacities and costs of such storage systems for its implementation on a larger scale.

The infrastructure needed to accommodate the storage system has been adapted and is located in one of ITER´s warehouses. A prototype of an 1MW inverter has aslo been developed along with the power system needed to adapt the storage system to the inverter.

CO_2 diffuse emissions of the Timanfaya volcano, Lanzarote, Canary Islands

This three year investigation Project was granted by the Science and Innovation Ministry.

The reasons to carry out this type of scientific campaigns are originated in the impossibility of obtaining this information through permanent instrumental networks, with the conviction that fumes are the driving force of volcanic eruptions and on the relevance of carbon dioxide in volcanic surveillance programmes. This kind of studies is extremely relevant because of carbon dioxide is the second principal component of volcanic emissions, after water steam, and because of its low solubility in high silicon melted contents –magma- making carbon dioxide easy to escape from deep volcanic systems.

Teide 2010

Since 1997, ITER has been working to optimize and improve the volcanic surveillance in the island of Tenerife providing a multidisciplinary approach to the volcanic phenomena monitoring.

Nine geochemical stations and nine more geodesic ones are operated and maintained within the frame of this project for the volcanic surveillance of Tenerife. Three of the nine GPS antennas have been handed by the Nagoya University which collaborates actively with the surveillance task.

Beside these geochemical and geodesic surveillance tasks in continuous mode, other geodesic surveillance work is done in discreet mode with the goal of optimizing the volcanic surveillance in the island of Tenerife.

CO_2 diffuse emisions in Decepcion volcano, Antartica

This project has been financed by the National Research Subprogram of Polar Investigation of the Science and Innovation Ministry. The project has taken place with the participation of researchers from ITER and the universities of Düsseldorf, Toyama and Tokyo.

The purpose of this project is to evaluate how much carbon dioxide the Decepcion volcano emits to the atmosohere and measure the space distribution of the carbon dioxide diffuse flow in this volcanic system. The Decepcion Volcano is in Decepcion island, place where the "Gabriel de Castilla" Antartic Base is located. This base is in charge of the Mayor State Operations Division of the Army and it is 100 km north from the Antartica, in the Strait of Bransfield. Decepcion Island is the top part of a volcano in a young volcanic shield which is still active and last erupted in 1967, 1969 and 1970.

Tenair 2009

The environmental quality of air and the improvement of our knowledge about atmospheric pollution emission sources in Tenerife as well as their inmission levels is the goal of this project.

To materialize this goal, there is a mobile unit equipped with sensors, that includes sensors to measure in continuous mode atmospheric polluting agents (particles, SO_2, NO_x, O_3, CO and CO_2), as well as a canister and an electrovalve system to take air samples and periodic analysis of volatile organic compounds (VOCs) in the environment air of Tenerife. They also count with remote optical sensors (COSPEC y OPFTIR) that allow the evaluation of pollutants from fixed sources and form the air quality.

Geothermal exploration by application and use of geoquimical methods in Ruanda, Africa

This geothermal exploration project in Ruanda has been developed by ITER and financed by the German Federal Institute of Geosciences and Natural Resources (BGR) with the purpose of performing geochemical studies applied to the exploration of geothermal resources in this African country. Nowadays, Ruanda´s Government is evaluating the geothermal potential in the northwest region of the country. These studies have the collaboration of Ruanda's Ministries of Infrastructure and Natural resources in collaboration with BGR. Geothermal exploration works developed by ITER consisted in performing a geochemical prospection of gases and volatiles as well as a geophysical prospection of the temperature gradient in an area of 140 km^2 approximately located in the northeast of Ruanda, very near to Karimbishi volcano.

According to a preliminary report written by the EEUU Geothermal Energy Association in 1999, Ruanda's geothermal resources are enough to provide the 100 per cent of the country's electrification. Nowadays less than 10% of the population in this country has access to electricity.

Seasonability of meteorological processes responsible of atmospheric pollutants REGional TRANSport – TRANSREG

This Project leaded by CEAM Foundation (Valencia) and in which the ITER´s Environmental Area research personal also takes part, is devoted to, firstly, seasonal description (spring versus summer) of meteorological processes which regulate the dispersion and transport of toxic fumes and aerosols, as well as their feedbacks and synergies associated with the occidental Mediterranean basin. Secondly, this is an applied research project with direct implications on the activities that the city councillor for Territory and Housing of Valencia maintain in ralation with surveillance, control and air quality in the Valencian Autonomus region.

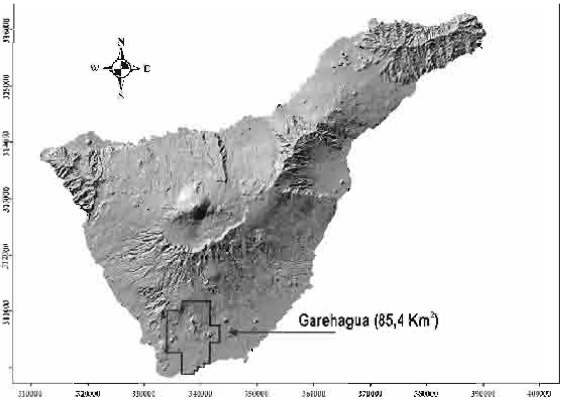
Its foreseen that the results of this study will be useful to complement surveillance and air quality prediction works all over the Mediterranean slope as a consequence of increasing the knowledge of the relationship between mesoescalar meteorology of the Mediterranean basin and the atmospheric pollutant concentration. TRANSGREG has been co-financed by the Science and Innovation Ministry.

Iberoamerican Vulcanology net

This net promoted and started by ITER is a new technical-scientific association. The founder partners of this new non profit organization, constituted by the will of iberoamerican institutions and foundations interested in the development of vulcanology and the volcanic risk management in the iberoamerican community are: el Instituto Tecnológico y de Energías Renovables (ITER), el Instituto Nicargüense de Estudios Territoriales (INETER), la Universidad de Buenos Aires (Argentina), la Universidad de Colima (México), el Observatorio Vulcanologico e Geotermico dos Açores (OVGA), el Ayuntamiento de la Villa y Puerto de Garachico, la Universidad Internacional Menéndez Pelayo (UIMP), la Universidad de La Laguna (ULL), la Univervisidad de Castilla La Mancha (UCLM), la Universidad de Granada (UGR), la Fundación Telesforo Bravo y Juan Coello, el Laboratorio de Engenharia de Civil (LEC) de Cabo Verde, y el Instituto Filipino de Volcanologia y Sismología (PHIVOLCS).

Fumes and volatiles geochemical prospection in the superficial atmosphere of Garehagua grid (Tenerife) for geothermal exploration.

This project copes with the execution of geothermal works applied to geothermal resource explorations in Tenerife. The first part of the geothermal exploration has been made in the south part of Tenerife during the summer of 200. In this first phase, works consisted in making a geochemical prospection of fumes and volatiles as well as a geophysical prospection of the heat flow on the superficial environment of one of the four principal mining areas distinguished by Petrathem Hispania S.L. in Tenerife. This works have been developed in the mining area known as Gareghagua, with an extension of 85,4 square kilometres sited in the municipalities of Arona, San Miguel, Granadilla and Vilaflor. The geochemical and geophysical prospection in Garehagua enabled hundreds of fume and volatile measurements on site, as well as heat flow measurements of the superficial environment in the studied area. At the same time, samples of fumes were taken from the 600 surveillance places related with this study for their later chemical and isotopic analysis in ITER´s Geochemical Laboratory.



Live monitoring of CO_2 diffuse emissions in Izu Oshima volcano, Japan

Since 2007, ITER and the Chemical Laboratory of Earthquakes of the Tokyo University (Japan), have been developing a live monitoring project of CO_2 emissions in Izu-Oshima volcano with the purpose of strenghening the geochemical programme for the volcanic surveillance.

In Izu-Oshima volcano, located 110 km southwest from Tokyo, 39 volcanic eruptions have been registered in the last 100 years, the last one in 1990. Volcanic eruptions with a higher explosivity index have occurred in this volcanic building in a gap of 50-135 years along the last 1500 years. The first research efforts about diffuse emissions of carbon dioxide in Japanese active volcanoes (Myiyake-jima, Usu, Tarumae, Hakkoda, etc.) where made by ITER´s researchers in collaboration with Tokio University scientists.

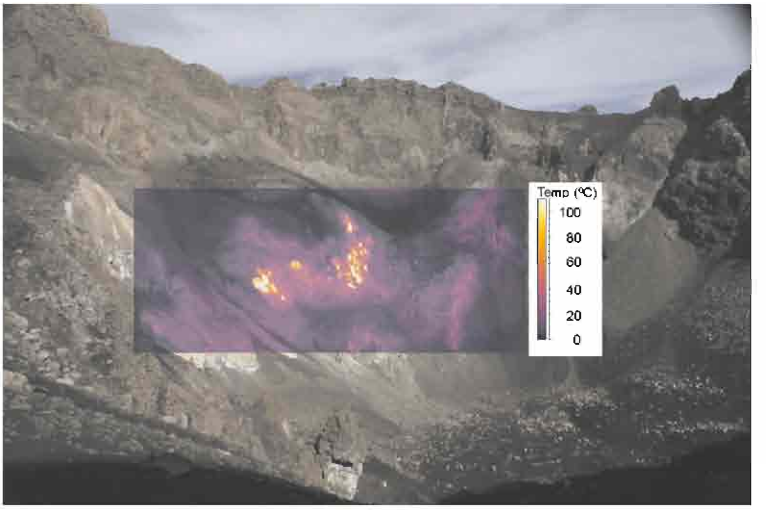
One of the most important results was published in the prestigious scientific magazine Science and was related with the high increment of CO_2 diffuse emissions observed in the volcano Usu (Hokkaido, Japan) 6 months before it erupted in year 2000.

Strengthening the prompt warning systems facing the volcanic phenomena in Nicaragua, Philippines and Cape Verde

The main goal of these three international cooperation projects financed by AECID is to provide the bodies responsible for the seismic and volcanic surveillance in Nicaragua, Filipinas y Cape Verde with the capabilities and technical resources needed to strengthen the volcanic surveillance in Nicaragua, Philippines and Cape Verde by incorporating the works on diffuse carbon dioxide (CO2) measurements as a scientific-technical tool to enhance the detection of early warning signs of volcanic adverse events (seismic-volcanic crisis and volcanic eruptions) in these three countries.

The bodies in charge of the seismic and volcanic surveillance in these countries are the Instituto Nicaragüense de Estudios Territoriales (INETER), the Philippine Institute of Volcanology and Seismology (PHIVOLCS) , the Laboratório de Engenharia Civil de Cabo Verde (LEC), the University of Cabo Verde (UNICV) and the National protecção Civil Service (NCPS) of the Government of Cape Verde.

The research activities, which have been carried out within the frame of these projects, have been mainly focused in Cerro Negro and Masaya volcanoes in Nicaragua, in São Vicente and Fogo volcanic island's systems in Cape Verde, and Pinatubo and Taal in Philippines.



Development of a Self-guided Vehicle for the Transport of People in ITER's Bioclimatic Dwellings

This project is carried out in cooperation with Department of Automatic Control and Systems, University of La Laguna.

The aim of the project is to develop a control system that allows the traffic of vehicles autonomously without a driver, in a controlled environment. The activities of this project began in 2002, and this work line has continued by means of funding from different sources, both regional and national.

ENGINEERING AND NEW TECHNOLOGIES

.7.

Cooperación Agreement with public administrations for the development of the Information Society

Participation in the development of activities within the ALIX initiative

Cooperation with the Agriculture Technical Service of the Cabildo de Tenerife

Cooperation agreements with the Insular Institute of Computing and Communications (IIIC)

TIC application projects for physically disabled people

Development of a 1 MW power inverter

Development of 3 kW single phase inverters

Development of a 1 MW continuous electric feed system

Continuation with the development line of 100kW power inverters

Monitoring and data register system for the study of the thermal comfort

Maintenance works

Telecomunication systems for the bioclimatic dwellings

Development of monitoring and management systems for energy production installations

Development of applications

7 ENGINEERING AND NEW TECHNOLOGIES

ITER works in the development of Information Technologies, offering services related to the New Technologies, developing web Communications and carrying out several projects and agreements to provide access to the network. The implementation and promotion of applied research in the field of renewable energies, along with the development of the technological systems needed to make use of these energies is one of the goals of the Institute.

Cooperación Agreement with Public Administrations for the development of the Information Society

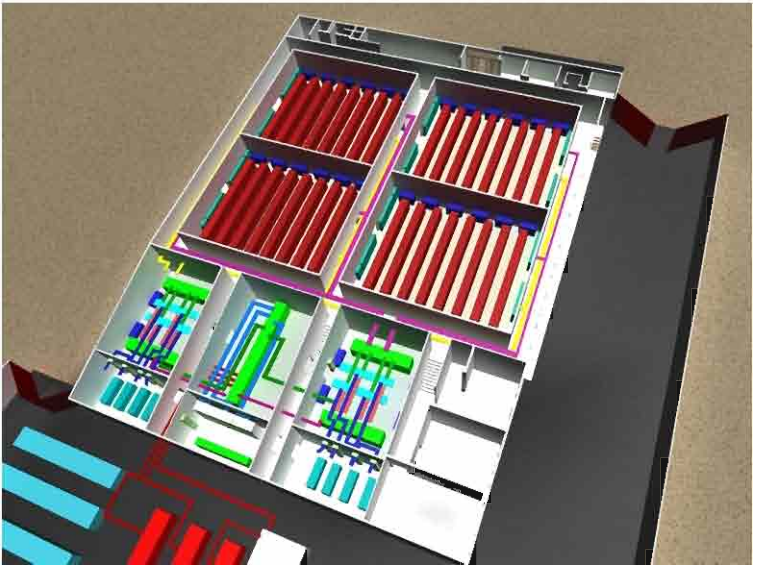
Iter keeps a line of work cooperation with different public organizations in order to develop different projects which pursue the same objective: to improve the access conditions to Information and Communication Technologies (TIC). Improving the availability of Internet services in general and the Electronic Administration services in particular.

Participation in the Development of Activities within the ALIX initiative

The Information Technology Department has performed different supporting actions according to ITER´s participation as promoter of the different projects that constitute the ALIX initiative, promoted by the Cabildo de Tenerife, such as:

- Cooperation with NAP for the project´s analysis and the definition of technical needs of the installations. ITER´s technicians took part and carried out full monitoring actions during the different steps taken to define the requirements that the high availability installations of the NAP must fulfil. The various systems that make up this infrastructure have been analyzed from the execution projects presented, establishing the requirements and costs associated to this installation.

-Cable Infrastructures definition for terrestrial connectivity in Tenerife. ITER has carried out a deep analysis of the different technological alternatives existing to perform the design of an optical fibre insular ring. In the framework's initiative, other proceedings have been carried out, such has constructive proceedings, types of wiring and fibres, possible routes and links between different nets, etc. Therefore, these studies have been used in the representation of the offer for the supply of dark fibre and optical equipment to Iris Net.



Cooperation with the Agriculture Technical Service of the Cabildo de Tenerife.

This collaboration started with the development of the websites www.agrocabildo.com and www.casadelamiel.com.

From then on, that cooperation has continued both in the hosting maintenance and in the improvement of the websites as in the development of a management and analysis application of the information collected by the data bases of the automatic stations distributed all over the island with the purpose of providing information about meteorological advises and water recommendations for farmers of Tenerife.

Cooperation Agreements with the Insular Institute of Computing and Communications (IIIC)

These agreements aimed the development of different joint activities, ranging from the improvement of quality application models in engineering software, to technical support in the development of websites for the Cabildo de Tenerife. Studies have also been conducted for the possible application of certain solutions based on free software, support in drafting specifications and evaluation, and the study for the implementation of an alternative support CPD in ITER installations.

TIC Application Projects for Physically Disabled People

ITER cooperates with SINPROMI since 1995, participating in a financed project within the European programme such as HORIZON II, and has remained in different projects until now. In 2009 we received the approval for the proposal presented in the 1st announcement for the ITERREG PCT-MAC 2007-2013. In this Project, ITER will carry out the development of different technical helps which are ment to improve the quality of life and the personal independence of physically disabled people.

Development of a 1 MW Power Inverter

Design and development of a 1MW triphasic-power inverter for the energy storage system in batteries of new-generation.

The inverter draws power from the batteries at certain moments and then transforms it and injects it into the electric grid.

The control phase of the inverter governs the energy extraction under order, depending on the energy demand at each moment.

The control phase must also ensure that each inverter module works at its optimum performance point, ensure the homogeneous wear out of all the inverter modules and manage how many modules should be working according to the order given.

Development of 3 kW Single Phase Inverters

Design and development of 3kW inverters for photovoltaic installations in households, whose immediate application would be the installation in the 25 bioclimatic dwellings situated in the terrains of ITER.

These single-phase inverters for small PV plants on roofs have the development objectives of reducing the size and weight while increasing its efficiency.

These inverters will be easily adapted for lower working powers, reducing in this way its manufacturing cost.

Development of a 1 MW continuous electric feed system

A voltage inverter for applications in uninterrupted electric feed systems (UFS) up to 1MW power and a battery charger up to 100kW have been designed and developed.

The battery's charger must be designed to work with unit power factors due to the high working power voltage. This way, mains disturbances and transportation losses are avoided.

The system will be preferably online with the aim of reducing the use of mechanical components and improve reaction time. In the usual operation of the grid, energy is taken out from the grid and then introduced again by means of the inverter. In case of a voltage-lack in the grid, the inverter takes out the energy from a set of batteries, guaranteeing electrical feed for the connected equipment at all times. The right design of the inverter allows improving the quality of electric power making it independent of any voltage peak or drop.

Continuation with the Development Line of 100kW power Inverters

Several changes have been carried out in the Teide 100 photovoltaic inverter for grid injection. These changes affect mainly the redesigning of the control system in order to add certain functions to the current system.

Monitoring and Data Register System for the Study of the Thermal Comfort

Design and development of a control system that works with a microcontroller, which allows to capture data from a set of humidity, temperature and air velocity sensors and transmit them through the MODBUS RTU communication protocol for the RS485 serial port.

This system has been designed for its installation in the bioclimatic dwellings located in ITER facilities.

The data obtained will allow us to make an indoor thermal comfort study under real use conditions in bioclimatic dwellings with different typologies. The final aim is to carry on a comparative study of the dwellings, in order to develop design guides and integration guidelines of active solar systems and domotics from real data of energy efficiency.

Maintenance Works

The Electronics Department contributes in the maintenance and operation works of the inverters installed in ITER´s different photovoltaic platforms.

Telecomunication Systems for the Bioclimatic Dwellings

ITER develops several activities for the definition, acquisition and installation of different information systems in ITER's Bioclimatic Dwellings:

- Design, installation and configuration of the television signal's distribution system through the conversion into IP signals.

- Installation of the telecommunication systems towards and within the dwellings

- Collaboration with ITER's Electronics Department in the definition of the communication systems for the acquisition of the monitoring data.

- Design and development of the website with general information and booking application.

Development of Monitoring and Management Systems for Energy Production Installations

Each of the energy production installations is connected via a corporate network, using different technologies and communication protocols. Among the interconnection technologies we have: optical fiber, for Ethernet data transmission between installations; twisted pair cable, used both for data transmission through Ethernet and for serial communication of the equipment; wireless communication, for data transmission both for short and long distance.

This network allows the data of energy production and operation of plants to be gathered in a central SCADA server located in ITER´s facilities.

At the same time, data can be displayed in real time from anywhere in the world using a web browser. To complement this system the installation of a video surveillance system with modern IP video cameras has been carried out allowing the connection through the same Ethernet communication's systems used for the interconnection of the rest of installations.

Furthermore, the infrastructure that allows to obtain real-time information form the inverters, energy meters, security systems and meteorological data acquisition stations have been developed in the different energy production units, both wind parks and photovoltaic plants.

Development of Applications

One of the activities of the Information Technology Department is the design and development of software applications adapted to the specific needs of other departments, either for internal use or for its external publication as a website. Support in graphic design activities is also provided, not only oriented towards the application's development but also towards the preparation of dissemination material.

Among the applications developed by the Department there are:

- Development and maintenance of ITER's webpage
- Software for enabling investor access to the production data
- Management of SOLTEN II investors
- Control system for staff costs charged to projects
- Software for data exchange between different systems (HR, accounting, local DB)
- Link system with CajaCanarias viratual TPV gateway for online payment services

BIOCLIMATISM

8

25 Bioclimatic Dwellings

Design patterns to optimize energy consumption and the sustainable energy generation in single-family houses in warm climates

Renewable energy integration in buildings

8 BIOCLIMATISM

Based on the needs identified by the Institute in the recent years and following the existing investigation lines, ITER created the Bioclimatism Department with the aim of researching and developing architectural techniques to design and construct buildings according to the climate, geomorphology, vegetation and water in order to reduce the energy consumption and increase thermal comfort. Another of its functions is to cover the need for technical advice for other projects and activities developed by the Institute.

25 Bioclimatic Dwellings

This project aims to the design and implementations of an urban complex developed under the criteria of bioclimatic architecture, capable of being self-sufficient in terms of energy and optimize the adaptation to surrounding conditions of the environment. It will be an autonomous, non-polluting and with open spaces inspired by ecological principles.

All projects are materialized although some are still working in the completion of integrating renewable energy systems.

Within the integration of renewable energy sources several fields are being developed:

a) Installation of small wind turbines integrated into houses and directly connected to the net consumption of the housing, with the fundamental premises of reducing transmission of vibration to the structural system, reducing the noise impact and the maximum power generation within the small scale wind turbines.

b) Integration of curtain walls and glass ceilings with photovoltaic glass to glass self-production panels.

c) Integration of photovoltaic panels as shade elements to control the solar radiation that affects the dwellings.

d) Integration of high yield solar panel systems and recycling of the energy redundancy.

The outer conditioning is strongly influenced by the climatic conditions that are wanted to be promoted in each case, so that the gardens are adapted to specific lush and moisture to achieve determined parameters for comfort. At the same time, the gardening is selected taking into account the unique characteristics of the area.

On the one hand, low rainfall, which determines the choice of species that require little input of water, avoiding unnecessary consumption after this appeal and on the other hand, the proximity of the natural environment of the Montaña Pelada, determines that only non invasive plants are used.

The design of the dwelling is complete. Currently, works are going on in small recreation areas related to the bioclimatic housing that will provide support to future activities to be developed in the complex.

The fundamental premise for the interior of the housing is that the operating conditions of each household remain unchanged. The furnishing projects of each house are specific for each residence, always coordinated with their architects in order to respect the spirit of the original idea as much as possible, keeping in mind the principles of energy saving.

Design Patterns to optimize energy consumption and the sustainable energy generation in single-family houses in warm climates

The main goal of the project is to find the factors that affect energy consumption in each of the houses that make up the 25 Bioclimatic Dwelling and develop a diagram of the most favourable design patterns for our climatic conditions.

The first stage of the project has been executed, consisting in the analysis of the 25 houses and determining the need monitoring to parameterize the different types of constructions, conditioning techniques and renewable energy yields.

Similarly, the domotic systems chosen were established and the types of units where they will be used. The following stages will belong to the installation and data take in, the design pattern development and the dissemination of the results of the bioclimatic lab.

The "Design Patterns for the optimization of energy consumption and the sustainable energy generation in single-family houses in warm climates" project is being developed with the grant of the Ministry of Science and Applied Innovation. The help received is 50% of the total cost of the Project, with a two-year execution deadline which started in the year 2008 and lasts until 2010.

Renewable Energy Integration in buildings

The department covers the needs of technical advice for other projects and activities developed by the institute. Mainly, the activities are divided into two fields: the energetic evaluation of buildings and the design of renewable energy installations.

The energetic evaluations are made by simulations or real working conditions throughout the implementation of inside and outside sensors for its later monitoring and interpretation. Once the evaluation has been made, we will proceed to disclose the energetic functioning of the different buildings to contribute in the users and group consciousness.

The design of renewable energies includes both their integration in buildings and in big installations: optimizing designs, energy models and elements used in buildings, defining models to integrate passive and active solar energy strategies in small and big scale and optimizing the integration techniques, planning and building big renewable energy installations.

DISSEMINATION AND TRAINING

9

Web page www.iter.es

Master's Degree in Renewable Energies

Open Doors Day / Eólica Festival

Management of dissemination-education facilities

Planeta Vivo Radio

Teleplaneta

Aires de Tenerife

Canarias: Una Ventana Volcánica en el Atlántico

Communications and Conferences

9 DISSEMINATION AND TRAINING

The Technological Institute for Renewable Energies makes big efforts to the dissemination of the investigation tasks and projects carried out by the Institute.

Not in vain, the Institute counts with a specific department assigned for this tasks. ITER carries out dissemination, education and awareness tasks related with energy, in order to inform Tenerife's population and ITER visitors about the investigation tasks, promoting new technologies for energy saving and renewable energies.

Awareness and training is an important activity carried out by this department. Since 1998, ITER counts with one of the first educational facilities bound to renewable energies in Spain. It is managed nowadays, by the Dissemination department, and in addition, different investigators of all the departments participate in several training activities, such as the Master's Degree in Renewable Energies, courses and conferences.

Between the tasks carried out by the department stand out those related with the management and refreshment of the Webpage, the dissemination and educational publications such as the Trimester Bulletin LESS CO2, Open Door Days, collaboration with media and the support given to the other departments in mater of project dissemination.

Web page www.iter.es

ITER works to develop and update the Web page content, improving navigation and accessibility. Work is underway to get a site more dynamic and easier to use. The page is now operational in both English and Spanish, offering a tour explaining the tasks carried out by individual departments as well as offering news updates of various activities conducted at the Institute and the possibility of downloading different ITER media publications and legislation concerning the sector.

Master's Degree in Renewable Energies

The main aim of the master's degree in renewable energies is to train university graduates in technical, scientific, economic and business degrees in the renewable energies area. The students may come from the Canaries and any other place to study this master's degree.

The degree offers three different specialities, allowing students to specialize in one of these three areas: Solar energy, Wind energy, or Enterprises and economy of energy.

ITER collaborates in the master's degree with the presence of several technicians and researches form the departments of Wind energy, photovoltaic and electronics as teachers and with its facilities, where the solar speciality is given taught. Besides, the solar energy speciality is given entirely at ITER facilities, as well as half of Wind speciality.

Open Doors Day / Eólica Festival

The Open Door Day in the scientific installations becomes fundamental to promote the scientific culture within the population. ITER is aware about this and bets for celebrating the Open Door Day every year, where visitors can see the installations, which are normally not available for the public, and know about activities and projects carried out by the Institute, learning and participating in them.

The Open Door Day matches the celebration of the Eolica Festival in the grounds of the Technological Institute of Renewable Energy. This festival, celebrated since 2003, combines musical performances with environmental awareness, and each year attracts more than 15,000 people. This fact allows a large number of people to enjoy the planned activities within the Renewable Energy Day. Such events have great potential for teaching children and adults new issues related with renewable energies with games or practical experience, combining entertainment and awareness.

The programmed activities carried out during the Renewable Energy Day in Tenerife are carried out in collaboration with Tenerife Energy Agency, which celebrates the Renewable Energy Day in Tenerife. The organization of the Eolica Festival is developed by the Dissemination Department, which is also in charge of designing the activities that will take place during the Open Door Day.

ITER staff participates in these activities. Some of the activities that take place during the Eolica Festival are: Renewable Energy Workshops; Solar Cooking Exhibition; Solar Kitchen Assembling Course; Ecodrive Virtual Trainer; Alexander Dang Exhibition "The Field of Dang´cing Sunflowers"; Guided Visits to the photovoltaic plant SOLTEN, Wind Tunnel, Bioclimatic Dwellings; and Lectures.

Management of dissemination-education facilities

The educational-dissemination facilities described are part of a very ambitious, large-scaled and complex project that can be divided into: the Visitors Centre, Technological Walkway and the Bioclimatic Dwellings. The Technological Walkway, in operation since 1998, was supplemented in 2004 with the opening of the Visitors Centre and the project will culminate with the inauguration of the next 25 Bioclimatic Dwellings.

The management of these facilities is conducted by the Dissemination Department which is responsible for informing the public about these facilities and the services offered, carry out and coordinate visits, and works continuously to improve and update the content and the development of supplementary materials such as brochures, guides and videos on energy problems, energy efficiency and adequate use of some sources of energy. Moreover, the department manages requests made to visit other facilities which are not specifically designed for information dissemination, such as the photovoltaic platform SOLTEN.

The first equipment developed for this purpose was the Technological Walkway, which was the first outdoor installation where visitors can actually see how renewable energy is generated in Spain. The walkway receives 8500 visitors including students and other groups. Furthermore, the walkway can be visited without the guide service so this number can be enlarged with an important number of people who decide to visit the Technological walkway on their own also considering the attendants of the Open Day ITER, which are about 15,000 each year.

The visitors centre is a bioclimatic building which belongs to the 25 Bioclimatic Dwellings, and is the precursor for the visit to the rest of the facilities. Visitors are greeted here and their specific rout is designed, depending of the time they want to dedicate, the type of audience etc. Moreover, the building itself is part of the visit, now that it includes an exhibition rout about energy. It also has a selection of posters presented to the "25 Bioclimatic Dwellings for the island of Tenerife" international contest, as well as the CLARITY exposure about Climate Change, Impacts, Causes and Solutions.

In the conference room of the Visitors Centre various events are organized and hosted, some of these events are: *The International Renewable Islands. New Future Markets and the European Policy on Energy and Climate Change. An island vision* Conference organized by the Tenerife Energy Agency. Another of the events of interest that took place was the visit of the European Commissioner for Energy, Andris Piebalgs who congratulated ITER for the labour it carries out in favour of the sustainable development of the islands.

One of the main goals of the 25 Bioclimatic Dwellings project is the dissemination of the term bioclimatism, to bring this type of construction closer to society and above all to the sector directly related with building activities and urban planning.

To achieve this, the department coordinated technical visits to the dwellings which are arranged with a previous appointment and depend on the availability of the Bioclimatism Department's technicians. They can also be visited during the open door day celebrated within the frame of Eolica Festival. The Bioclimatic Dwellings project receives 2000 visits per year.

In addition to the facilities mentioned above, ITER throughout an agreement with the city hall of la Laguna, participated in the design and implementation of the first public park bound to renewable energies in Tenerife, the Ofra-Ingenieros Park. This participation was executed with wind and photovoltaic installations that feed the park energetically and with the demonstrative renewable energy installations and information panels that complete the educational rout, along with advice on the development of educational actions. These tasks were carried out by the dissemination, Electronics, Information Technologies and Photovoltaic Departments.

General dissemination activities

The Dissemination Department provides support to other ITER departments with the dissemination of their projects or in the design of informative publications at educational level. In addition, there is a continuing search for announcements and grants of interest to all of ITER departments and is internal and external dissemination is carried out.

During 2008 the Dissemination Department releases ITER´s trimester brochure LESSCO$_2$, which are distributed by mail to over 400 regional and national organizations, as well as European institutions. They are also available for download on ITER website and are distributed directly in our facilities and events. In addition, ITER releases its anual Activity Report, both in English and Spanish, available for download on the website and other publications such as posters or leaflets.

ITER makes big efforts addressing external consultations, conducted by telephone, in person or via e-mail enabled for this purpose on the website. The Dissemination Department responded to incoming queries, directly or directing them to the Department concerned.

ITER, in most cases through the Dissemination Department, participates in fairs, courses and conferences conducting lectures and workshops on renewable energies and on the different projects carried out by ITER. Likewise, ITER technicians were involved in the Work Group of "Responses from the Education and Communication on Climate Change" of the Environment Ministry of the Spanish Government and in its annual meetings. ITER also participates in the *European Photovoltaic Solar Energy Conference and Exhibition*, *Science Fair Orotava*; the *Meeting of the Network of Spanish Volcanology*; *EUSEW ; EU Sustainable Energy Week*. As well as in other relevant conferences. Many of these actions are carried out in collaboration with the Tenerife Energy Agency.

The result of collaborations with other entities have been translated in being able to carry out many other activities, such as participating with the celebration of the European Solar Days in the ITER facilities since its beginnings in 2008.

The Dissemination Department also works as a Press Office, responsible for sending regular press releases, which are channelled through the Press Office of the Cabildo Insular de Tenerife. In addition, the department frequently collaborates with the media through interviews, reports, or submitting written or graphic material, interviews with management personnel from other departments and the management of the shooting of videos of the facilities are other of the things the department takes care of.

Planeta Vivo Radio

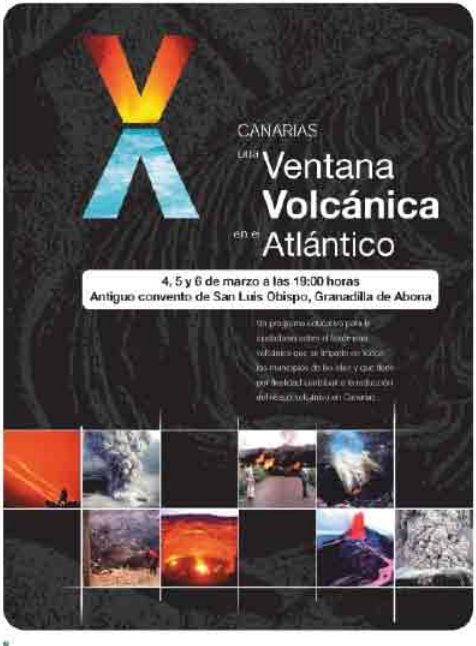
It is a diffusion and disseminatin programme of both, ITER and RNE in Canarias. This radio programme is 50 minutes long and is broadcasted weekly on Radio 5 for Canarias and Radio Exterior de España for the rest of the world. This initiative promoted by, both ITER and RNE, was born in a very special year (2008), the International Year of Planet Earth, and intends to contribute in the dissemination and accomplishment of the purposes of this important international statement proclaimed by the General Assembly of the United Nations in the session of December 22nd, 2005. The main objective of this statement is to make the society aware of the relationship between the Humankind and Planet Earth, and to stand out the importance that Sciences of the Earth has in the consecution of a sustainable and balanced future in order to increase the quality of live and safeguard the planetary dynamic.

Teleplaneta

It is a new television microspace shared by both, Canarias TVE and ITER, and coordinated by ITER, which seeks to make inform about the impact of natural risks in our society with the aim of giving an incentive to culture's development and innovation, in order to contribute in the reduction of natural risks. TELEPLANETA is a new programme completely developed in the Canary Islands for the whole world by its broadcast in the Channel 24 Hours of TVE. This programme, which also is broadcasted weekly in Channel 2 of TVE for the Canary Islands, is directed by David Calvo, it is a joint bid of ITER and TVE in Canarias and has been co-financed by the Spanish Foundation for Science and Technology (FECYT), organism dependent on the Science and Innovation Minystry (MICINN).

Aires de Tenerife

This technical-scientific dissemination programme carried out by ITER´s Environmental Division and provided to all the municipalities of Tenerife, has the purpose of contributing to a higher awareness about of pollutant emissions into the atmosphere, the quality of air and climatic change. In the framework of this programme and for a period of 7 days for each municipality, a mobile unit was installed in order to carry out the monitoring and measurements of air pollutants (SO_2, CO, O_3, CO_2, No_x and PM10 particles), as well as to organize the exhibition of "The climatic change: Impacts, explanation and solutions", promoted by the Environmental Ministry and consisting in 17 posters about the air pollution, reasonable energy saving and global climate change, together with 4 posters about the quality of air, the atmospheric surveillance programme in the Canary Islands and the tasks ITER carries out in this topic. There are guided visits organized during the whole day to the mobile unit. This unit is equipped with different optical sensors type COSPEC that ITER has in order to evaluate the emission and immission of air pollutants in the island of Tenerife. Also, several conferences were imparted in order to explain to the school community the emission of pollutants into the atmosphere, the quality of air and the climatic change.



Canarias: Una Ventana Volcánica en el Atlántico

It´s a disseminatio programme that ITER´s Environmental Division provides to all the municipalities of the Canary Islands, including the Island of La Graciosa. This programme consists in the dissemination and divulgation of the volcanic phenomenon and the volcanic risk management. It started with the support and collaboration of the Instituto Español de Oceanografía (IEO) and el Instituto Geológico y Minero de España (IGME), both dependants of thel Science and Innovation Ministry, of the Academia Canaria de Seguridad and the Agencia Canaria de Investigación, Innovación y Sociedad de la Información (ACIISI), both dependants of the Goblerno de Canarias, of the Federación Canaria de Municipios (FECAM), and the Fundación Telesforo Bravo-Juan Coello, have made it possible. This programme arises from the need to form and inform to people who live in Canarias about the volcanic phenomenon and the volcanic risk management. This programme has also received publicly the applause and praise of the Secretario General de la Asociación Internacional de Volcanología y Química del Interior del la Tierra (IAVCEI).

24rd European Photovoltaic Solar Energy Conference And Exhibition. 21 -2 5 septiembre 2009. Hamburgo, Alemania.

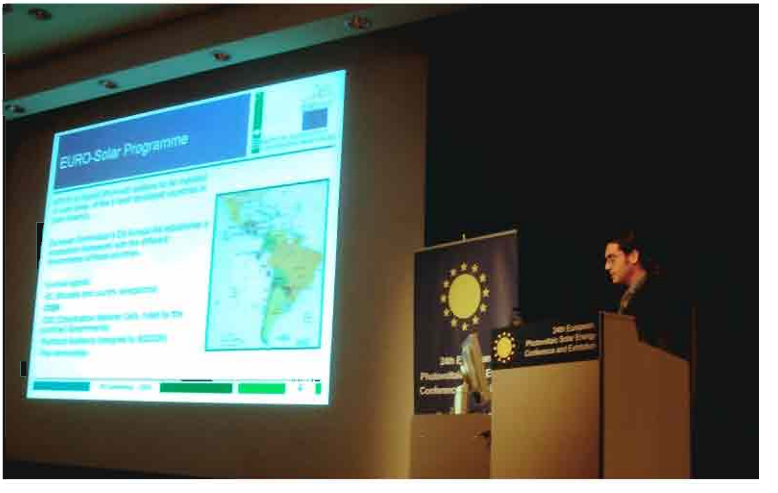
Presentación oral 5AO8_2 *Lessons Learned while Installing Multi-MW PV Grid-Connected Facilities in Canary Islands (Spain).*
M. Cendagorta, C. Montes, A. Linares, E. Llarena, & M. Friend, ITER S.A.

Presentación oral *5DO.8.4 EuroSolar Programme. Renewable Energy Kits to fight Poverty*
M. Cendagorta, J. Rodriguez & L. López-Manzanares

Póster *5BV.2.20 Three Years Operating 24 MW PV Grid-Connected Facilities in Tenerife (Canary Islands)*
M. Cendagorta, M. Friend, A. Linares, E. Llarena & C. Montes.

Póster *5BV.3.19 Hybrid System in Ksar Ghilène, Tunisia: Installation, Set-Up and First Results*
M. Cendagorta, M. Friend, L. López & A. Linares

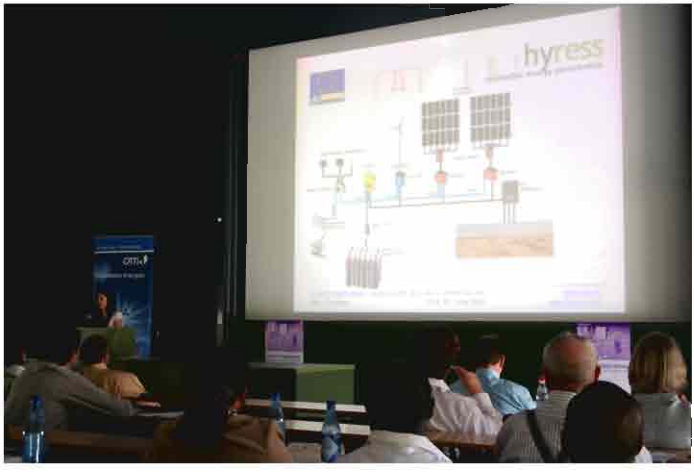
Póster 5BV.3.43 *Development of a Solar Plane Prototype*
M. Cendagorta, J. Fernéndez, J.E. Martín J. Fernández, M. González, E. Friend,



Symposium Small PV-application. Rural Electrification and Commercial Use. Ulm, Germany

May 25th/26th, 2009

Oral Presentation *EURO-SOLAR Programme. RE Kits to fight poverty. O. López-Manzanares*
Oral Presentation *Hybrid Project. Study Case of Ksar Ghilène, Tunisia. A. Linares.*



Internacional conference "Cities on Volcanoes 6 – Tenerife 2010"

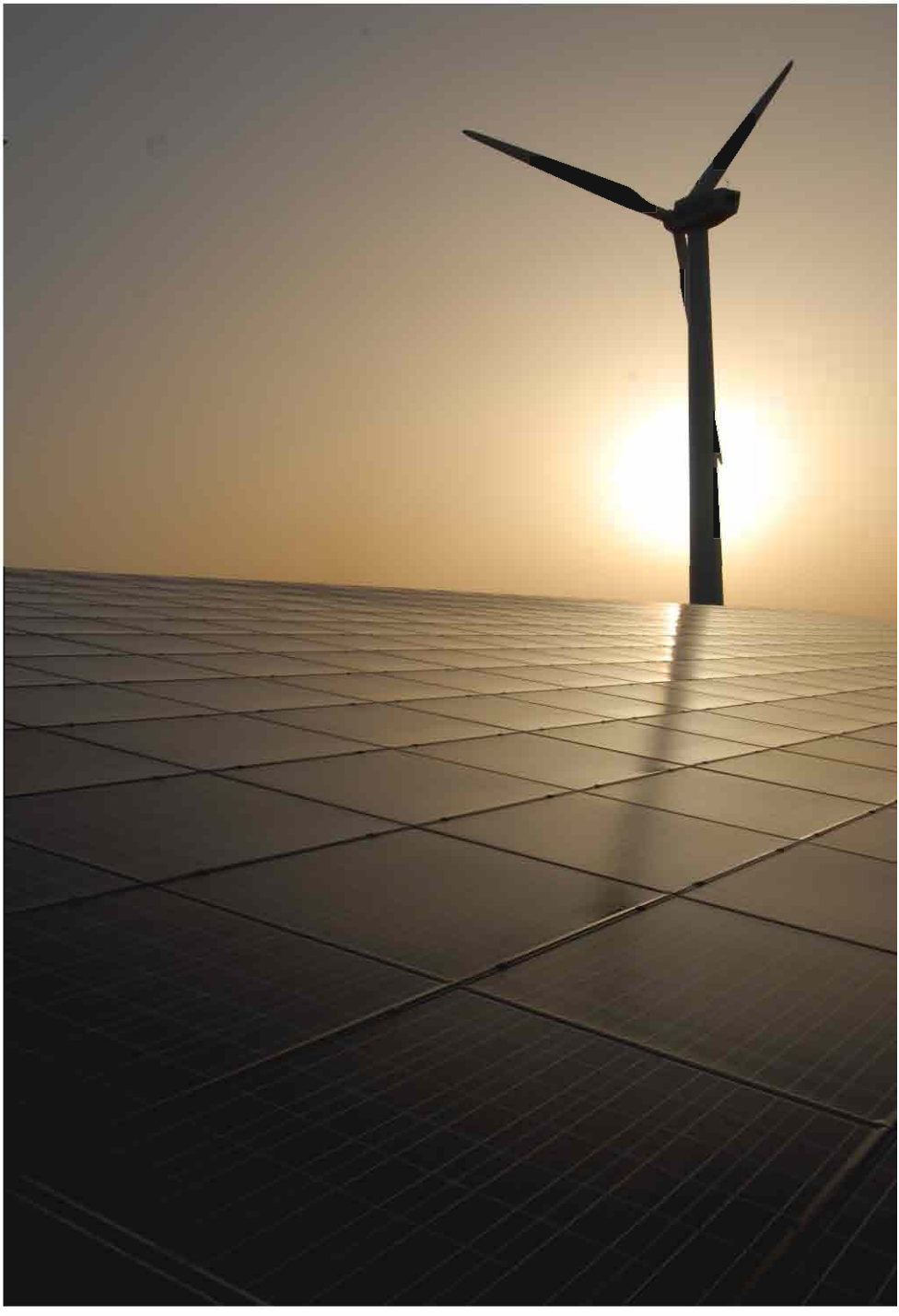
CoV6-Tenerife 2010 (http://www.citiesonvolcanoes6.com/) is the 6th edition of the main international conference about volcanic risk management and it's organized by ITER and the Cabildo Insular de Tenerife. This event is ment to be a meeting point for geoscientists who work in active volcanoes, authorities, civil protection and emergency specialists, urban and territorial planners, sociologists, economists, psychologists, educators, health specialists, entrepreneurs, engineers, professionals of communications and citizenship in general who work and live in volcanically active locations. The purpose of this event is to exchange experiences and knowledge in order to contribute with a better volcanic risk management, as well as to show the mildness of living in a volcanically active area.

Presentation of the Solar Plane in the international meeting "Espacio Enter Canarias".

Espacio Enter Canarias' aims are the promotion and strengthening of the alliance among Art, Science, Technology and Innovation for the creation of the Knowledge Society. The progresses made in the solar plane project were introduced within the section TECH OPEN, in which the last projects related with the above mentioned matters were publicly presente.

Internacional Symposium of Volcanology CHINYERO 2009

This scientific-technical meeting organized by the ITER Environmental Division took part in the municipalities of Puerto de la Cruz and Santiago del Teide between the 16th and 20th of November, 2009. The purpose of this meeting was to contribute with de commemoration of the last volcanic eruption centenary in Tenerife (Chinyero volcano, 1909). CHINYERO 2009 was co-financed by the Agencia Canaria de Investigación, Innovacón y Sociedad de la Información (ACIISI) del Gobierno de Canarias together with the Ayuntamiento de la Villa Histórica de Santiago del Teide, el Ayuntamiento del Puerto de la Cruz, la Universidad de La Laguna (ULL), la Universidad Internacional Menéndez Pelayo (UIMP), el Instituto de Estudios Hispánicos de Canarias (IEHC), la Fundación Telesforo Bravo-Juan Coello, la Sociedad Volcanológica de España (SVE) y la Asociación Volcanológica de Canarias (AVCAN). 60 persons from 7 different countries Argentina, Cabo Verde, Filipinas, México, Nicaragua, Portugal y España took part in this meeting.



INVESTEE COMPANIES

.10.

Solten II Granadilla S.A.

Energía Verde de la Macaronesia S.L (EVM)

EVM2 Energías renovables S.L.

Eólicas de Tenerife, AIE

Fundación ITER

Parque Eólico Punta de Teno S.A.

Agencia Insular de la Energía de Tenerife, Fundación Canaria

Parque Científico y Tecnológico de Tenerife S.A.

Constante Solar S.L.

NAP África Occidental-Islas Canarias S.A.

Soluciones Eléctricas Insulares S.L.

Instituto Tecnológico y e Telecomunicaciones de Tenerife, S.L.

SOLTEN III Arico, S.A.

10 INVESTEE COMPANIES

The Technological Institute of Renewable Energies PLC., ITER, promotes and participates in the capital of companies or entities with the aim of carrying out activities that are specifically entrusted under its social purpose.

These are, among others, the implementation and promotion of applied research in the field of renewable energies or related with them, the creation of the needed infrastructure for the development of local research activities, engineering and industry or the development of results for the local industry, and the exportation of know-how to other countries and archipelagos.

Currently, the network of companies participated by ITER consists of the ones listed below which include a brief presentation:

Empresas particpadas	Participación del ITER
Solten II Granadilla S.A.	21,55%
Energía Verde de la Macaronesia S.L (EVM)	39,94%
EVM2 Energías renovables S.L.	30,00%
Eólicas de Tenerife, AIE	50,00%
Fundación ITER	100,00%
Parque Eólico Punta de Teno S.A.	3,00%
Agencia Insular de la Energía de Tenerife, Fundación Canaria	23,53%
Parque Científico y Tecnológico de Tenerife S.A.	1,80%
Constante Solar S.L.	4,40%
NAP África Occidental-Islas Canarias S.A.	48,52%
Soluciones Eléctricas Insulares S.L.	100,00%
SOLTEN III Arico, S.A.	100,00%
Instituto Tecnológico y de Telecomunicacines de Tenerife S.L.	100,00%

Solten II Granadilla S.A.

Trading company established the 26th of October 2007, and registered in the Company House of Santa Cruz de Tenerife. It is shared by private investors and ITER.

Solten II Granadilla S.A deals with the acquisition, promotion, management, development and exploitation of PV solar platforms, as well as with the production, transport and distribution of electricity from solar photovoltaic platforms.

Private investors interested in the production of PV solar energy connected to the grid have, this way, the opportunity to participate by means of the purchase of shares in sustainable initiatives for the economical and industrial development of the island, contributing to increase the participation of renewable energy in the primary energy balance of the Canary Islands.

Energía Verde de la Macaronesia S.L (EVM)

Trading company established the 10th of October, 2007, and registered in the Company House of Santa Cruz de Tenerife. It is shared by Sumitomo Corporation, ITER, Cerco Tenerife LTD., Feralon Canarias LTD., and two private investors.

As established in its social purpose, the limited company Energía Verde de la Macaronesía (EVM1) has the aim of promoting, designing, constructing and exploitation of all kinds of renewable energy plants, as well as the implementation and promotion of any type of applied research in the field of renewable energies and the development of systems or techniques that allow the use of them.

EVM2 Energías renovables S.L.

Trading company established the 10th of October, 2007, and registered in the Company House of Santa Cruz de Tenerife. It is a limited company whose main shareholders are Proparsa 2000 PLC., ITER PLC., Cerco Tenerife LTD. and Feralon Canarias LTD.

The social purpose is the promotion, design, construction and exploitation of all kinds of renewable energy plants as well as the implementation and promotion of any type of applied research in the field of renewable energies and the development of systems or techniques that allow the use of them.

Eólicas de Tenerife, AIE

Economic Interest Association established on November 27th, 1995, and registered in the Company House of Santa Cruz de Tenerife.

It is integrated by Unelco Participadas PLC., el Instituto Tecnológico de Energías Renovables S.A and Made Energías Renovovables PLC. The social purpose of the Association is the cooperation between the shareholder for the development and research in the field of wind energy, by means of the promotion, construction, exploitation and management of the resources of Tenerife, increasing therefore the wind energy exploitation in the island.

Eólicas de Tenerife owns the 4.8 MW Wind Farm installed in ITER lands, which consists of 8 MADE AE-46 wind turbines, each one with 600 kW nominal Power and has an annual energy production of 14 GWh.

Fundación ITER

Foundation established the 3rd of December, 1997, and registered in the official Foundations Registry of Santa Cruz de Tenerife with ITER as its only shareholder.

The foundation has as social purpose the promotion, development of scientific, technical and economical activities in renewable energies and technologies, which contribute to reduce the dependence on imported oil, to obtain stable and competitive prices and to guarantee minimum energy supplies for production and elevation of drinkable water in exceptional situations.

For the development of these aims the Foundation carries out different actions:

- Awarding of financial grants.
- Awarding of grants to institutions.
- Participation in the development of activities from other entities that carry out overlapping or complementary activities with the Foundation.
- Studies, research, courses and conferences.
- Publications, exhibitions and other cultural activities.

Parque Eólico Punta de Teno S.A.

Trading company established the 30th of June, 1997, and registered in the Company House of Las Palmas de Gran Canaria, being its shareholders the City council of Buenavista del Norte, Unelco participadas PLC., Vega Luz Teno Ltd, owner of the land where the Wind Farm is located, and Instituto Tecnológico y de Energías Renovables PLC.

This public limited company is in care of the promotion, installation, exploitation and management of the Wind Farm in the Municipality of Buenavista del Norte, Parque Eólico de Punta Teno, within the municipality of Buenavista del Norte.

This wind farm has an installed power of 1.800kW, divided into 6 wind turbines of 300kW each, with an estimated annual energy production of 6180 MWh.

Agencia Insular de la Energía de Tenerife, Fundación Canaria

Foundation established the 3rd of December, 1997, and registered in the Company House of Santa Cruz de Tenerife with Cabildo Insular de Tenerife as founding member.

The foundational members of the Tenerife Energy Agency is formed by Cabildo Insular de Tenerife, Instituto Tecnológico y de Energías Renovables, Fundación Canaria Caja Rural Pedro Modesto Campos, Loro Parque PLC., Endesa Distribución Eléctrica LTD., Compañía Transportista de Gas de Canarias PLC. and Asociación Hotelera y Extrahotelera de Tenerife, La Palma, La Gomera y El Hierro.

As established in its social purpose, the foundation has as aim to coordinate and collaborate with the different administrations, particularly those from the island, to facilitate measures for the rationalization of energy production and consumption that enable to achieve the highest level of energy self-sufficiency in the island territory.

And develop, in collaboration with local bodies, the implementation of dissemination, promotion and implementation programs of actions related to renewable energies and energy efficiency and saving.

Parque Científico y Tecnológico de Tenerife S.A.

Trading company established the 10th of January, 2006, and registered in the Company House of Santa Cruz de Tenerife. This insular company with mixed economy is participated by Cabildo Insular de Tenerife as principal shareholder, the City council of Santa Cruz de Tenerife and Instituto Tecnológico y de Energías Renovables PLC.

This Public Limited Company has a social purpose the promotion and management of the Scientific and Technological Park of Tenerife through out the recruitment and establishment of companies and institution of research, innovation, development or production of unique technology.

Within its social purpose we can highlight the following activities: Acquisition of land and make it suitable for building in order to make an attractive land offer to potential investors, promoting the all purpose building of the Park, promoting the construction of any buildings or warehouses as possible headquarters for companies who want to settle in the park, management and administration of them, the actions aimed at enhancing the relationship between companies that settle in it along with the technology centres and institutions that generate knowledge and the promotion of relations with the national and international scientific community.

Constante Solar S.L.

Trading company established the 11th of April, 2006, and registered in the Company House of Santa Cruz de Tenerife. It is a limited company whose foundational shareholders are el Instituto Tecnológico y de Energías Renovables and the trading company Energías Renovables de Canarias LTD.

Constante Solar LTD works in the field of solar energy and is engaged in the manufacture of solar thermal collectors and photovoltaic panels for the use of solar energy and other equipment, materials and articles that are related to renewable energy in general.

As it is reflected in its social purposes, the company focuses its activities on the manufacture of low-temperature solar thermal systems, equipment and systems for solar thermal installations, projects, studies, consulting, energy audits, training and computer calculation programs, design and manufacture of components.

NAP África Occidental-Islas Canarias S.A.

Trading company established the 28th of April, 2006, and registered in the Company House of Santa Cruz de Tenerife. It is shared by a high number of companies including Chafiras PLC., Construcciones Gomasper LTD., Obras y Servicios Daltre LTD. and Instituto Tecnológico y de Energías Renovables.

This society is aimed for the purchase of infrastructure for the establishment of the Neutral Access Node NAP in Tenerife, the operation and maintenance of the telecommunications networks within the NAP of clients housed at the neutral point, as well as of the own ones of the centre.

The NAP of Tenerife, which is planed to be built in La Laguna, is one of the centres that Terremark plans, together with other two in Jordan and the Dominican Republic, and will help to reduce the cost of Internet connection for Africa, to focus the international traffic of data to this continent and to manage the regional communication.

Soluciones Eléctricas Insulares S.L.

Trading company established the 17th of July, 2007, and registered in the Companies House of Santa Cruz de Tenerife. It is totally shared by Instituto Tecnológico de Energías Renovables PLC.

As established in its social purpose, this limited company has as aim the manufacture, installation, marketing and distribution, both in national territory and abroad, of all sorts of articles and materials related to electricity and renewable energy in general, as well as the construction, repair, restoration and preservation of the building works and, specifically, facilities involving directly or indirectly the use of renewable energies.

The company also elaborates studies, technical projects, offers advisory services, technical support and engineering management within the field of any activity in renewable energy and technological innovation, together with research, development and demonstration for the development of the activities listed above.

Instituto Tecnológico y de Telecomunicaciones de Tenerife, S.L.

Trading company established the 20th of Apri, 2009, de abril de 2009 and registered in the Companies House of Santa Cruz de Tenerife. It is totally shared by Instituto Tecnológico de Energías Renovables PLC.

As established in its social purpose, this limited company has as aim the construction, exploitation, installation, management and maintenance of all types of networks and telecommunications infrastructures including the wiring through the seabed and / or land bed as well as the promotion, provision and marketing of services and / or products of electronic communications, telecommunications, information society services, Multimedia and added value.

Furthermore, among its objectives there is the promotion of free competition in the market for telecommunications networks and services on the island of Tenerife, Canary Islands and West Africa.

SOLTEN III Arico, S.A.

Trading company established the29th of October, 2008, and registered in the Company House of Santa Cruz de Tenerife. It is totally shared by Instituto Tecnológico de Energías Renovables PLC.

This public limited company is in care of the promotion, design, builing and exploitation of every kind of renewable energies plants, as well as to carry out and promote any kind of applied researches in this field and develop technical systems that allow the use of this energies.

ENERGY PRODUCTION

11

Solten I

Solten II

Finca Verde

Finca Roja

Mercatenerife 1

Pilot Plant

Experimental Wind Park

MADE Wind Park

Enercon Wind park

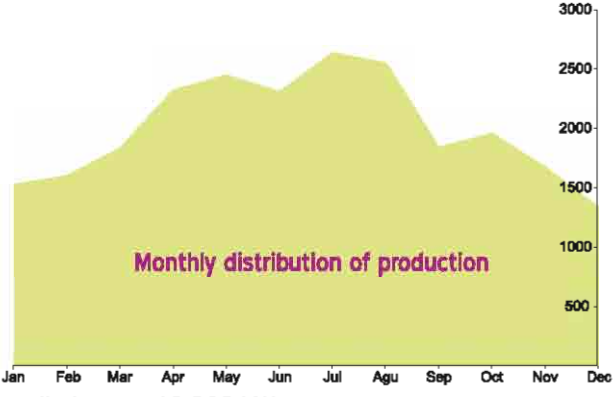
11 ENERGY PRODUCTION

The energy production details of ITER installations and of those in which the Institute participates are shown next.

The following information is given for each instalation:

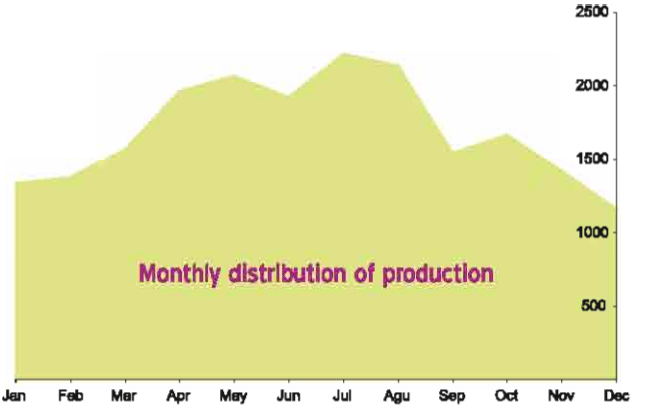
- Installed power (kW)
- Generated energy (MWh)
- Participation percentage (%)
- Equivalent consumption (persons)
- Tons of CO2 emissions avoided (tons)
- Monthly distribution of the production during 2009 (MWh)

Solten I



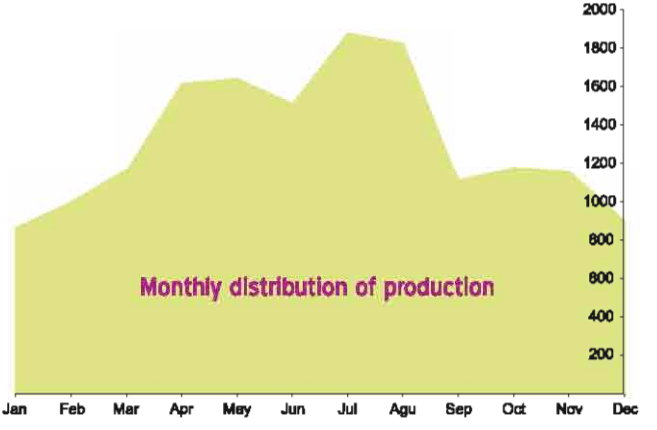
Installed power 13.000 kW
Generated energy 24.042,2 MWh
ITER participation 400 kW
Equivalent consumption 28.477 persons
Tons of CO2 emissions avoided 13.351 tons

Solten II



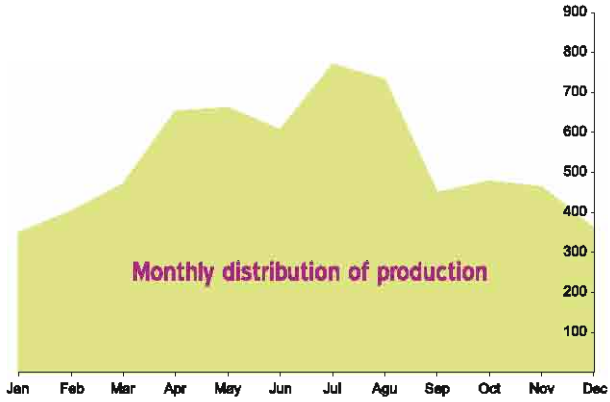
Installed power 11.000 kW
Generated energy 20.493,9MWh
ITER participation 21,55 %
Equivalent consumption 24.270 persons
Tons of CO2 emissions avoided 11.380 tons

Finca Verde



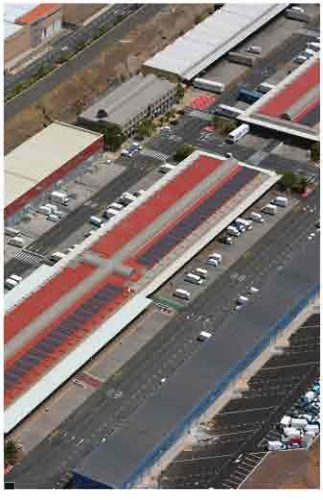
Installed power 9.000 kW
Generated energy 15.835,6MWh
ITER participation 30 %
Equivalent consumption 18.755 persons
Tons of CO2 emissions avoided 8.790 tons

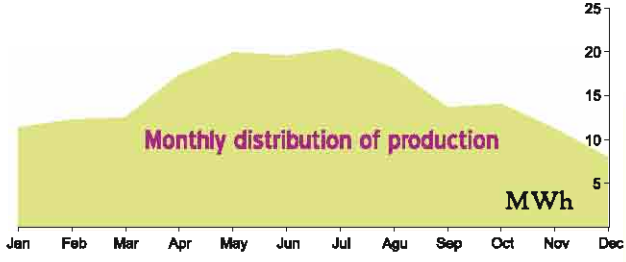
Finca Roja



Installed power 3.600 kW
Generated energy 6405,3 MWh
ITER participation 39,94 %
Equivalent consumption 7.582 persons
Tons of C02 emissions avoided 3.552 tons

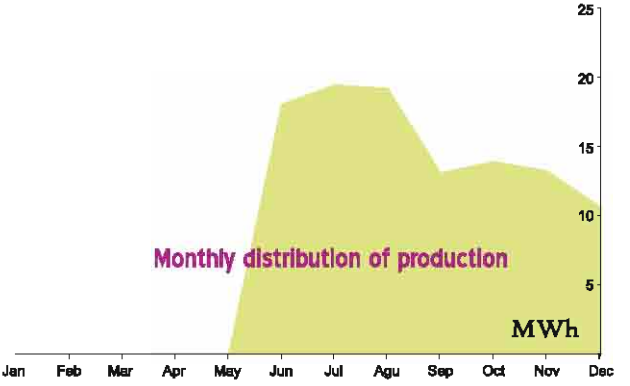
Mercatenerife 1





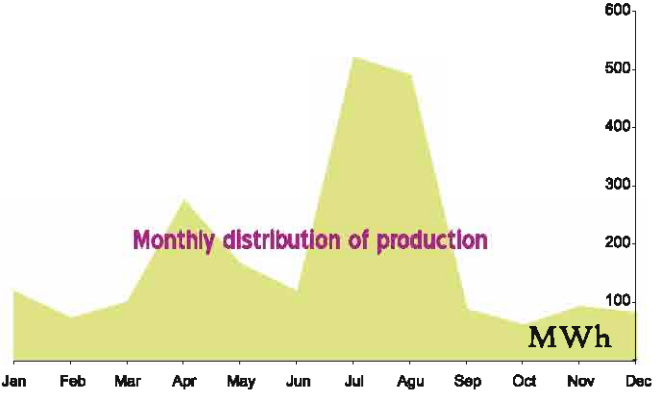
Installed power 100 kW
Generated energy 177,8 Mwh
ITER participation 100 %
Equivalent consumption 211 persons
Tons of C02 emissions avoided 98 tons

Pilot Plant



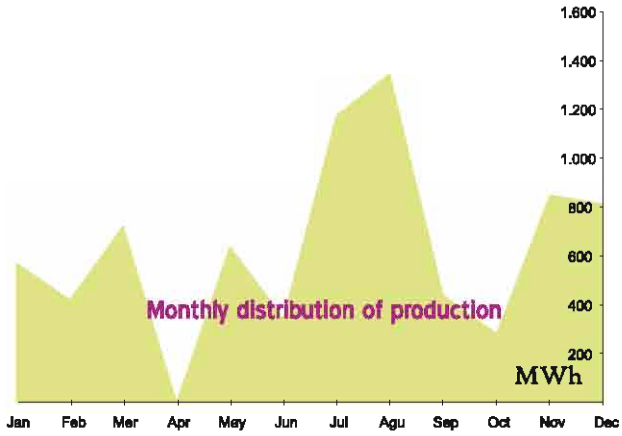
Installed power 100 kW
Generated energy 107,7MWh
ITER participation 100 %
Equivalent consumption 127 persons
Tons of CO2 emissions avoided 59 tons

Experimental Platform



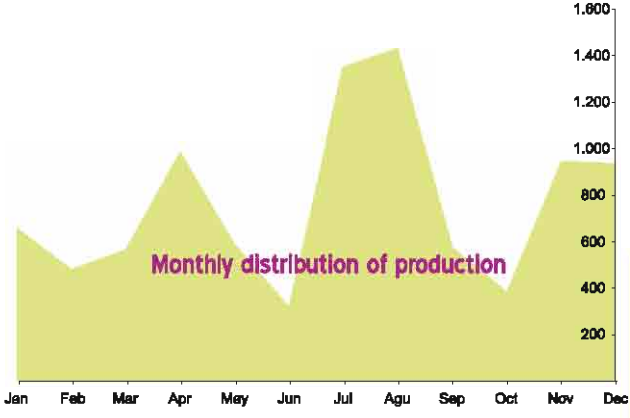
Installed power 2.830 kW
Generated energy 2.169,3 MWh
ITER participation 75,26 %
Equivalent consumption 2.568 persons
Tons of CO2 emissions avoided 1205 ton

4,8MW Wind Farm



Installed power 4.800 kW
Generated energy 7.617,9 MWh
ITER participation 50 %
Equivalent consumption 9.022 persons
Tons of C02 emissions avoided 4.230 ton

5,5MW Wind Farm



Installed power 5.500 kW
Generated energy 9.196,293 MWh
ITER participation 100 %
Equivalent consumption 10.858 persons
Tons of C02 emissions avoided 5.091 ton

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