ANNUAL REPORT
2015

25

ITER Instituto Tecnológico y de Energías Renovables

INDEX

ITER 1990 2015 | 25 años promoviendo el desarrollo sostenible y la innovación

25 years have passed since the day the Cabildo of Tenerife promoted the Constitution of the Institute of Technology and Renewable Energies, aiming to start a new field of research in the Islands that contributed to the sustainable development. Since then, ITER has exceeded all expectations growing in facilities and fields of action, maturing into a centre of international reference in the fields of renewable energy, engineering, telecommunications and environment.

During our 25 years in the sector, we have focused on technological development and innovation, researching and developing new materials, processes and technologies, with the aim of contributing to the sustainable development of the island of Tenerife and to improve their competitiveness. We have not only grown in facilities and personnel, but we have branched into a group of entities that allow us to perform activities that are mandated in our corporate purpose. These entities make up the ITER group.

From a technological perspective, we have evolved in response to an environment in which activities involve multidisciplinary teams, and where the demands and expectations of society are rising. For this reason, and given the growing importance to society in recent times of information and communication technologies (ICTs), our activities in this sector have grown exponentially.

1999

2009

Since 1990, we have actively participated in various European programmes, having developed more than 200 research and development (R&D) projects with partners from most European regions. We have also acted as technological and scientific advisor to numerous agencies, including the European Commission, the Tenerife island council, Spain's AECID international cooperation and development agency, as well as numerous governments and international bodies. In recent years, underlining the importance of the Canary Islands as a tri-continental platform linking Europe, America and Africa, we have conducted numerous international projects involving technology transfer and pro-development cooperation, exporting know-how to other countries and archipelagos.

In 1990, we inaugurated our first wind park, a 1.05MW array designed to assess the operational requirements and performance of different wind turbines. Since then, we have installed wind and photovoltaic systems totalling 13MW and 41MW respectively, which account for 35% of the island's total renewable energy capacity. In addition, we have established other facilities over the years to support and boost our R&D activities, such as: the D-ALiX High Availability Datacentre, a wind tunnel for civilian R&D use, the GCC-ITER power-generation control centre, or the dedicated laboratories for research into photovoltaics (SiCellLab), underground gases and water chemistry and isotopes, and electronics.

On another front, in order to bring our research and projects closer to both the resident population and visitors to the island, we pay special attention to public information, education and social awareness. In support of these activities, we have a number of facilities, including a bioclimatic homes development, a technology-themed trail and a visitors' centre, which receive more than 10,000 visitors a year.

The Tenerife island council's initial idea was to help establish an R&D organization whose activities would become self-financing. We have achieved this aim, consolidating and strengthening our activities through our own resources, namely from selling the power generated in wind parks and photovoltaic plants, conducting R&D projects and providing consulting and engineering services.

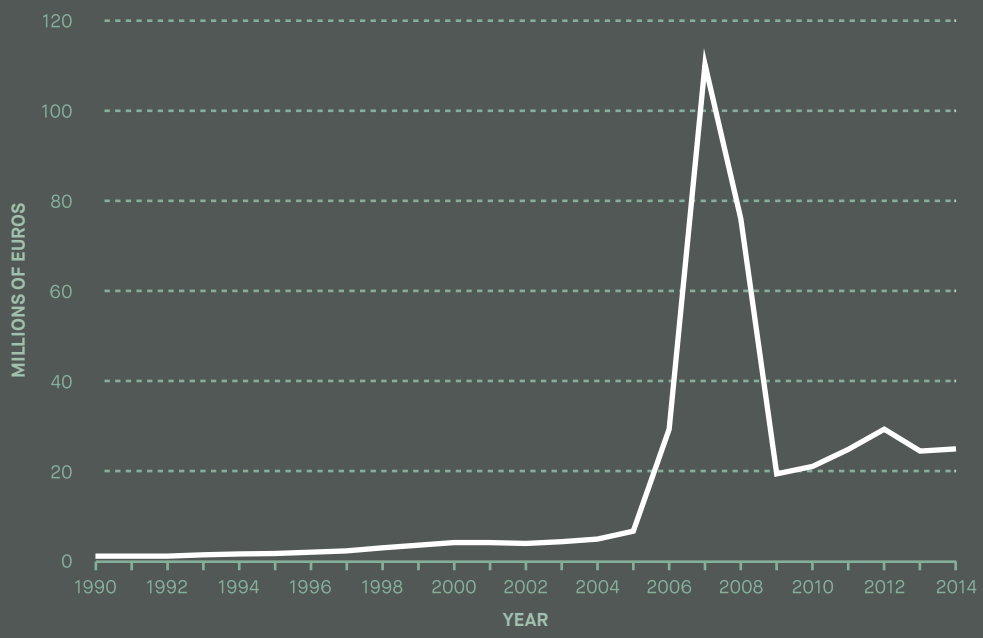
We are convinced that this is the path which we must follow and, therefore, restate our commitment to continue focusing our efforts to associate the name of the island of Tenerife with science, technology and progress, and so that the Tenerife's society, aside from feeling proud for this, can also enjoy the benefits that these investigations may report them. That is our commitment.

WIND PARK

54 MW
OF RENEWABLES INSTALLED

130,000
VISITORS

+200
R&D PROJECTS



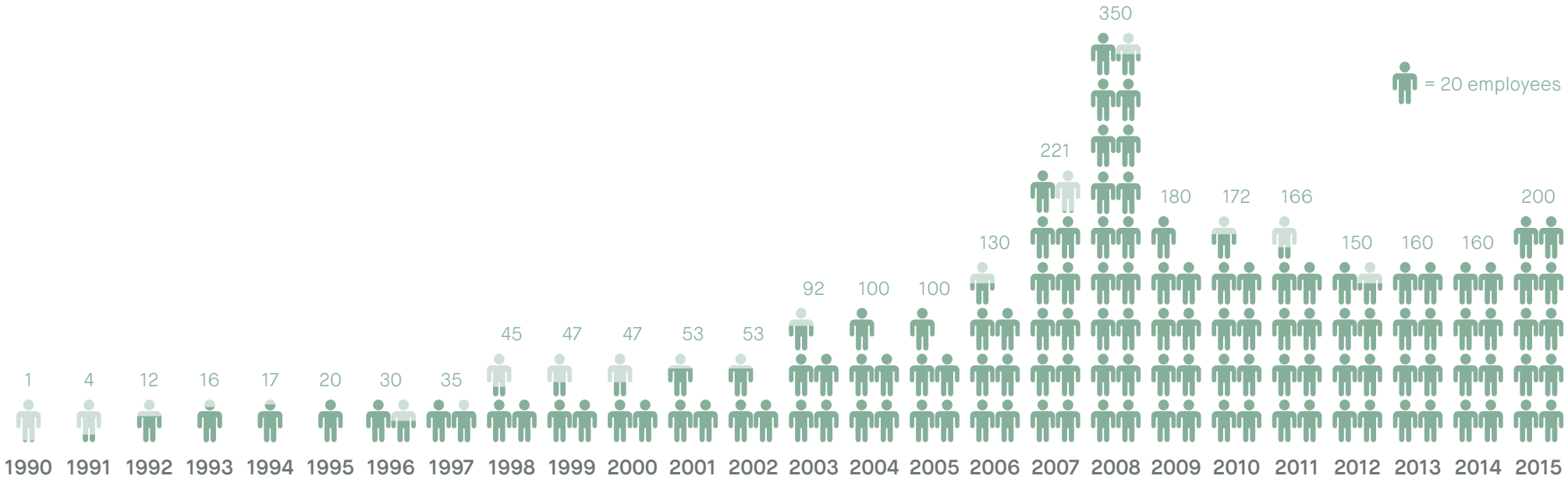
BUSINESS VOLUME

MADE AND ENERCON WIND PARKS

By initiative of Tenerife's island council (Cabildo Insular), the Institute of Technology and Renewable Energies (ITER) was established in 1990 with the aim of supporting sustainable development and innovation on the island. Today, ITER stands as an international centre of reference for research into renewable energies, engineering, telecommunications and the environment. During its development, we have grown not only in terms of the scale of our facilities and personnel, but by branching out and establishing the ITER Group, a group of entities which enables the attainment of the activities entrusted within its corporate purpose.

Among the activities developed by the group, we can highlight the cutting-edge R&D infrastructure provided to the region to foster research and engineering applied to renewable energies and new technologies along with the export of know-how to other countries and archipelagos.

The ITER group is formed by a multidisciplinary team of 200 professionals who combine the extensive professional experience of those who contributed to the founding of ITER, the youth and freshness of the new additions, sharing the enthusiasm and the motivation to believe that their daily work contributes to a future better for society.



ITER group entities and shareholding percentage

ENERGY

SOLTEN II Granadilla	20,7%
EVM2 Energías Renovables	30%
Energía Verde de la Macaronesia	40%
Parques Eólicos de Granadilla	30%
Eólicas de Tenerife	50%
Parque Punta de Teno	3%
Agencia Insular de Energía de Tenerife	23.5%

TELECOMMUNICATIONS

CanaLink

CanaLink BAHARICOM

CanaLink ÁFRICA

100%

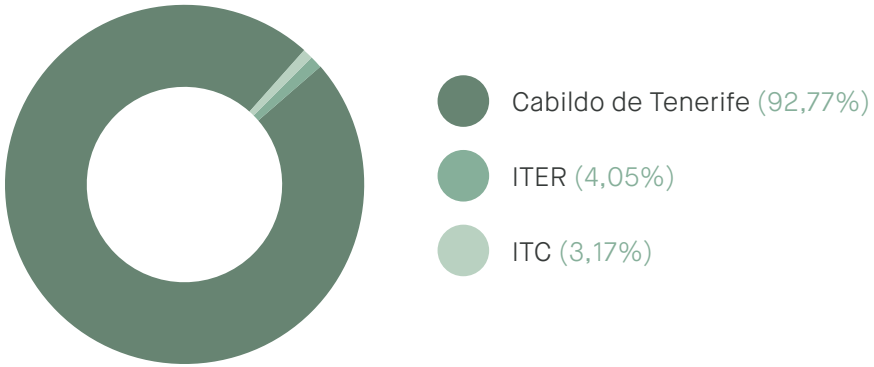
VULCANOLOGY

VOLCAN INSTITUTO VOLCANOLÓGICO DE CANARIAS

100%

INSTITUTO TECNOLÓGICO Y DE ENERGÍAS RENOVABLES, S.A.

Public limited company constituted on December 27th, 1990. The Cabildo Insular de Tenerife is the main shareholder and after several incorporations, ITER´s share is distributed in the following way:



ITER's creation intended to encourage research and development of technologies related to the use of renewable energies, as well as other technologies of interest to the regional socio-economic development such as: groundwater resources, surveillance and seismic-volcanic prediction, environmental monitoring, and the development of information and communication technologies.

Since its commissioning, the Institute has two fundamental lines of action: the generation of electricity with renewable energy sources and research and development projects in the areas of energy, environment and new technologies.

12
SITES

200
STAFF

INTERNATIONAL PRESENCE IN **30** COUNTRIES

90,993 MWh
OF RENEWABLE ENERGY OUTPUT

=

40,844 HOMES

103,338 PEOPLE

THE CONSUMPTION OF

AVOID THE EMISSION OF

48,481
TONNES OF CO_2

TO THE ATMOSPHERE

2015

RECOGNITIONS AND AWARDS GRANTED TO THE ITER GROUP

Through many years of experience, the ITER Group has received numerous awards. These recognitions have contributed to the consolidation and expansion of the group and state the usefulness of the social work carried out.

Appointed Centre of Excellence for the Development and Dissemination of the Renewable Energies by UNESCO. (Special session of the General Assembly of United Nations in 1999).

Award "**TEIDE DE ORO**" 2001 of Radio Club Tenerife.

Award **Sol y Paz** to the managerial work 2005 within the frame of the Solar Meeting celebrated in the same year.

Award **FECITEN** 2009 of the Centres of Initiatives and Tourism´s Federation of Tenerife.

Data Centre Leaders Award in the category of "Innovation in an Outsourced Environment" in the International Contest **Datacentre Dynamic Awards 2010**.

Award **Mundo Empresarial Europeo** 2011 which recognizes the Institute of Technology and Renewable Energies as the best organization of the Canary Islands in the edition XIV of the prizes.

Research and Development Award to the Institute of Technology and Renewable Energy of the Circle of Entrepreneurs of Tenerife in Puerto de La Cruz, 13 November, 2015.

DATACENTER DYNAMIC AWARDS 2010

Facilities

ITER is located in the Industrial Estate of Granadilla, in the southern coast of the island of Tenerife, covering a total of 400.000m2. ITER was designed as an experimental and dissemination area. Following this premise ITER gathers several installations resultant from the projects carried out.

ITER is in continuous growth to support and encourage the R & D activities it develops. The results of the demonstrative projects executed have added new facilities to the infrastructures of the Institute.

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Datacenter of the ALiX project: D-ALiX

This high availability Datacentre, framed within the ALiX initiative and instigated by the Cabildo Insular of Tenerife, is the infrastructure that stands as a site for ICT equipment. This equipment is required so that Tenerife can host technological enterprises that offer services both within the archipelago and Europe, Africa and America.

The building of the Datacentre is a simple and modular structure that will allow its construction to take place in 4 phases replicating the initial model. At present, the first phase is finished.

D-ALiX

Phase one has a constructed surface of 4,498.87m^2, from which 1,500m^2 correspond to space assigned for technical floor where the ICT equipment will be located, and the rest for auxiliary facilities.

This infrastructure provides service levels comparable to the ones established in a TIER IV categorized facility. The TIER classification, established by the TIA (Telecommunications Industry Association), is based in the high availability infrastructure of the datacentre, due to its N+1 and 2N+1 redundancy levels in its electrical supply and air-conditioning infrastructures, and in the access to communication with the outside.

Wind tunnel

The wind tunnel is a facility in which a rectilinear, uniform flow of air is created at a controlled rate within a test chamber, and is used to study the effect of air movement around real objects or scaled models. For aeronautical uses, air-flow quality is determined by its uniformity and turbulence levels.

The wind tunnel of ITER is highly competitive in costs and benefits, as well as suitable for a variety of applications such as: civil engineering, architecture, renewable energy, sports training, agricultural I + D. The tunnel has recently been modified for aviation trials, in which flow must have a quality that is determined by its consistency and level of turbulence, being in this case the uniformity of flow > 99.5% and the level of turbulence < 0.5%.

The most outstanding features of the tunnel are: closed circuit; test Chamber with a 2x2m^2 cross section by 3m long; maximum operating speed in the test section: 56m/s, or 48m/s in its aeronautical configuration; and nine 22kW fans controlled by a frequency inverter that regulates the speed of the fans to control the airflow rate in the test chamber.

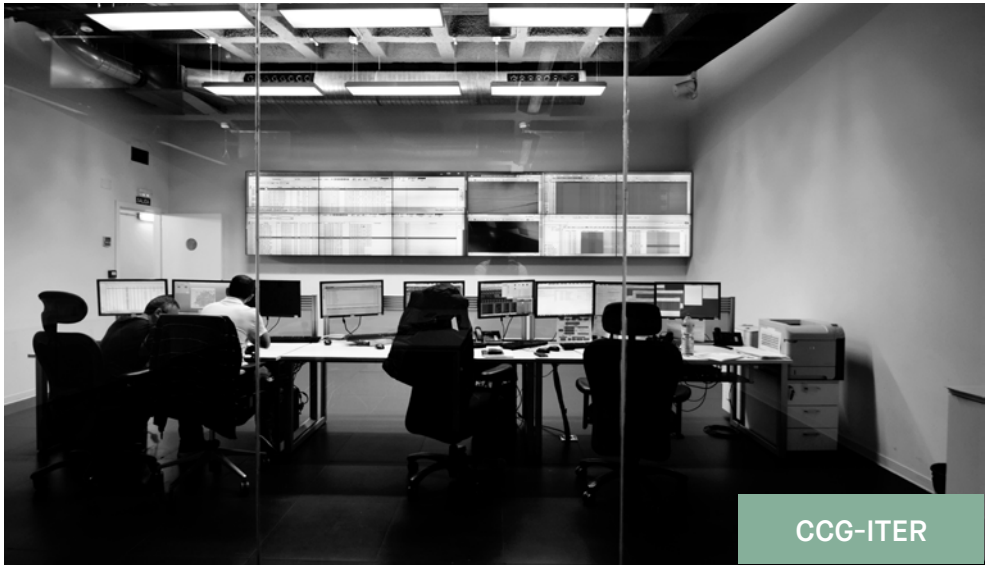
Among the available in the tunnel for the testing instrumentation highlights: Six-point test bed for measurement of global forces acting on the model, Scanivalve pressure sensor with 128 simultaneous shots, Hot-wire anemometer, Pitot tubes, Comb-type pressure gauge, accelerometers and display systems.

Generation control centre – the link to the national grid

The Generation Control Centre of the Institute of Technology and Renewable Energies (CCG-ITER) is the base from which the operation of 145 facilities for generating electricity from renewable sources, totalling more than 51MW, is monitored in real time.

The GCC is located in the Datacentre D-ALiX, works 24/7 managing production data from 3 wind parks, 7 photovoltaic installations and more that 130 photovoltaic systems of different groups.

WIND TUNNEL



CCG-ITER

GCC-ITER is an installation with computer and telecommunications support of great power, to carry out the corresponding operations and real-time instructions, required by the system operator to the GCC. The control centre is provided with connections and equipment needed to monitor and act on electricity production facilities attached to it.

GCC-ITER offers assignment services to the generation and Telemetry Control Centre in real-time (TTR). In addition, in the event that the installation does not have the infrastructure necessary to register in the service, ITER offers the adequacy of facilities.

Operation and Maintenance Centre for Renewable Energy Facilities

ITER has developed a 24x7 monitoring system, based on a SCADA (Supervisory Control and Data Acquisition) that allows the lecture of the operational parameters of renewable facilities in real time and communicate them to a data server centralized for storage in order to ensure that the facilities operate in accordance with the required specifications.

The data acquisition of the system allows the personnel of the Generation Control Centre (GCC) and the operator of the installations to check the actual state of them in real-time as well as their evolution in time. This information is necessary to be able to react quickly and appropriately to any incident on site.
The data acquisition from the systems allows the staff of the GCC and the operator of the facilities know the status at real time, as well as their evolution in time. This information is necessary in order to react quickly and in a proper way to any incident that may occur in the premises.

At the same time, this operability has been used to obtain other benefits such as the centralization of the monitoring system of the installations that optimizes the available resources, the reduction of the operation and maintenance costs, the control and register of the preventive and corrective maintenance activities, the improvement of the availability and of the grid integration and the increasing of the efficiency of the generating installations.

Electric Substation

ITER has finalized the 20/66KV transformation substation. Its construction has been necessary to overcome the limitations in the available capacity of the electric company's distribution lines and enable the evacuation of the energy generated, not only by ITER's photovoltaic plants, but also by the new wind parks to be installed in the area. This electric substation will be used by future projects that will develop in the territory as well as by some previous ones.

The transformer substation of 66/20kV, initially of 50 MVA, will be enlarged with a second transformer until reaching a power of 100 MVA. This transformer substation will be connected by an underground line of 66 kV to the future substation of Abona, as planned by Red Electrica de España, although nowadays it is still in process to be connected temporarily to the substation in the Industrial Estate of Granadilla. The connection works of ITER substation will be completed when more information is available regarding the planning of the new ABONA electric substation.

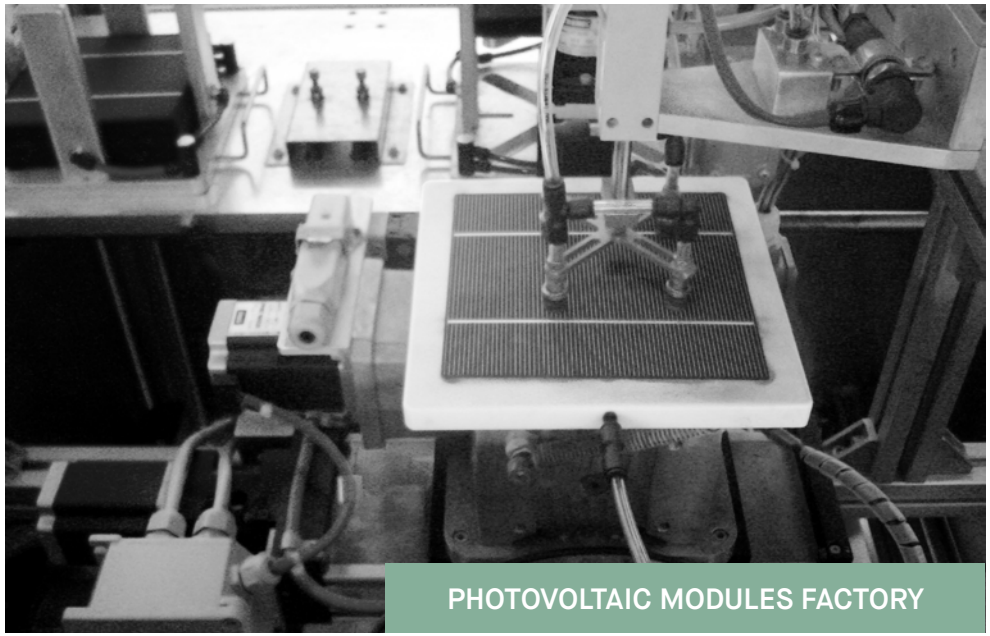
Photovoltaic modules factory

Due to demand created by the projects of ITER, a photovoltaic modules factory has been set up which aims to meet not only the institute's needs, but also to enable the institute to continue and even expand its research activities in the field of renewables.

The factory is located within a warehouse 125m long by 20m wide, divided into three sections: one for storing raw materials, a second for manufacturing photovoltaic modules and a third for storing these. Of the 2,500m^2 total floor space, 1,500 is dedicated to storing raw materials and finished photovoltaic modules, and 1,000 is for production, featuring two assembly lines, north and south.

Each line consists of two cell-joining machines, a cell-positioning robot, tables for positioning the glass fascias and for checking the modules, and a laminator. Both lines converge at a machine for testing and classifying the modules, prior to their framing in aluminium and final packaging.

This photovoltaic modules factory became operational at ITER's facilities in 2008. The experience of the technicians and our deepening knowledge of the machinery involved have enabled us to achieve a manufacturing capacity of 60MW per year.



PHOTOVOLTAIC MODULES FACTORY

Underground gases and water chemistry and isotopes laboratory

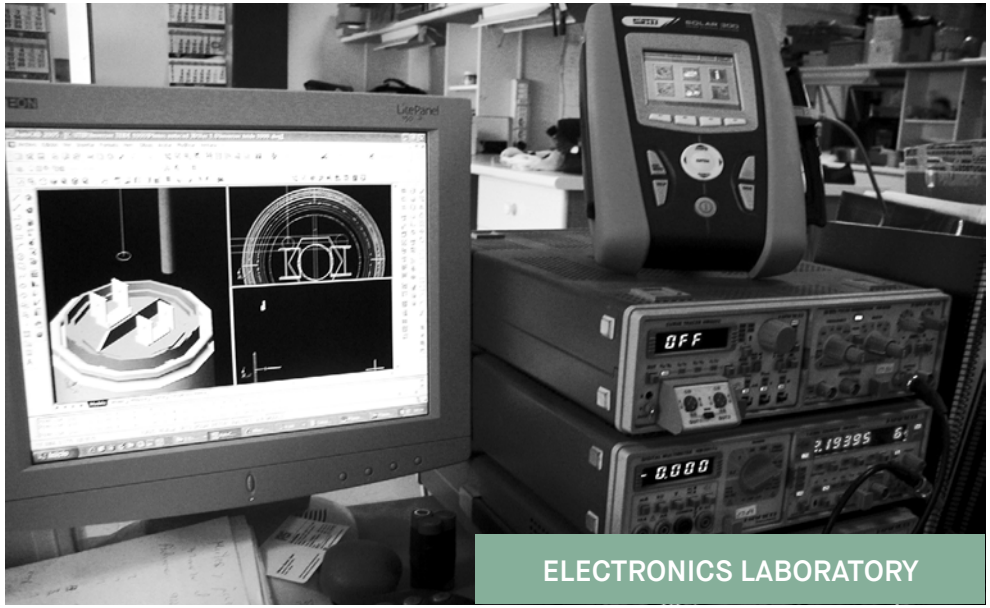
ITER's Underground Gases and Water Chemistry and Isotopes Laboratory is a scientific and technological facility designed for the chemical and isotopic characterisation of underground gases and water, as well as of other environmental matrices.

CHEMICAL LABORATORY

Electronics laboratory

Research, development and innovation are the mainstay of ITER's work. This is the very philosophy that underpins the activities of the electronics laboratory. The laboratory is located in a building within the ITER complex. Its main area of activity is the design, construction and testing of circuits and devices based on analogue and digital electronics.

The high levels of competence and professional experience of our staff enable us to develop proprietary electronic technology. The facilities are dedicated, on the one hand, to developing and testing electronic circuits, as well as to producing them in small quantities. In addition, the laboratory provides support services to certain ITER projects and activities, with one of its main areas of work being the development of renewable energy conversion and storage systems.



ELECTRONICS LABORATORY

PHOTOVOLTAICS LABORATORY

Laboratory equipment

Underground gases and water chemistry and isotopes laboratory

Portable dual-channel gas microchromatographs Varian 4900 and Varian 490 with TCD detector.

Portable dual-channel gas microchromatograph Varian 2003P with TCD detector.

Gas chromatograph Varian 3800 with TCD and FID detectors.
Gas chromatograph Varian 3900 with TCD detector.

Varian Saturn 2000 ion trap gas chromatography and mass spectroscopy system.

Liquid chromatograph Dionex 500DX.

Liquid chromatograph Metrohm 861 Advanced Compac IC.

Automatic titrator Metrohm 716 DMS Titrino.

ICP spectrometer Perkin Elmer Optima 3300DV.

Stable isotope ratio mass spectrometer Thermo Scientific MAT 253.

Noble gas mass spectrometer Thermo Scientific Helix SFT.

Quadrupole mass spectrometer Pfeiffer Omnistar 422.

Electronics laboratory

Circuit fabrication:

Surface-mount (serigraphy, 'pick & place', reflow oven) and insertion (hand-soldered) technologies.

Cable-processing equipment (cutting, peeling, fitting terminals). Materials and components.

Prototyping and testing equipment and tools.

Circuit-design CAD/CAM software.

Basic equipment: power supply units, metering devices, oscilloscopes, analysers...

Printed circuit prototyping workshop, using the chemical etching and milling methods.

Circuit-prototyping component stocks.

Power units: IGBT modules, high-power reactors, racks and miscellaneous plant.

Energy conversion plant.

General workshop.

Capability for testing small numbers of photovoltaic modules.

Connection to photovoltaic systems of power >100kW available.

Photovoltaics laboratory

Fabrication laboratory – cleanroom:

Wet bench wafer cleaning and coating system. MEI, Achiever.

Ultrasonic cleaning bath. JP Selecta, Ultrasons-HD.

Type-II (E-POD) pure and type-I (Q-POD) ultrapure water purification and delivery system. Millipore, Milli-Q Integral 3.

Spincoating system. SPS, Polos HD 300.

Rapid thermal processing and annealing oven. LPT Thermprozess, TM 100BT.

Conveyor belt furnace. Torrey Hills Technologies LLC, Hengli.

Chamber furnace. Carbolite, CWF 11/13.

Drying oven. JP Selecta, Conterm 19.

Open-load plasma-enhanced chemical vapour deposition (PECVD) system. Advanced Vacuum, Vision 300 Mk II.

Screen and stencil deposition printing system. HMI, 485 screen printer.

Triple roll grinding mill. ESG65, Shanghai Espread.

Characterisation laboratory:

This laboratory has a total surface area of 110m^2 and features the following equipment:

Spectral response measurement system. Bentham PVE 300.

Optical fluorimetry system. Gilden Photonics FluoroSENS M11.

Ellipsometer. JA Woollam ESM-300.

Microwave photoconductive decay (MWPCD) measurement system. Semilab WT-2000PVN.

Semiconductor characterisation system. Keithley 4200-SCS.

Pulsed laser kit with 2D scanning and opto-mechanical parts. Powerlase.

Bioclimatic houses

This complex, comprising 24 houses, has been developed in accordance with bioclimatic architecture criteria, in synchrony with the environment and the climate, so as to minimise the impact of the latter and thereby reduce conditioning-related energy needs. In addition, the houses incorporate renewable on a small scale, as required to satisfy the demands of the complex.

The 24 houses that make up the development are energetically self-sufficient due to the use of PV and solar thermal panels. It is, therefore, an autonomous, not pollutant complex provided with open spaces and inspired by ecological principles.

The houses are under constant research. Both the everyday monitoring and the different implementation of systems and materials used in each house are observed regularly.

The development is organized in 3 blocks separated by four streets which branch from the main that come down from the Visitors Centre. The development also has small squares and open spaces where the visitors can relax.

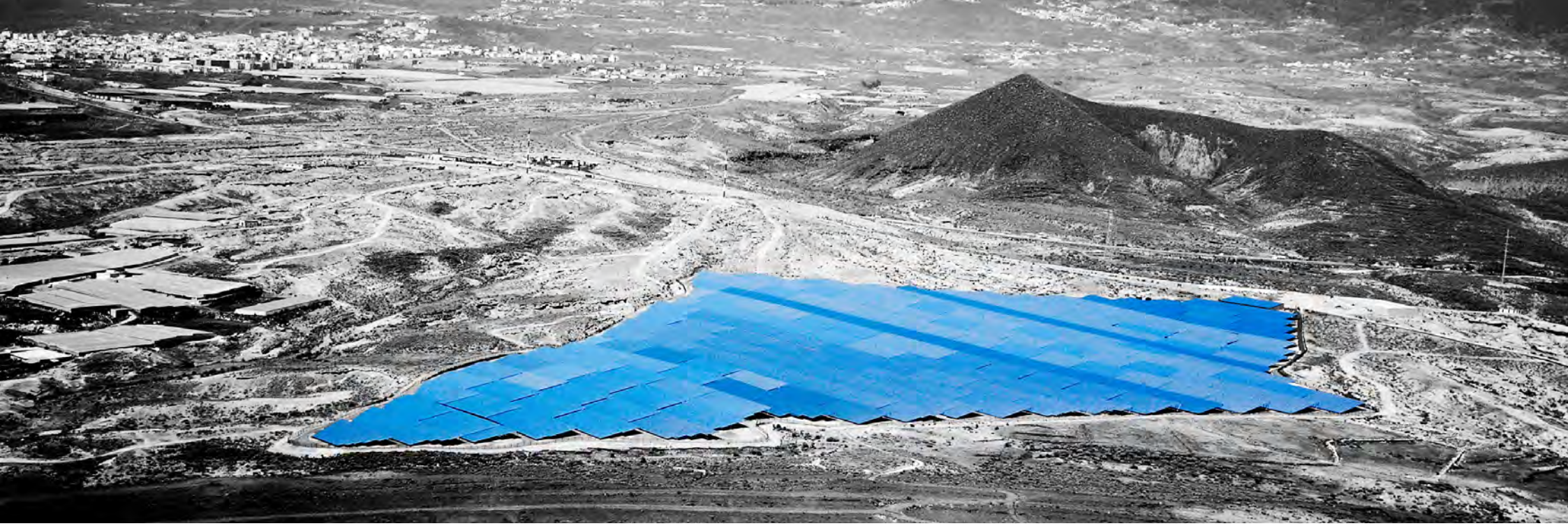
The averaged built surface of each house is between 110-120 m^2, with a kitchen, a lounge, 1 or 2 bathrooms and 3 or 4 bedrooms, distributed in one or two floors. All of the designs are different and count with contrasting aesthetic concepts. This makes the development a perfect place for the dissemination of the bioclimatic principles and to raise awareness about the importance of making this principles part of the actual buildings.

"LA ARCILLA" BIOCLIMATIC HOUSE

"LA GEODA" BIOCLIMATIC HOUSE

BIOCLIMATIC HOUSES - PARTIAL VIEW

Photovoltaic installations



In line with its founding objectives and exploiting the opportunities offered by current energy policies, ITER has made significant efforts to promote the development of renewable energies in the island. Particularly in the area of photovoltaic solar energy, since 2005 ITER has contributed to the installation of around 41MW of generation capacity, either owned directly or on behalf of third parties, acting as developer, installer and maintainer.

Worthy of note from a technical perspective is that ITER's link-up to the grid has relied on the 100 kW TEIDE 100 inverter, designed and manufactured by ITER itself. As for their support structures, these too have been developed by ITER: fully modular and removable lightweight structures made in anodised aluminium, basically consisting of columns, beams and straps.

These systems are all operated using a comprehensive remote monitoring and control system designed and operated by ITER. Since 1 July 2011, the Generation Control Centre (GCC-ITER) is responsible for their running and, in compliance with RD 1565/2010, they have certificates of conformity to respond to voltage dips, issued by AENOR.

Grid connected installations

Installations owned by ITER						
FACILITY NAME	NOMINAL POWER	LOCATION	INVERTER	LAUNCH DATE	MODULE MANUFACTURER	NUMBER OF MODULES
SOLTEN I	13 MW	Granadilla	ITER Teide 100	April 2006	Kyocera, Solarworld, Iter, Sharp, Yingli y Deiko	82,206
SOLTEN II	11 MW	Granadilla	ITER Teide 100	December 2007, June 2008 and August 2008	Kyocera, Solarworld, Isofotón, Sharp, Yingli y Deiko	69,087
Finca Verde	9 MW	Arico	ITER Teide 100	June 2008	Sharp	53,380
Finca Roja	5 MW	Arico	ITER Teide 100	September 2008 and May 2012	Sharp	30,030
Edificio D-ALiX	400 kW	Granadilla	ITER Teide 100	2013	ITER	2,520
Bodega Comarcal Tacoronte	200 kW	Tacoronte	ITER Teide 100	December 2012	ITER	1,218
Mercatenerife	100 kW	Santa Cruz	ITER Teide 100	September 2008	Kyocera	616
Planta Piloto	100 kW	Granadilla	ITER Teide 100	January 2006	Kyocera	646

Third party installations						
FACILITY NAME	NOMINAL POWER	LOCATION	INVERTER	LAUNCH DATE	MODULE MANUFACTURER	NUMBER OF MODULES
Loro Parque Fase II	1 MW	Arico	ITER Teide 100	March 2011	Conergy	5,106
Metropolitano	880 kW	La Laguna	ITER Teide 100	September 2008 and January 2009	ITER y Chaory	5,432
Mercasa	100 kW	Santa Cruz	ITER Teide 100	September 2008	Kyocera	616
Orquidario	80 kW	La Laguna	ITER Teide 100	September 2008	ITER	504
Casa del Ganadero	17 kW	La Laguna	ITER Teide 100	September 2008	Solarworld	114
Helechos de Cuero Tenerife	20 kW	La Laguna	SMA STP 10000TL	September 2012	ITER	144
Vivienda Los Realejos	9 kW	Los Realejos	SMA SB 3000TL	March 2012	ITER	60
Vivienda Radazul II	4.6 kW	El Rosario	SMA SB 5000TL	December 2012	ITER	30
Vivienda Radazul I	2.7 kW	El Rosario	SMA SB 3000TL	May 2008	Kyocera	18
Vivienda La Laguna I	2.7 kW	La Laguna	SMA SB 2500	September 2008	Solarworld	20

Stand-alone installations

ITER's Photovoltaic department has developed a series of photovoltaic kits for the electricity supply in isolated installations. These kits are designed to meet the needs of domestic consumption at three levels: basic, moderate and intensive. Thus, the market segment of homes without access to the distribution grid or customers that require independent and autonomous energy supply has been covered. The main characteristics of these kits are:

- The kits are Pre-assembled in ITER, so that its installation is very simple and can be performed in a short period of time. The support structure is also made by ITER ensuring their maximum reliability and performance.

- They are custom designed according to the specific needs that are to be must be met. The kits can include both photovoltaic and wind generation.

- For the energy storage, the kits use GEL or AGM batteries to minimize their maintenance.

- The kits are optimized to obtain the maximum utilization of solar energy, equipped both with maximizers such as VICTRON inverters.

Installations in third countries

As part of its international cooperation projects, ITER has executed several renewable energy installations, mainly photovoltaic ones, in other countries. In most of these projects, ITER has been is responsible for the onsite technical assessment, the design of the installation, the provision of the necessary materials and the development of the educational and training materials for the local companies that were selected for the final installation tasks. Subsequently, ITER performed the validation and monitoring of the installations. These facilities were designed specifically considering the peculiarities of the energy supply and consumption in each country / region.

Third party stand-alone installations

FACILITY NAME	NOMINAL POWER	LOCATION	INVERTER	ACCUMULATION	AUTONOMY	MODULE MANUFACTURER	NUMBER OF MODULES
Vivienda y Granja Caprina La Laguna	1.4 kW	La Laguna	Xantre X XW4024	24 V / 786 Ah	2 days	ITER	8
Vivienda Adeje	1 kW	Adeje	Victro N3024	24 V /400 Ah	2 days	ITER	6
Vivienda Santa Úrsula	0.7 kW	Santa Úrsula	Victro N1200	24 V / 140 Ah	1.5 days	ITER	4
Barranco Urbano de Añaza (BUA)	1.2 kW	S/C de Tenerife	Xantrex Prosine 1800i	24 V / 250 Ah	2.5 days	ITER	8

Stand-alone installations in third countries

FACILITY NAME	TYPE	NOMINAL POWER	LOCATION	INVERTER	ACCUMULATION	AUTONOMY	PHOTOVOLTAIC MODULES
Registro Civil Sor			Saint Louis - Senegal	SMA SB - 3000 TL + SI 5048	48 V / 465 Ah	1 day	21xITER
Registro Civil Engalele			Saint Louis - Senegal	SMA SB - 3000 TL + SI 5048	24 V / 400 Ah	1 day	21xITER
Proyecto MACSEN-PV			Dakar - Senegal	SMA SB - 3000 TL + SMA SBU	24 V / 875 Ah	4,2 h	18xITER
Proyecto Ranerou (Fordou)			Ranerou - Senegal	Studer	12 V / 730 Ah	3 days	9xITER
Proyecto HYRESS			Ksar Ghilène - Túnez	2xSMA SB3300 + SMA WB2500 + SMA SI5048	48 V / 3000 Ah	1 day	36xKyocera

Wind parks

ITER currently has three active wind parks: the Experimental platform of 2,86 MW, Park MADE of 4.8 MW, and 5.5 MW Enercon. All of them are in process of repowering. Three new wind parks shall be installed in the near future as a result of the last power competition organized by the Government of the Canary Islands.

2.83MW Experimental Platform

The 2.83MW Experimental Platform was co-funded by a number of organisations (ITER, the Tenerife island council, the Canary Islands regional government, the energy supply company UNELCO and the European Union). Its main aim was to assess the performance of different types of wind turbines, by power rating, manufacturer, origin and technology. This wind park has a total nominal rating of 2.83MW and consists of 9 different wind turbines installed between 1990 and 1993, with individual ratings of 150-500kW. Each of the turbines feature different technologies, using horizontal axis and vertical axis systems, fixed-pitch and variable-pitch turbines and asynchronous and synchronous generators. They also differ considerably in diameter and height, ranging between 25m and 40m in diameter, and 25-42m high. The current operating output of the park is about 1.8MW.

ITER and Endesa Cogeneración y Renovables (ECYR) signed a collaboration agreement to upgrade these wind turbines, in observance of a 6 October 2004 Order issued by the industry, trade and new technologies department of the Canary Islands regional government, which establishes the technical and administrative conditions for the repowering of the existing wind parks. The upgrade aims to make best use of the wind energy potential in the area, while replacing obsolete technology with state-of-the-art generators. The new installation will feature one ENERCON E-70 wind turbine, with a 2000kW nominal rating.

4.8MW Wind Park

The 4.8MW wind park was installed in 1996 by the economic interest grouping (AIE) Eólicas de Tenerife (Tenerife Wind Energy Companies), which was established by ITER with a 50% share, together with the renewables firm MADE and energy supplier UNELCO, and with financial backing from MINER. The wind park started out as a wind park of sixteen MADE AE-30 wind turbines, each with a 300kW nominal rating. In 1999, these were replaced by eight MADE AE-46 wind turbines, each rated at 600kW.

On 17 May 2007, Eólicas de Tenerife AIE applied for formal permission and approval of a project to repower the Granadilla III wind park, through the replacement of the existing wind turbines with four ENERCON E-82 wind turbines. The project was proposed in accordance with a 15 November 2006 Order issued by the industry, trade and new technologies department of the Canary Islands regional government establishing the technical and administrative conditions for the repowering of the existing wind parks.

5,5 MW Wind Park

The 5.5 MW wind park is a self-funded ITER installation completed in 1998. It consists of 11 ENERCON E-40 wind turbines each with a nominal rating of 500kW. Its estimated total annual output is 16.5GWh.

According to Article 7 of Decree 53/2003 of April 30, which regulates the installation and operation of wind park within the Canary Islands region, you can replace turbines with new ones to increase their capacity, as long as the wind parks' total output does not rise by more than 50%.

In this context, the project aimed to upgrade the wind parks to a capacity of 9.75MW in the industrial area of Granadilla, replacing the existing generators with five ENERCON E-70 turbines rated at 2MW each.

MADE WIND PARK

ENERCON WIND PARK

New wind parks

In 2007, a public tender was issued for the supply of wind power from new wind parks feeding exclusively into the Canary Islands electrical grid. The total power requirement (as described in an Order dated 27 April 2007) was 440MW, of which 170MW was for the island of Tenerife alone.

The result of the tender, as set out in an Order dated 29 December 2009 (and published in the regional official bulletin BOC of 14 January 2010), awarded ITER an allocation of three wind parks, each rated at 18.4MW, and of which two were promoted by an economic interest grouping (AIE), as follows:

- An 18.4MW wind park in the grounds of the Arico Environmental Complex (Tenerife), in the area of Lomo del Arrastradero, within the municipality of Arico; this was promoted by ITER.

- The Areté and La Roca wind parks (each rated at 18.4MW), both located in the Granadilla industrial estate, plot No. 26327, in the SP1 and SP2 sectors, within municipality of Granadilla de Abona. The promoter of this facility is PARQUES EÓLICOS DE GRANADILLA AIE, which is owned by three public-capital companies: ITER SA (of the Tenerife island council), GRANADILLA DE SUELO SUR SL (owned by Granadilla town hall) and POLÍGONO INDUSTRIAL DE GRANADILLA (itself jointly owned by the Tenerife island council, the Canary Islands regional government, Granadilla town council and the SEPES group).

NEW WIND PARKS

The three parks each consist of eight ENERCON E-70 turbines, each rated at 2.3MW nominal and arranged as a two-row array. Each turbine has an in-built transformer, increasing output to 20kV. Since the wind park is connected to the grid at 66kV via the future SE ABONA 220/66 substation, an intermediate 66/20 kV substation is also required.

In December 2015, the three parks (with connection to the transportation network and environmental impact statement) were presented for registration in the register of specific remuneration arrangements in the quota laid in the sixth additional provision of the order EIT/1459/2014. If the registration is formalized, there will be 24 months to install the above mentioned parks.

Monitoring, operation and maintenance of wind parks

ITER has continued in the same operation line with the wind parks. Each year new strategies are implemented, always with the intention of increasing the efficiency and profitability of the facilities, giving primary attention to the tasks of preventive and predictive maintenance which is intended to minimize the damage incidences and increase the effectiveness of the mechanisms used.

MADE WIND PARK - PARTIAL VIEW

One of the main activities of the ITER group is the development of R&D projects in the area of Renewable Energies. Projects focus mainly on the study and improvement of the processes for obtaining clean energy from the main natural energy resources of the Canary Islands.

The Institute has outstanding infrastructure for R&D, such as the manufacturing characterization laboratory of photovoltaic devices, testing and experiment platform for the study of the operation and validation of photovoltaic devices, wind tunnel and the modelling workshop, enabling it to offer a wide range of services in the field of renewable energies.

The Institute carries out renewable energy projects to help increase the contribution of renewables to the island's energy mix. In this vein, ITER has installed photovoltaic power plants totalling 41MW, and has 13.16MW installed across three wind parks.

ITER also provides a number of related services, including the design and manufacture of related components and equipment (photovoltaic modules, support structures, inverters, etc.) and the operational and maintenance tasks required by these facilities.

In the same line, the Institute also carries out technical audits of photovoltaic systems, whose main objective is that the owner knows how he´s installation is working, detect and identify possible causes of performance loss, as well as to provide a report prepared by an independent audit company.

A noteworthy work is done on development cooperation and technology transfer, with the ultimate aim of improving the living conditions of local people in developing countries through the use of renewable technologies.

Testing ground for prototypes

ITER has a test area attached to the engineering warehouses, which is dedicated to the study of the performance and the validation of photovoltaic prototypes in normal working conditions. This area is available for research and development projects that can either be from the institute or not. This area is specially prepared for the installation of different types of structures, power outlets to both supply and evacuate energy from and to the grid and a communication network that enables the take in and storage of data of the performance of the prototypes. Thus, in this area, performance tests for PV modules of crystalline silicon cells, amorphous silicon, cadmium telluride and CIS has been carried out by installing them on fixed structures or with single or dual axis tracking systems. Also, optical concentration systems have been tested. In the year 2015, the testing grounds were used to carry out trials for the photovoltaic layer project.

ASSEMBLING THE SOLAR TRACKER PROTOTYPE

Capa FV

The purpose of the capa FV consists of verifying the performance and reliability of light-concentration films of two kinds, based on the data gained from a set of Test Modules, supplied by Sumitomo Corporation, which have been installed and put in operation under normal conditions at the ITER's premises and under the supervision of the Photovoltaic Department, attached to the Renewable Energy Division.

The Test Modules consists on a set of two modules of single cell with light-concentration film and one module of single cell without light-concentration film, which is used as a reference for the system.

For the purpose of measuring the performance of the modules, the Department of Electronic, attached to the Engineering Division, developed a set of components which can be summarized in two main components: The Cell Printed Circuit Boards, and the Data Logger.

Likewise, the technology Area codified a set of programs in order to, on the one hand, acquire the data, modify them and save them in a database, and on the other, make them available for evaluation in real time, via a web application.

UVSiTE project

UVSiTE aims to improve the energy efficiency of silicon-based photovoltaic cells and modules by integrating a new type of downconverter (or downshifter). The technology enables the capture of high-energy photons, thereby increasing the quantum efficiency of solar cells at certain wavelengths.

The project is considering the following aims:

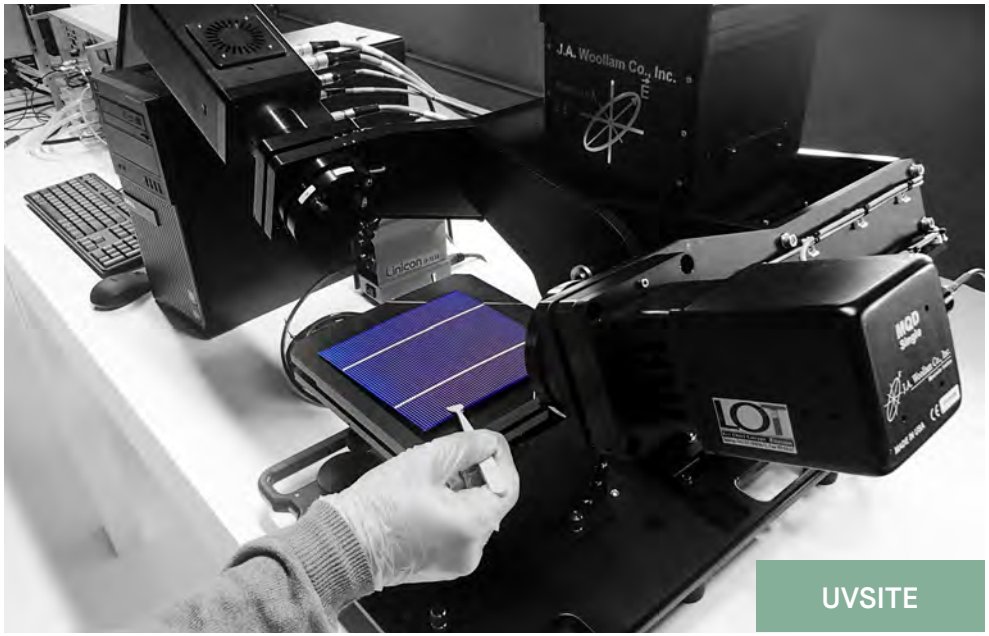
• To produce a new type of downconverter for standard solar cells and silicon photovoltaic modules which can increase device efficiency by at least 0.3 percentage points compared with not installing the downconverter.

• To design the procedure for integrating the downconverter in the process of producing standard silicon technology solar cells and PV modules.

• Ensuring the increased efficiency achieved with the downconverter, in terms of additional revenues from increased electricity production, compensates for the additional cost of the manufacturing process.

• Ensuring that the downconverter offers a similar degree of durability for a PV module as the standard durability available on the market, i.e. 25 years.

The project is led by the University of La Laguna, in partnership with ITER and the Fraunhofer Institut für Solare Energiesysteme. The project lasts three years, ending in December 2016. UVSITE is financed by the Fundación Obra Social CajaCanarias within the frame of the 2013 Call of Investigation Projects.



UVSITE

SINARQ project

The SiNARQ project was financed under the 'societal challenges' chapter of the 2013 national research, development and innovation programme, part of the national scientific and technical research and innovation plan 2013-2016.
The project proposes the manufacture of photovoltaic cells based on thin-film crystalline silicon (c-Si) and hydrogenated amorphous silicon (a-Si:H), with an integrated downconverter (or downshifter) for increased efficiency. The cells will be assembled in ITER's photovoltaic modules factory and integrated at ITER's bioclimatic buildings.

The main aims of the project are:

• To competitively synthesise and layer the downconverter on photovoltaic cells/modules.

• Full fabrication of silicon solar cells and stages of a-Si:H cell fabrication at ITER.

• A 0.4-0.5 percentage-point improvement in efficiency of photovoltaic devices with downconverter.

• Integration of the photovoltaic devices and glass slide with downconverter layer in bioclimatic buildings.

• Obtaining international patent.

• Designing an industrial production line for integrating the downconverter, and appraising the relevant economic and business implications.

The project is led by the University of La Laguna (ULL), and involves ITER and the Fraunhofer Institut für Solare Energiesysteme (ISE-FhG) as collaborating partners.

QuatumOrg project

This project, financed with funds from the IMPLANTA 2012 programme aims to develop and apply new manufacturing process of third and fourth generation photovoltaic cells using nanostructures with organic polymeric materials. This research seeks to produce more efficient low cost silicon photovoltaic cells applying new concepts regarding the bond between the nanostructures and the organic polymers.

The general aim of the project is to manufacture more efficient low cost silicon PV cells that will allow its deployment in commercial production systems. In this vein, the research will focus in manufacturing concepts of the third generation cells, in order to improve the absorption of photons and obtain more efficient emitters.

Likewise, the implementation of new ways of bonding nanostructures with organic polymeric materials, which some authors have begun to be called "Fourth-generation cells" will be one of the priority aspects of this project.
This project will last 3 years and ended in December 2015.

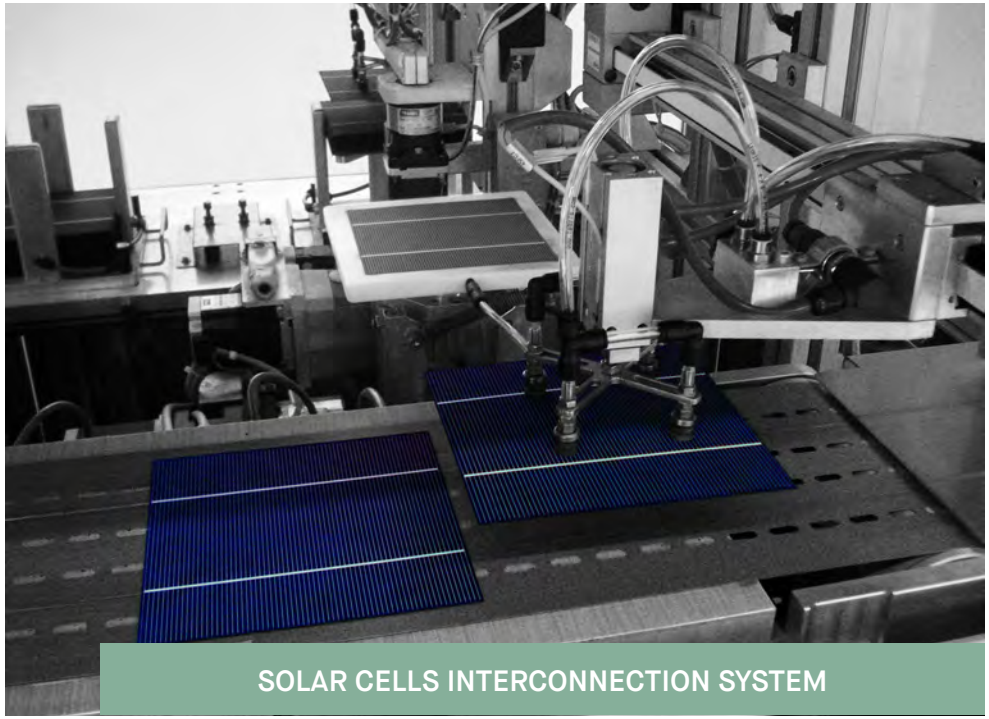
AiSoVol project

The AiSoVol Project (Photovoltaic generation solution for use as an alternative building material) is funded by the Ministry of Economy and Competitiveness through the national R&D programme dedicated to social challenges, specifically Challenge 3: The challenge of safe, efficient and clean energy.

The project was launched on 1 October 2015 and is due to conclude on 30 September 2018 and is a partnership between ITER as coordinator, and the National Renewable Energy Centre, CENER-CIEMAT Foundation. Co-financed by the European Union, it has a total budget of €1,008,543.07, of which €849,495.70 have been funded under the said programme, with a grant of €488,632.08.

The AiSoVol project involves the experimental development, manufacturing and scientific testing of a versatile modular photovoltaic panel for use as an architectural structural component. The proposed solution is a "plug & play" photovoltaic module produced by encapsulation of its constituent electrical components (PV cells and connections) by 'sandwich' low-temperature lamination. The modules would feature various types of transparent thermoplastic plaques, instead of tempered glass, and cohesive materials and woven-fibre structures inspired by the sails used in sailing ships, to give them strength without the need for an aluminium frame. This design aims to result in photovoltaic modules that are lighter, of versatile geometric design and providing varying degrees of structural flexibility.

In addition, to improve the module's electrical connectivity, a novel connector is to be prototyped that might be located on the outer edge of the photovoltaic module, thereby also improving the ventilation needed to ensure the integrity of the module's protection diodes.



SOLAR CELLS INTERCONNECTION SYSTEM

Finally, and in compliance with Spain's 2006 CTE technical standards for building (CTE), including the error corrections set out in the national official bulletin (BOE) of 8 November 2013, regarding energy-saving requirements, the final product of this project will be adapted to ensure it meets the energy-saving requirements set out in the CTE's Basic Document on Energy and Energy-saving. The solution envisages a rear insulation sheet being fitted against the backsheet of the module which adequately helps minimise the energy demand on the thermal envelope of the building, thanks to its specifications regarding insulation quality, air permeability and exposure to solar radiation, which meet the thermal transmittance standards established under the CTE.

Perovskita project

The Perovskite project of ITER's photovoltaics department is a line of research, development and innovation that aims to develop high-efficiency, low-cost photovoltaic cells using organic-inorganic hybrid materials as the active (light-capturing) layer.

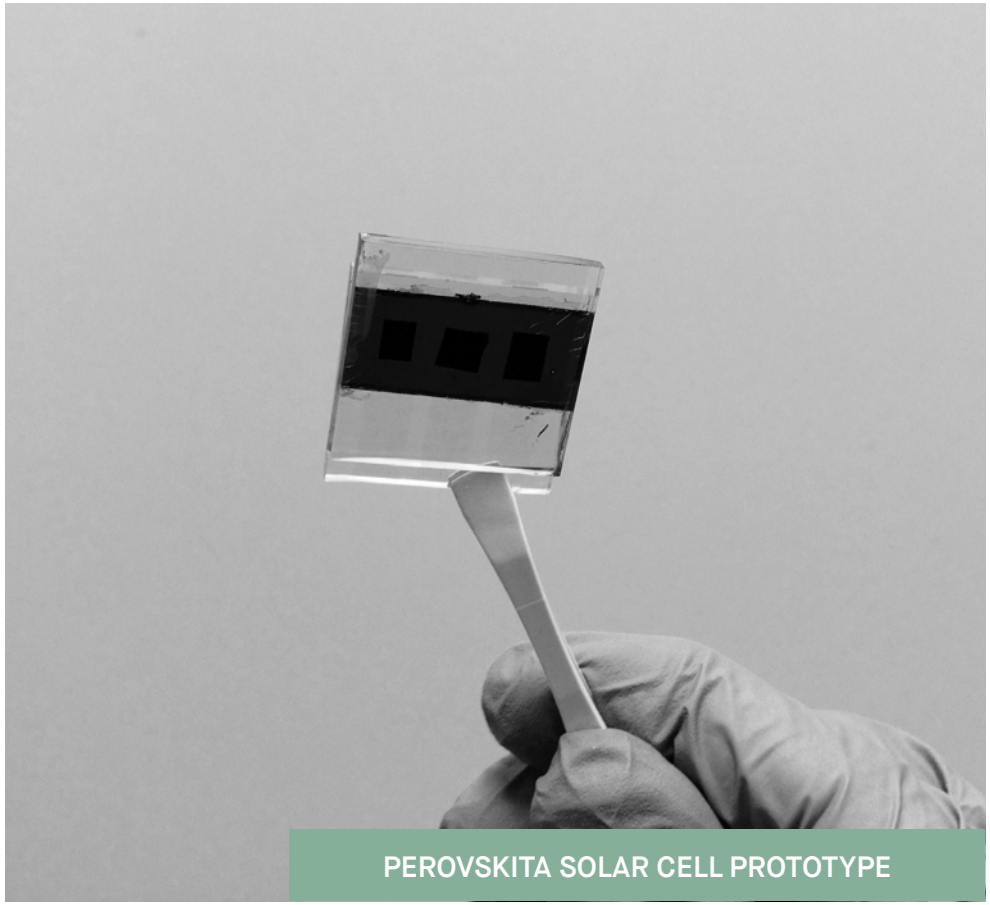
This technology, which has evolved rapidly over the past decade, having achieved record-breaking efficiency levels in laboratory conditions of over 20%, is particularly attractive because of the relative simplicity of the processes involved in developing it. These consist in arranging its constituent elements in the form of thin layers on transparent substrates, which reduces the cost of both the materials and the manufacturing processes.

The aims of the project are centred on improving the technology with a view to harnessing its commercial applications. To this end, the project will focus on three areas:

- Improving the synthesis of the structures of the deposited layers, to ensure greater photovoltaic cell efficiency by reducing light-capturing and electrical losses.

- Research into the methods of layer deposition related to the structure of the photovoltaic device itself.

- Assessment of the performance of such structures over time and in response to their exposure to the environment.

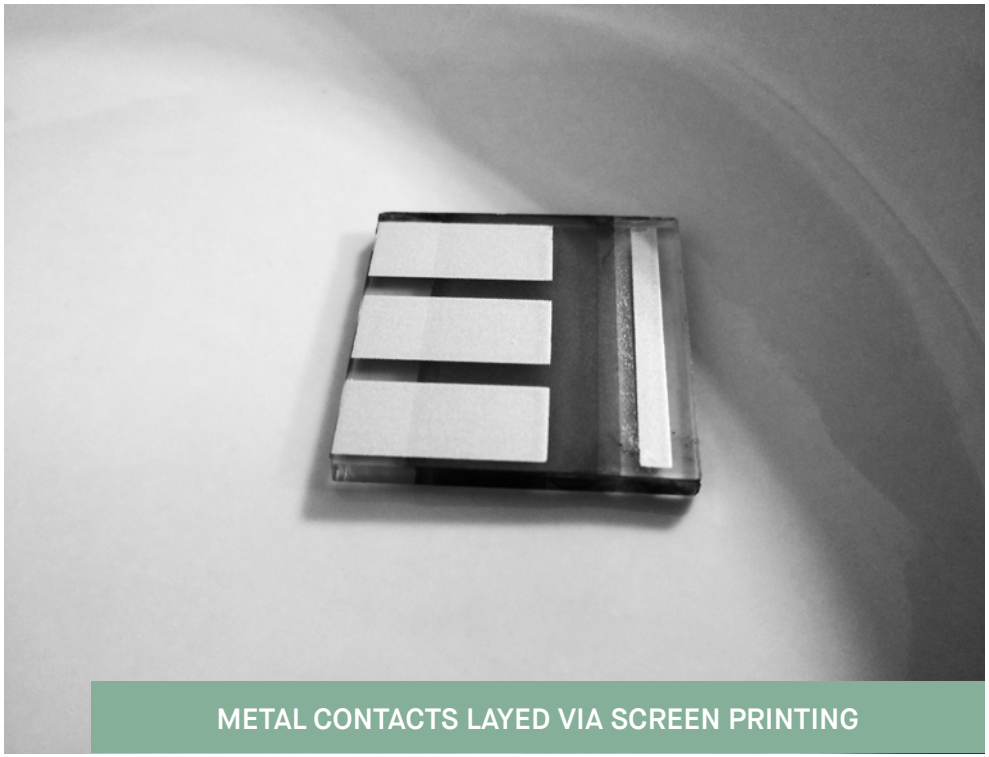


PEROVSKITA SOLAR CELL PROTOTYPE

Research results from this project were accepted for publication at the European Photovoltaic Solar Energy Conference and Exhibition, held in September 2015 in Hamburg (Germany), where the team presented the following scientific articles:

· Adaptation of a crystalline silicon solar cell laboratory to produce perovskite solar devices. This paper explains the adaptations made to the photovoltaics laboratory, which was originally designed for researching crystalline silicon cells, for this research.

· Screen printing for Perovskite solar cells metallisation. This paper explained novel advances in metallisation processes using silver pastes and inks, using the screen printing deposition method.



METAL CONTACTS LAYED VIA SCREEN PRINTING

Actions aimed to promote energy diversification in the insular system of Tenerife Adjusting to the current regulatory framework, and taking advantage of the favourable conditions of the existing resources, the Cabildo Insular de Tenerife has approved a series of actions aimed to promote the energy diversification in the insular system of Tenerife aiming to deploy actions aimed to develop a more sustainable energy model that favours the creation of a local economy of high added value.

This project represents a determined support to the diversification of power generation, reinforcing the role of renewable energies and giving a renewed incentive to the efficient management of energy.

Within the framework of this project, the three actions to be implemented in the year 2016 are:

· A **photovoltaic plant of 6MW connected to grid**. The project proposes a pilot model in which the technical and economic feasibility of medium and great grid-connected solar installations are checked. This action aims; therefore, to explore the possibility of increasing the participation of photovoltaics in the generation mix. The criterion of energy production cost will be crucial when it comes to offering a competitive selling price with reasonable margins that revert in an adequate financial profitability.

· **Energy accumulation system, load management and consumption reduction programme**. This action aims to develop an integrated system of accumulation and management of loads that will allow a more efficient energy management, providing a reduction in ITER´s consumption. This will be a pilot project whose results are expected to be reflected in repeatability in industrial systems.

· **Low-enthalpy geothermal air conditioning system in open circuit to improve the energy efficiency in the refrigeration of the D-ALiX datacenter**. This action aims to improve the energy efficiency of the air conditioning system of the Data Centre, one of ITER facilities. This building has a complex system of redundant air conditioning, thanks to which the major flows of air are balanced and achieving optimal temperature values needed for the correct operation of the equipment.

Solar aircraft propulsion system tests in the wind tunnel

Aircraft propulsion system groups have been tested in ITER´s wind tunnel. The aim has been to design an appropriate testing methodology for the propeller and engine, in order to characterize its behaviour, as well as the influence of the wake of the propeller in the wing. Four configurations of the propeller, with different angles of attack, and various wind velocities were tested. The results were quantified using the coefficient of thrust and the coefficient of power, as a function of the ratio of advancing and Reynolds (Re) number, taking the chord from wing as the characteristic length section.

PRONTAS project

This project is the continuation of the Study of Viability for the Development of a Solar Plane, financed by the Ministry of Industry, Tourism and Trade within the frame of the National Plan of R+D+I 2008-2011; and of the construction of a smaller prototype financed by the Canary Islands Agency of Research, Innovation and Society of the Information. After the success of these two previous steps, the Ministry of Science and Innovation has awarded a grant to ITER, the Technical University of Madrid and the company Aernnova Engineering Solutions for the development of the solar plane. The total cost of the project is 1.400.000 Euros and it will be co-financed by the Ministry with 1.000.000 €. ITER acts as leader of the project.

The aim of the project is to build a solar plane, capable of flying autonomously and for indefinite time, using only solar energy, and developing different types of predefined scientific, institutional or commercial missions. This plane is thought to carry out vigilance tasks, rescues, environmental protection, communications in case of emergencies, materials research or urban development and geographical control.

The project started in 2011 and ended in May 2015. During this last year, ITER has undertaken the final assembly of the prototype of the solar aircraft. Once the airframe (wings, nacelles, landing gear, control surfaces) were manufactured, the prototype was assembled also installing the energy generation and storage system, the piloting and navigation system and the power plant, which have all been developed throughout the project on ITER.

PRONTAS SOLAR PLANE PARTS

In addition, a series of tests were performed with the assembled battery packs in order to check that all connections were working properly and that the batteries behave according to what was expected. Regular checks were also carried out with a thermal camera in order to locate "hot spots" in connections and welds, as well as any deficient cells.

Among the trials carried out during this year are the static load tests that the solar plane has undergone in order to obtain the deformation that occurs in the wing when it is subjected to loads of twice its own weight, to anticipate if the deformation can induce changes on aerodynamic forces involved or may eventually lead to a collapse of the wing, or cause an unexpected response of the control surfaces.

Finally, big efforts have been focused in the obtainment of the permits and licenses necessary for carrying out the test flights of the solar aircraft prototype.

The fact that the PRONTAS prototype has a maximum mass during take-off of more than 25 kg complicates the procedure for obtaining the certificates and permissions required for the test flights, which add to the delays in the manufacturing process of the aircraft that has also slowed the application for the permits, only possible once the prototype was finished. Once the authorization of the Agencia Estatal de Seguridad Aérea gives the authorization, ITER will proceed with the test flights of the solar aircraft prototype.

AEROVIAV

AEROVIAV is a research project that aims to develop two new solutions to help mitigate the aerodynamic phenomena that affect track ballast along high-speed railway lines. The performance of such lines is reduced in cases where rolling stock travel in excess of 250km/h, as a result primarily of the way in which gravel is lifted by the movement of air, known as ballast flight.

The project is led by Foresa, which in partnership with ACCIONA and Metalúrgica Cuevas, form the core of AEROVIAV. ITER's involvement is as one of a number of subcontractors.

ITER's role in the project is the full-scale appraisal of the solutions developed to minimise high-speed railway ballast flight, with testing conducted on three possible scenarios: without a solution; implementing a physical solution; and implementing a chemical solution.

The first phase of the project consisted in wind tunnel tests aimed at, firstly, reproducing the phenomenon that causes ballast flight, in order to validate the testing model, and, secondly, assessing the effectiveness of prospective physical and chemical solutions to the problem. In this first phase, the initial performance of a potential physical solution led to its being redesigned and being subjected to a second round of tests.

The second phase consisted in evaluating these solutions, which were developed in Brihuega testing and validation centre, in a real railway setting, namely along the Madrid-Barcelona high-speed line. During this phase, the tests

AEROVIAV

were similar to those conducted in the wind tunnel, namely: an initial study of the situation with no solution in place, and then the impact of potential physical and chemical solutions.

Brasilsat project

During the month of November 2014 BrasilSat conducted several tests on their satellite dishes in ITER´s wind tunnel, and then decided to award the contract to the Consortium in which ITER participates.

This project includes both the design and the specific instrumentation of the wind tunnel. Among the tasks to be developed, ITER is responsible for the civil engineering project and the development of all the construction plans of the project, as well as the development of the data acquisition and processing software, for the operational control of the tunnel and the six component balance. On the other hand, the aerodynamic design of the tunnel, including the power plant, design and calibration of the balance and the tests for the wind tunnel calibration will be carried out by the other two members of the Consortium.

The test Chamber shall be 2,4 × 2,4 m2 section and 5m in length, with a maximum operation speed of 65m/s. The tunnel will be designed for two main applications: tests of satellite dishes, and aeronautical tests. Each test has different flow requirements, measured in terms of turbulence and the uniformity levels. In the case of satellite dishes and similar items, an average quality flow is required (less than 2,0% turbulence level and non-uniformities and a maximum speed of 60 m/s). For aeronautical tests a high-quality flow is needed, with turbulence levels lower than 0.5% and a maximum operation speed of 65 m/s.

A six component balance will be designed based on the specified data for the wind tunnel. Those specifications are based on standard load cells capabilities, and to be checked in static conditions. Taking into account the big differences in force ranges, specifications are different for bluff or aerodynamic body tests. The balance will be calibrated to determine the lift to drag and side force coupling. This scale will incorporate mechanisms for the variation of the angle of attack and yaw angles of the tested object.

Throughout the year 2015 ITER has collaborated with BrasilSat in the selection of the location of the wind tunnel and the clearing of the site. In addition, ITER has elaborated the civil engineering project and has advised the company for the selection and location of the transformer station, calculated for the power of the installation.

ITER, in collaboration with the company Ingeniería y Proyectos Viento and the Escuela Técnica Superior de Ingeniería Aeronáutica y del Espacio de la Universidad Politécnica de Madrid, have been recipients of a contract with the BrasilSat Harald company to develop a project for the installation of a wind tunnel in the city of Curitiba in Brazil, which is part of a bigger project to facilitate access to the Internet throughout the country.

¿Es posible una isla 100% renovable? project

The project "Es posible una isla 100% RENOVABLE?" aims to teach students about the viability of implementing renewable technologies in an insular system, taking into account the socio-economic and environmental features involved in this process.

To achieve the main objective, the teaching tool Isla100% has been energetically disseminated among the students in an interactive and innovative way. This tool has been developed by the Tenerife Energy Agency and ITER, being co-financed by the FECYT, within the framework of the project "Isla Renovable". This tool is a cross-platform game whose objective is to achieve a greater penetration of renewable energies in the electrical system of an island exclusively powered by conventional power sources.

¿ES POSIBLE UNA ISLA 100% RENOVABLE? PROJECT

Thanks to this initiative, backed by the CajaCanarias Foundation through its call for educational projects 2015, AIET has carried out interactive dissemination sessions with the teaching tool Isla100% among middle and high schools students, used as a complementary activity to the conventional visit to ITER´s Renewable Energies Trail and has continued the dissemination of the tools developed within the Isla Renovable project.

The 'ISLA 100' planning tool

The Island 100 computer model developed by ITER some years ago has continued with gradual modifications to include other renewable supply sources as well as storage. Furthermore the model has been standardized allowing the addition of any energetically isolated scene for its analysis.

Besides improving the model to refine its operation and increase its speed, new variables (including conventional minimums and areas with different renewable potential) have been introduced.

A specific model for the island of Tenerife has been developed that includes all the conventional power installed and the model of its normal behaviour, with the entry order of the different groups to model and verify the operation with the actual results of the energetic behaviour of the island.

The application also includes the replacement of the current car pool by one of electric vehicles. This new scenario requires an additional energy input for to charge the vehicles, but also allows a power supply during inactive periods of the vehicle, thus flattening of the curve of the insular system demand.

After updating the tool with real energy demand scenarios using updated information requested to Spain´s electrical network and improving the characterization of the hydraulic storage, improvements and updates have been made in the cost module as well as the creation of various scenarios of remuneration.

Collaboration with the University of La Laguna for smart grids

ITER continues working with the Department of Systems Engineering and Automation of the University of La Laguna's School of Industrial Engineering in order to continue the search of public financing for future joint projects.

The main objective of this collaboration is to develop a smart grid modelling and simulation tool. Since 2015 both entities have been working with neural networks and fuzzy logic in order to model the forecast of the wind parks energy production, using ITER's wind parks as starting point. A better forecasting of the wind production implies facilitating the management of the electrical system and contributes to its security, and therefore opens more possibilities to integrate renewables.

Meteorological stations

ITER has several meteorological stations located in different parts of its facilities, from which ITER obtains important information required for the wind resource and solar radiation studies. In order to have a proper historical weather data recompilation, constant maintenance efforts are made to have the stations and sensors working properly.

In the last quarter of 2015 the restoration work of one of the meteorological towers support, which was affected due to its age, began. This weather station was completely restored in early 2016 and was operating normally. ITER will continue with its efforts to make available to the general public the instantaneous values measured by weather stations through the webpage http://www.climatenerife.iter.es.

WEATHER FORECAST

Weather forecast

In collaboration with the Earth and Atmosphere Observation Group (GOTA) of the University of La Laguna (ULL), weather prediction models based on the WRF (Weather Research and Forecast) have been put in place. This tool is a valuable starting point for various types of analysis and forecasting across a variety of geographic locations.

Since its launch, high-resolution wind-speed forecasting has been used to make highly accurate predictions regarding the electricity generated by ITER wind parks.

These weather forecasting improvements have also led to a collaboration with the Canaries Institute of Volcanology (INVOLCAN), in support of the work it conducted at the location of the volcanic eruption on the island of Fogo (Cape

Verde) between December 2014 and February 2015. For this expedition, it was of vital importance to know the direction and strength of the wind around the volcano, since the transfer of personnel to the area depended fundamentally on the movement of volcanic gases from the eruption.

A visualization tool that generates daily videos of predicted weather parameters (rain, wind, temperature, etc) has also been launched and is published on the project's YouTube feed.

During the year 2015, the model of weather forecasting WRF used to obtain local wind and other weather predictions was optimized and moved to the Teide-HPC supercomputer with an increased storage capacity for the resulting data variables. Forecasts are already underway in real time, which are incorporated into ITER´s meteorological website. In terms of optimizations performed by 2015, ITER has continued working on the platform "Argestes", in production since May 2014, which is an interface web through which both the prediction of meteorological data and the wind production forecast are managed. Predictions graphs of meteorological variables and videos have also been included. In the year 2016, ITER intends to continue working on this platform, adding new features in order to facilitate the operation and maintenance of ITER´s wind parks, and obtain a more accurate wind production forecast working on new statistical models of polynomial regression.

WEATHER FORECAST

METEOROLOGICAL STATION

ITER HEADQUARTERS

Sustainable architecture

Continuing with the existing research lines, ITER has encouraged the sustainable architecture, conscious of the importance of developing architectural techniques that allow to design and to construct buildings in tune with the climate, the local geomorphology, the vegetation and the water, so that the energetic consumption is reduced and the thermal comfort increases. Furthermore, the group also takes part in projects that promote energy saving at home and contribute to a more sustainable island.

In this field, ITER provides Building energy rehabilitation and urban regeneration services and develops sustainable architecture projects aimed at reducing the environmental impact of the construction sector and energy consumption of buildings.

The Institute also has a platform of tests and trials to study the performance and validation of new solutions and building systems that improve energy efficiency.

SOLAR PANELS ON "EL CANGREJO" BIOCLIMATIC HOUSE

DESIGN PATTERNS

Renewable Energy Integration in Buildings

Following this line, ITER works mainly in two fields: the evaluation of buildings energy performance and the design of renewable energy installations.

The evaluations of buildings energy performance 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.

A new research line has begun in coordination with different Universities to implement the energetic evaluation also in the urban space, uniting comfort, urban geography, social development and I design.

The design of renewable energies includes their integration in buildings optimizing designs, energy models and elements used in buildings, defining models to integrate passive and active solar energy strategies in small and big scale. A new line has been implemented to integrate these kind of installations in historic town centres without interfering or decreasing their cultural value. Research is also going on regarding big renewable energy installations, optimizing the integration techniques, planning and building.

Design patterns project: contrasted comfort

The project "Design Patterns to optimize energy consumption and sustainable energy generation in single-family housings in warm climates" that aimed to create exportable design pattern, which could be used in other regions with similar climate, was developed with the co-financing of the Department of Science and Innovation within the National Program of Applied Research Projects. The results of this project are now being contrasted in real situations.

Design patterns are compared taking into account the basic parameters in conjunction with other factors that influence the perception of comfort such as: the circumstantial parameters such as the activity, the clothing and the average time spent in the environment; the physiological parameters such as the age, the gender and other personal characteristics; and the psychological and sociological parameters such as the expectations, the social status and the nationality.

As a complement to this project, estimated measurements related to luminous efficacy and interior visual comfort have been carried out. Daylight is one of the natural variables that influences the most in the perception of architecture and in the energy saving of non-residential building's. Due to the outdate or absence of direct natural lightning measurements in Spain, it is of vital interest to gather a database which records illuminance data, at least indirectly. The methods that predict illuminance based on solar radiation data, given the value of luminous efficacy, are probably the more versatile to implement as they are sensitive to climate and latitude variations.

Thus, the project demonstrates the feasibility of creating a competitive product based on sustainable architecture solutions. Collaboration and valid results for the investigation are achieved through the continuous occupation of short tourist stays and promoting an interest in energy efficiency in users with availability, based on:

· The variety in the type of users therefore nationality marking usage habits and comfort requirements such as age and family unity. Demonstrating the relationship between the thermal comfort feeling and the psychological expectations for certain thermal environment or climate in which the user lives.

· Results' increased exportability by being parameterized for a wide range of users.

· The inflexibility showed by tourist users regarding the comfort conditions.

· The concept of energy efficiency not as a mechanism that reduces comfort but as a set of systems that properly applied and adjusted provide a greater comfort which adapts to the tourist demands.

HUMIDITY SENSOR AT "EL MURO" BIOCLIMATIC HOUSE

Energy awakens the PRIS attractive

The project "Energy awakens the PRIS attractive", which was carried out in the fishing village of el Pris located in the municipality of Tacoronte, aimed to create a common identity associated with the Energy Efficiency and Artisanal Fisheries in this fishing area by means of the citizen participation in order to promote el PRIS as a Sustainable Fishing District.

The specific objectives of the project were:

1. Promote the uniqueness of the El Pris fishing district and their way of life craft associating it with the energy saving and the renewable energies.

2. Accelerate the incorporation of the information technology in the daily lives of the citizens of el Pris as a tool to promote and improve their quality of life.

3. Organize participatory actions to define the image their want to show to visitors, especially in the areas of its product exposure: the seafront promenade as a place of communication and the frontline business emphasizing the quality and freshness of the product captured.

The main project activities focused on participatory actions with the local population to increase the sustainability of neighbourhood, development of a mobile application designed to disseminate El Pris Artisanal Fisheries and increase the value of its product, energy audits and the installation of smart meters in frontline business, advice on the use of information technologies and proposals for measures to modernize and improve the energy efficiency of the seafront promenade of El PRIS.

The project was co-financed by the Regional ministry of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands and the European fisheries fund (EFF).

EL PRIS ESPLANADE

ALNATUR

Use of natural light in architecture according to urban planning, this project is intended to move forward in optimizing the use of natural light in architecture, taking into account the location of the buildings in the various urban plots and the possibility of have direct and diffuse solar radiation on the facade of the building. The end result will be a series of design recommendations for the openings in the architectural skin in urban situations, as well as an evaluation method of the lighting comfort that brings natural light into the Interior. The results obtained will integrate in the solar radiation control systems, and therefore natural light, with the possible use of regulatory systems of artificial lighting.

Project co-financed by the Research Projects General Sub-Directorate of the Ministry of Economy and Competitiveness.

"EL ALISIO" BIOCLIMATIC HOUSE

"EL ESCUDO" BIOCLIMATIC HOUSE

Environment

The scientific works developed within this field are basically related with the reduction of the volcanic risk, the research of underground water resources in volcanic islands, analysis and evaluation of atmospheric pollutants using optical remote sensors, exploration of geothermal resources using and applying geochemical methods, and the prediction of earthquakes by means of geochemical and hydrological methods.

GEOTHERCAN project

Experimental development of 3d models for characterising geothermal reservoirs in the subsoil of the canaries using a combination of geophysical, geochemical and geological methods.

The aim of this project is to carry out an experimental study of the use of 3D models to characterise geothermal reservoirs on the islands Tenerife, Gran Canaria and La Palma, to help further the development of geothermal energy in the archipelago.

The project is a collaboration between research organisations and companies. The Institute of Technology and Renewable Energies (ITER) is the project's coordinator, and the other partners are: Petratherm Spain SL, Volcanology Institute of the Canary Islands (INVOLCAN), the University of La Laguna (ULL) and the University of Barcelona (UB).

This project involved the creation of a public-private research consortium to jointly help promote research, development and technological innovation in the field of geothermal energy, and thus foster stable cooperation in the medium-term between public and private players through R&D projects.

The results of this project will help to secure energy supplies, strengthen the role of emerging energy technologies in an efficient and competitive way, and promote their integration in the Canarian energy system. The result is greater reliability of supplies, a more diversified energy mix and a positive impact on the environmental.

The research areas covered by this project are unique, for the groundbreaking way they have been deployed. At present geothermal renewable energy is still at a very early stage of evolution in Spain, and its development will depend largely on a better understanding of the natural resources available, which requires an innovative technology that has not yet been deployed in Spain.

The aim, therefore, of this project is the application of innovative geothermal exploration methods in areas of thermal anomalies both on the surface and at depth on land in the Canary Islands. The proposed methods are for use prior to assessment using geothermal probes, and will greatly help to identify optimal locations for this, while concurrently quantifying the geothermal potential in selected areas.

The project is co-financed by the European Union's European Regional Development Fund (ERDF) and the Spanish government's economy and competitiveness ministry.

GAS MEASUREMENTS AT MT. TEIDE

HEGEOTERMIA project

Application and use of helium gas geochemistry in the surface atmosphere for geothermal exploration (2013-2016).

The main objective of the He-Geothermia project is to conduct a technical feasibility study for the use of ground-surface gas geochemistry on the islands of Tenerife and Gran Canaria, as a novel geochemical technique for geothermal exploration. Geochemical and geophysical surveys are a precondition to the selection of suitable sites for exploratory testing.

The aim is to ascertain the scope for using a novel, simple and low-cost means of conducting preparatory geothermal exploration in areas considered to offer geothermal energy exploitation potential, based on thermal and gas anomalies at the surface, as well as deep underground.

The proposed methods are based on geochemical gas prospection (using helium) in the surface environment of selected areas in Tenerife's northwest sector and Gran Canaria's southeast sector. Because of its physical properties (light, inert), helium is an ideal gas for detecting and mapping areas of increased permeability and surfacing of fluids that originate deep underground, which is one of the most interesting indicators of geothermal exploitation potential. The results of this project will advance our understanding of the feasibility of geothermal exploitation in the project's chosen areas, and will also advance research that could help develop geochemical techniques for determining geothermal exploration potential in other areas of the world. (TORRES QUEVEDO programme, Ministery of Economy and Competitiveness, MINECO; 2013-2016).

Strengthening the volcanic activity early-warning system in the philippines using innovative geochemical methods – GEOCHEMTAAL

The main aim of this scientific collaboration between ITER and the National Institute of Geological Sciences at the University of the Philippines in Diliman, is to improve and optimise the Taal volcano's early warning system, by establishing a geochemical programme which involves monitoring and continuously measuring the diffuse flux of CO2 and H2S.

The project is co-financed by the Spanish Agency of International Cooperation for Development (AECID) and was requested by the Philippine Institute of Volcanology and Seismology (PHIVOLCS) to AECID and ITER in 2011, following the positive results of a programme of geochemical monitoring of diffuse emissions of carbon dioxide (CO2) into the crater lake of Taal, which was conducted by ITER-PHIVOLCS' scientific team on a quarterly basis (and not continuously). This non-continuous mode of geochemical monitoring proved of great use in 2011 when the volcanic alert level was raised in response to a significant rise in diffuse emissions of carbon dioxide (CO2) in the crater lake, from about 500 to 4,700 tonnes per day (Arpa MC et al, 2013).

Taal Volcano is located about 50km north of Manila, the capital of the Philippines, and has erupted violently several times, causing loss of life. Due to its proximity to populated areas and its eruptive history, Taal was designated by the United Nations and the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) as one of the 'Volcanoes of the Decade', with a view to promoting research aimed at preventing future natural disasters related to volcanic activity.

MEASURING AT TAAL

PROCIVMAC project (MAC/3/224)

The PROCIVMAC project arises due to the increase of the incidence of natural disasters, in order to act preventively in such situations. The main beneficiaries of this project are the municipalities of the Macaronesian region. The project focuses on the knowledge of the risk situations to which the Macaronesian region and Cape Verde are exposed, as well as on the training actions. These training sessions aim to share techniques and ways to improve the environmental management with the municipal technicians, as well as to introduce the implementation of risk prevention and minimization measures. The project includes the exchange of experiences and concerns among the local corporations, the study and the development of risk mapping in the Macaronesia, the organization of conferences related to the environmental management and the development of training sessions and awareness programs.

The PROCIVMAC project was carried out from 1st July, 2014 to 31st December, 2015.

In this case, there have been several activities:

• Technical assistance during Fogo last eruption (November 2014 - February 2015).

• Experience exchange with the security and emergency bodies in Cape Verde (6 - 10 March, 2015).

Two congresses:

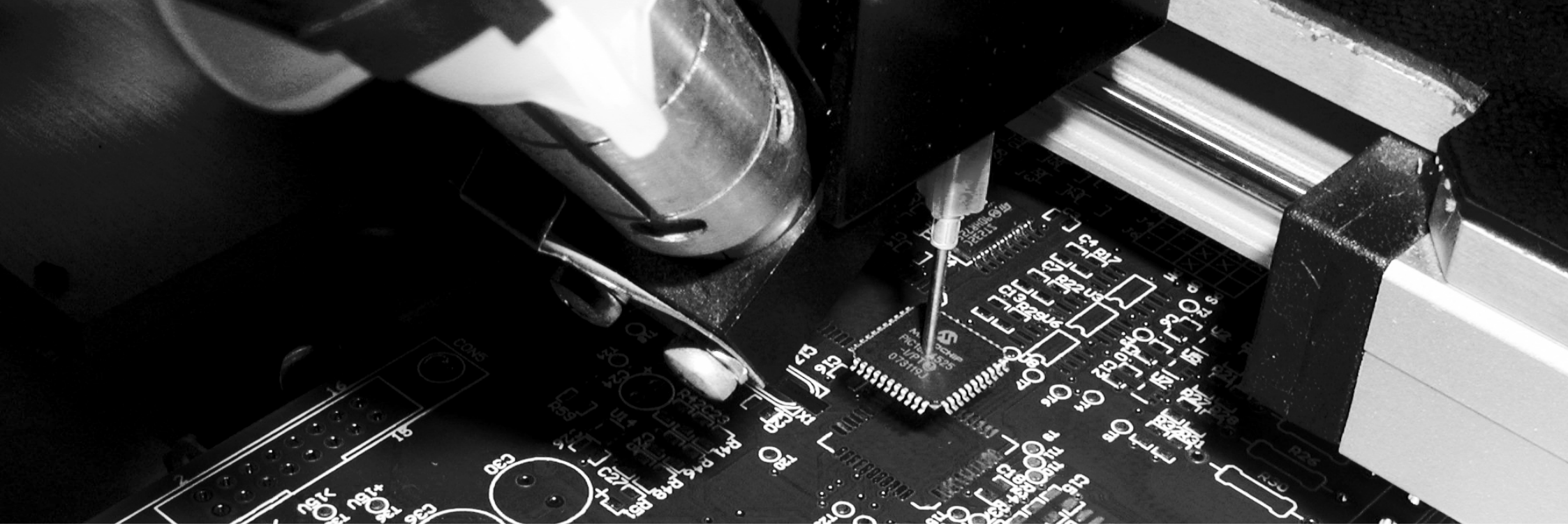
• Organization of a conference in Cape Verde commemorating the first anniversary of the last eruption on November 23, 2014.

• Attendance to the training sessions on emergency planning organized by the Association of Municipalities of the Autonomous Region of Madeira (AMRAM) in December 2015.

FOGO

GAS MEASUREMENTS AT CAPE VERDE

Engineering and new technologies



ITER works in IT development offering services related to New Technologies and focused in the development of Web communications, mobile applications, SCADA platforms, applications related to the health sector and the development of global software solutions. In this field, ITER has carried out several projects and agreements in order to improve the technical capacity of the company, providing solutions that can be beneficial for the society in general.

On the other hand, ITER designs and develops electronic systems that allow the integration of technological systems which feed on renewable energies.

Finally, the supercomputing infrastructure Teide-HPC constitutes a key piece of the ALiX project, allowing the introduction of infrastructures orientated towards the creation of an industrial network linked to the Information and the Communication Technologies (TICs) in Tenerife.

The Supercomputing service offers the possibility of running compute-intensive high performance using the available infrastructure in the Teide-HPC supercomputer from simulations of evolution of the Universe to the design of more efficient industrial parts.

ITER'S supercomputing service offers options for running high-performance computing, using the facilities of ITER's Teide HPC supercomputer: from simulations of the evolution of the universe to the design of more efficient industrial parts. It is available to university research teams, national and international research centres or companies that need to rely on such systems for their research and development.

High Performance Computing

This infrastructure constitutes a key piece of the ALiX project, allowing the introduction of infrastructures orientated towards the creation of an industrial network linked to the Information and the Communication Technologies (ICTs) in Tenerife. It is an initiative funded as part of the INNPLANTA programme of the Ministry of Science and Innovation, financed by FEDER funds for the acquisition of scientific and technological infrastructure for R&D.

The equipment of the High Performance Computing is distributed in 1100 compute nodes are FUJITSU CX250 housed in ratio of 4 CX250 nodes per CX400 chassis. These nodes are interconnected through several Ethernet ports and a Low-latency network Infiniband QDR.

Such equipment has a large number of applications. The available computing power allows a substantial improvement in the accuracy of processes of simulation in fields such as: weather forecast and climate analysis, aerodynamic simulations, geological models, modelling of interaction of molecules into drugs, analysis of DNA, etc.

TEIDEHPC SUPERCOMPUTER

During the year 2015, ITER has been studied the possibility of incorporating a high-performance storage system to Supercomputing infrastructure. As a result, the procedure for the acquisition of a LUSTRE system that will serve as the first phase and serve to assess the technology within the current infrastructure has been initiated. It is expected that in 2016 the installation and commissioning operation of the storage is carried out.

In addition, several agreements and contracts of services which include multi-year projects that will continue to work during the year 2016 have been signed, such as those signed with public Galician Centre technological foundation of Supercomuptacion of Galicia (CESGA), the Canary Islands Astrophysics Institute (IAC), the Canarian Institute of statistics (ISTAC), the University of la Laguna or the European Space Agency (ESA).

In particular, in the framework of the service contract signed with the ESA, ITER has given cloud services for the entire 2015 and will continue during the year 2016.

Another highlight in the services provided by 2015 is the one given to the producer Lightbox Animation Studios for the animated Spanish movie "Catch the flag" which has been rendered in the Teide HPC supercomputer. During the last months of production, Lightbox Animation Studios had capacity computation of TeideHPC to achieve its goal and arrive on time for the premiere. In this way, up to 12800 processors of this infrastructure have been used for the rendering of scenes from the film. This, although it is not the first experience of TeideHPC in this field, represents a remarkable milestone, given the scope of the production to be distributed internationally by Paramount Pictures.

Open government

A cooperation agreement was drawn up to establish the conditions governing the data storage and information-gathering activities of the Tenerife island council, and the sharing of that information with the Tenerife public, in the context of the island council's Open Government initiative.

The agreement features, among other things, the following activities:

- Establishing technological strategies, best practice and technological alternatives, in relation to making publicly available information and data regarding the management of public services and the work of the island council, in accordance with international Open Data standards.

- Advising and providing technical support to the Tenerife island council regarding the capture of the information and data that are to be made available.

- Putting into the public domain audiovisual content generated from the activity of the Tenerife island council, with the aim of publishing them on the Internet through an institutional digital platform.

As set out in the agreement, identifying best practices and technological alternatives, providing advice and technical support to the island council's various departments and services regarding the collection of information and data that are to be made public in accordance with Open Data standards.

This action, aimed at establishing an open data map and at developing the open data portal, will prioritise the publication of at least two data sets of the institution.

Tenerife TV channel

Within the international frame of providing public administrations with resources to enhance their management transparency and with the aim of improving their digital competence, the online TV platform of the island's Council was launched: Tenerife TV channel (http://www.canaltenerifetv.com).

The 'Tenerife TV' channel is the on-line television platform of the Tenerife island council, designed to provide multimedia content generated by this public institution, as well as live broadcasts via video streaming.

Under the Open Government Project, the channel is a key component of the island council's commitment to transparency, providing an open window onto its work. The portal offers various forms of multimedia through a simple interface that functions like a television. The content is classified by creating channels covering specific issues of interest to the public, and through labelling based on keywords that helps to access the information easily and efficiently.

The Tenerife TV channel, which has been developed by ITER under the collaboration agreement with the Cabildo de Tenerife, began to broadcast on 19th December, 2014.

TENERIFE TV CHANNEL

ICT support for the Modernization and Municipal technical assistance unit (UMAM)

The island council of Tenerife has signed a collaboration agreement with ITER in a bid to increase the efficiency of the public resources used in the island council's "municipal modernisation and technical assistance" activities. The agreement is managed by the Unit for Modernisation and Municipal Technical Assistance (UMAM), under the auspices of the island council's Tourism and Innovation Technical Service.

The activities envisaged by the agreement include:

· Providing IT support services related to portals and web pages, including design, development and maintenance.

· Providing advice and support related to the deployment of a range of technological solutions involved in the management of municipal services, as made available to local councils on the part of other public service departments.

· Hosting, managing and maintaining the UMAM's collaborative environment in its day-to-day operations.

· Setting up a Municipal Services User Centre for resolving incidents and problems.

Within the framework of this agreement, ITER has developed the new web portal of the Municipality of el Sauzal http://www.elsauzal.es/, also providing its hosting and maintenance, and technical advice for the use of social networks. Furthermore, ITER has begun with the proposals development of websites for the municipalities of Buenavista, Los Silos, Santiago del Teide, Vilaflor and Tegueste in which the institute will continue working during the year 2016.

Facial recognizer

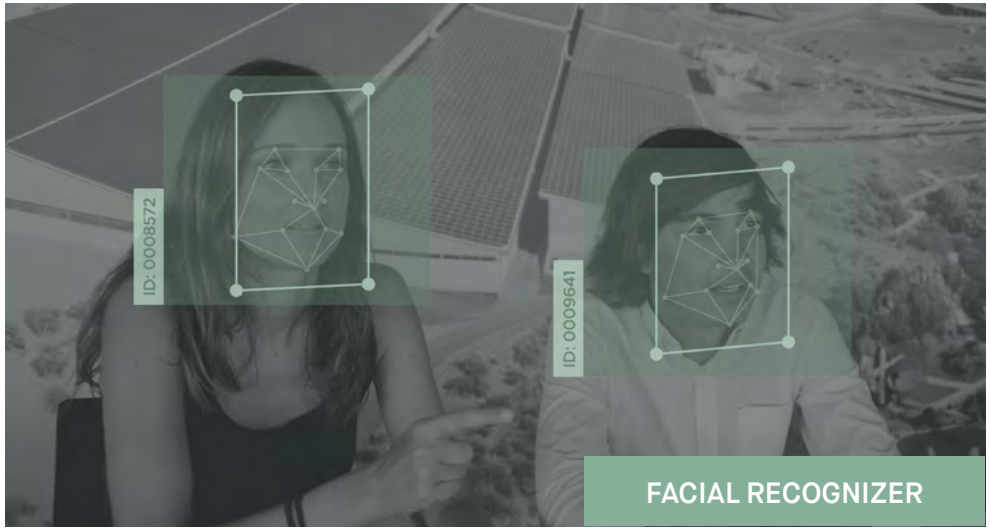
With the aim of strengthening ITER's systems for controlling the presence of staff and, passively, visitors to ITER facilities, this project was launched to research and develop a facial recognition application that might be sufficiently precise and self-sufficient to:

· Complement current ITER staff access monitoring systems.

· Detect potential intruders and to trigger alarms.

· To record people traffic volumes in each of the company's various buildings and warehouses.

To this effect, ITER has developed a facial detection and recognition algorithm with approximately 90% reliability. The system was designed initially to ensure that the processing load created by the facial recognition system did not fall directly on the user application, but to be processed at server level, thereby increasing the detection speed and enabling that information to adequately reach clients who are linked via subsystems that do not have a high processing capacity. With regard to the server, the project envisaged integrating it into the Teide HPC supercomputer, so as to fully utilise its potential and minimise the processing time required by the algorithm.



Tango:H project

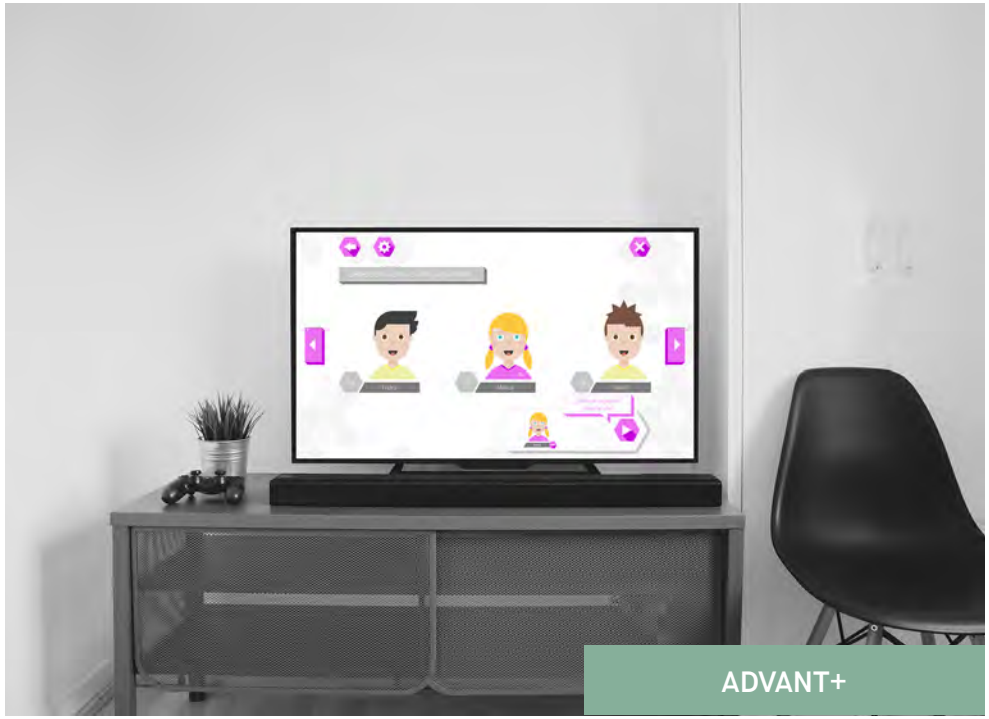
This platform was developed through a collaboration agreement between the Institute of Technology and Renewable Energies (ITER) and the Research Group Interaction, Technology and Education (i-TED) of the Department of Systems Engineering and Automatic and Architecture and Technology of Computers at the University of La Laguna under the framework of the project SALUD-in, "Platform for interactive virtual rehabilitation based on social health and physical education games and natural interaction techniques". Furthermore, given the power and versatility of the platform, it was incorporated to the project VIDEM, "Development of healthy habits and physical education through motor skill educational video games for hospitalized children and teenagers", project which is funded by Ministry of Science and Innovation of the Government of Spain and it was also deployed in the SAVEH project, "Support Virtual educational service hospital" PCT-MAC 2007-2013 FEDER-funded.

During the year 2015 Tango:H joined as an indispensable tool of the PROVITAO project (program of active video games for the outpatient treatment of obesity) that aims to support the treatment of obesity at early ages, contributing to the improvement of the State of health of the patients and the prevention of future disorders in adult ages. To do this, the project includes a model of educational intervention designed for education in healthy habits, with a program of exercises, motor skill games and commercial games and those proper of the group, such as TANGO:H, for patients and parents, where presence-based sessions will alternate with home sessions. All this program is gamed, i.e., the mechanics of the games are used to motivate and hook the children in the activities. This project, funded by the Foundation Caja Canarias 2013 in the field of health research projects, is carried out altogether by the ULL and ITER.

ADVANT +

ADVANT is a platform to support physical rehabilitation and cognitive training, through exercises that involve movement by the user using Microsoft's Kinect device ©. Through Kinect, ADVANT enables the user to interact without having to make physical contact with traditional control systems.

During 2015, ITER developed the next stage version of the ADVANT platform, the ADVANT + (developed under the TICa Project, under the PCT-MAC 2007-2013 transnational cooperation programme) and of the Tango:H (which was developed under a agreement between ITER and the University of La Laguna (ULL) under the SALUD-in health project "Interactive virtual rehabilitation platform based on video games for health, physical education and natural interaction techniques").



ADVANT+

Fade: the fall detector algorithm

Fade (http://fade.iter.es) is a mobile application designed and developed by ITER, S.A. able to detect falls using the information collected by some of the mobile sensors such as the accelerometer. Fade has been designed for people who might at risks of falling in an isolated environment without any supervision. This makes the application ideal for bikers, motorcyclist, working at heights, hikers or elders.

During the year 2015 several companies contacted ITER in order to acquire the falls detection algorithm developed. Given the interest aroused, ITER developed an API (Application Programming Interface) that allows Android developers to use the fall detection algorithm to develop their own app.

We currently have two customers:

- **SERIS GROUP** (http://www.seris-group.be/). Brussels.
- **ATOS** (http://es.atos.net/). Madrid.

Management, monitoring and control system of the bioclimatic houses

At the ITER facilities, there are a set of Bioclimatic houses comprising a non-pollutant urbanization inspired by ecological principles. Each of the houses are different in design, materials, the integration of natural resources and in architectural integration thermal and photovoltaic solar energy.

Due to the importance of this project, several lines have been developed for the control and presentation of the environmental data gathered in the houses, as well as for their public promotion:

- **Web page**. Aimed to promote the bioclimatic houses and favour their rental. Web page of the bioclimatic houses http://casas.iter.es/.

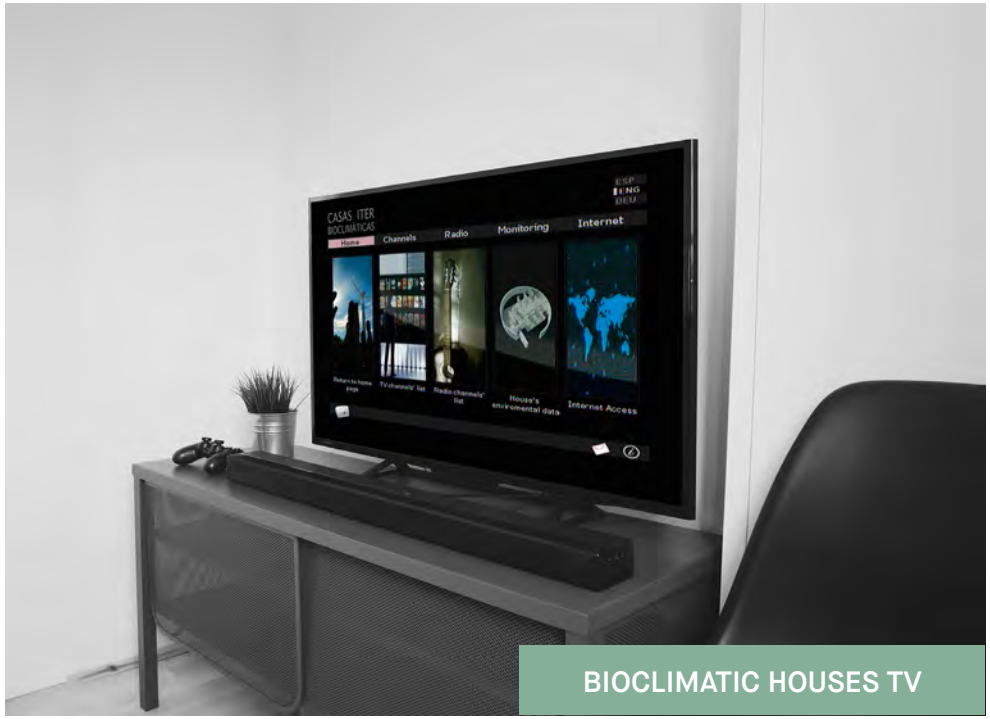
- **Management application.** Designed as hotel management application, the application controls reservations and the occupancy of the bioclimatic houses.

- **Remote monitoring**. Real-time monitoring and the storage of the environmental variables registered by the sensors installed in each of the bioclimatic houses.

- **Information panel**. TV screen located in ITER's Visitors Centre that gives information and a real-time representation of the environmental variables monitored in each of the houses.

- **IP television**. An interface for the use of TDT (freeview) televisions in the bioclimatic houses. It provides access to the Internet, real-time monitoring of the environmental sensors, internal communication, online press, etc.

During the year 2015, the user's interaction with the different interfaces of the bioclimatic houses has been enhanced, adapting all systems for a better operability between them. In addition, new functionalities have been added to the management application and web portal of the bioclimatic houses in order to increase the efficiency of the work performed by the staff of that managed



BIOCLIMATIC HOUSES TV

the houses.

Monitoring system for ITER's meteorological stations: meteo ITER

Meteo ITER was born due to the need to optimize the different photovoltaic and wind production systems of ITER, S.A. This is achieved though the real-time monitoring of weather variables from the areas surrounding these different energy production plants.

The SCADA (Supervisory Control & Data Acquisition) system developed arises from another broader project, called meters, which tries to establish access (adopting the same read / write protocol) to different monitoring devices. In this acquisition system, the read / write and data storage processes present a completely customizable interface.

Clima Tenerife is the public web interface of meteo ITER. It displays general information from some of ITER's stations along with the real-time values of their sensors and graphs presenting the last 24-hour data (http://climatenerife.iter.es).

In 2015, the weather forecasting calculated by the supercomputer Teide-HPC has been added to the data available on meteo ITER and its interface has been improved for a greater control over the data collected by the different meteorological stations.

Supervisory Control And Data Acquisition (SCADA) system of the ALiX project: BMS 2

During 2015 more devices have been incorporated to the SCADA (Supervisory Control And Data Acquisition) system of the ALiX project. This platform was developed with the aim of unifying, under a common environment, the D-ALiX datacenter's equipment and devices along with CanaLink's infrastructure and telecommunications network. In addition, some of ITER's photovoltaic laboratory (SiCell Lab) equipment has been integrated in BMS2.

METEO ITER

Tenerife Traffic Cameras app

Tenerife traffic cameras is an application for Android mobile devices and iOS, developed by 2015 for the Cabildo Insular de Tenerife, showing cameras of the road network of the Cabildo Insular de Tenerife enabled for the traffic control and to show information in real time the traffic and road conditions.

This first version shows the cameras under two different modes; a map so that the driver can refer to the roads conditions immediately and a second mode that shows traffic cameras near his position and according to the path to be led. This second mode helps the user identify the conditions of the road automatically as you are approaching traffic cameras placed in the streets.

STIRPE – Towards a system of intelligent transport in residential and pedestrian areas

The project is part of the "Smart, Sustainable and Integrated Transport" Challenge framework document noted in the "Spanish Strategy for Science, Technology and Innovation 2013-2020". The aim is to make progress in resolving the difficulties which currently prevent autonomous vehicles from being a viable alternative to conventional transport. The project is presented as a coordinated effort, with a team comprising: The University of La Laguna (ULL) Robotics Group, GRULL, CICEI, Information Centre for a Knowledge-based Society and ITER, Institute of Technology and Renewable Energy.

In this regard, the project has the proposed three main objectives:

- To establish and validate a testing environment for autonomous vehicles.

- To improve sensing systems, with the common feature that they combine heterogeneous information sources and, separately, devices.

- To advance issues of energy sustainability and efficiency. Consideration is given to providing a service using a fleet of the relevant vehicles.

Verdino is an ecological low-cost electric vehicle, such as the ones used in golf courses, but mechanically and electronically adapted in order to make its steering, braking and traction systems able to receive commands from a computer while maintaining the possibility of being manually driven.

Development of a bidirectional converter

The development of the inverters TEIDE100 has enabled a new work line in this type of converters. Thus, for example, it has been developed a variant of this inverter that can operate bi-directionally. This converter allows the generation of AC current over the grid from the DC power stored in batteries, and alternately the charging of these batteries in DC obtaining the power from the grid AC. In addition, the converter can operate at unity power factor and low distortion (unlike other types of rectifiers), and can even operate with variation (by set point) of the power factor.

This variant also includes electrical equipment that allows it to operate at higher power (160 kW) than TEIDE100 model. This equipment has been tested successfully and is the basis of the energy storage system that has been proposed. The equipment along with the 500kWh battery bank form an electric storage system.

The system has worked well both in load and production. However, it is expected to make certain improvements in the control board to integrate on it the elements added to the previous TEIDE design

Development of an autonomous inverter

ITER has worked in the electronic control of the inverter TEIDE100 for the operation in generator mode. Along with a battery bank and an inverter / charger system it will be able to work as UPS, initially of 100kW. This will be also the basis for the construction of a micro-grid to which ITER's residential inverters of 3kW will be connected.

ITER also contemplates its use as grid simulator for testing power.

In the work plan, tests were first performed at low voltages, and progressively increased tensions escalate up to the planned nominal. In 2015, 150 VCC have been reached with three-phase resistive loads and external inverter with injection on one of the phases. The tests were satisfactory.

Continuation of the development of 3kW inverters: Construction of the final units for the bioclimatic houses

ITER's 3kW single-phase inverters have been manufactured for the bioclimatic houses and have been progressively installed, operating normally. In parallel, certain performance aspects have been improving and several versions of the firmware have been updated.

A monitoring and control system for these inverters has been developed that allows the online monitoring of the installed equipment, its product and and operating conditions (voltage and current). This system also keeps track of all these magnitudes that are stored on a server, if further use of the data is needed. The development of inverters has required, in addition to the manufacture of electronic cards, the mechanization of the enclosure elements (radiators, backside of the unit, seals, wall mount and various settings). The main parts of the box (front and back) were conceived and designed by CAD in the Electronics Department and built in the workshop of the Wind Department that is equipped with machining and manufacturing resources.

Filter chokes have been designed and manufactured, performing manually the winding and vacuum impregnation.

The manufacture of these elements (enclosure and filters) is dictated by the small manufacture volume that makes prohibitive to buy it to external suppliers. Taking advantage of the already operational design, tests have been conducted on next generation MOSFET transistors. In order to enable the operation of the new devices, the electronics of the inverter have been adjusted, being able to measure the efficiency of two new models: a SiC (silicon carbide) and a GaN

"STIRPE" AUTOGUIDED VEHICLE

"TEIDE 100" INVERTER

(gallium nitride). These devices are operated by the high frequency side in an extended range showing good behavior. Especially, the GaN model allowed an increased frequency over 6X maintaining similar efficiency, thereby reducing the reactive element, a relevant issue to reduce weight and cost.

There have been problems of differential current in some PV plants of the houses. These problems may be due to an insulation failure, or be inherent to the manufacturing characteristics of the panels. They are generally more frequent in the extreme hours of the day due to humidity. The inverter checks the PV plant insulation before starting. However, there may be variations throughout the day making the external circuit breaker to interrupt the current flow, requiring a manual reset of the switch. To avoid this, a differential current smart meter has been designed and implemented and can optionally be added to the equipment. Thereby the inverter can perform monitoring and disconnect under dynamic conditions of insufficient insulation, anticipating to the circuit breaker switch off. This device allows some plants presenting this problem in the past to operate uninterruptedly.

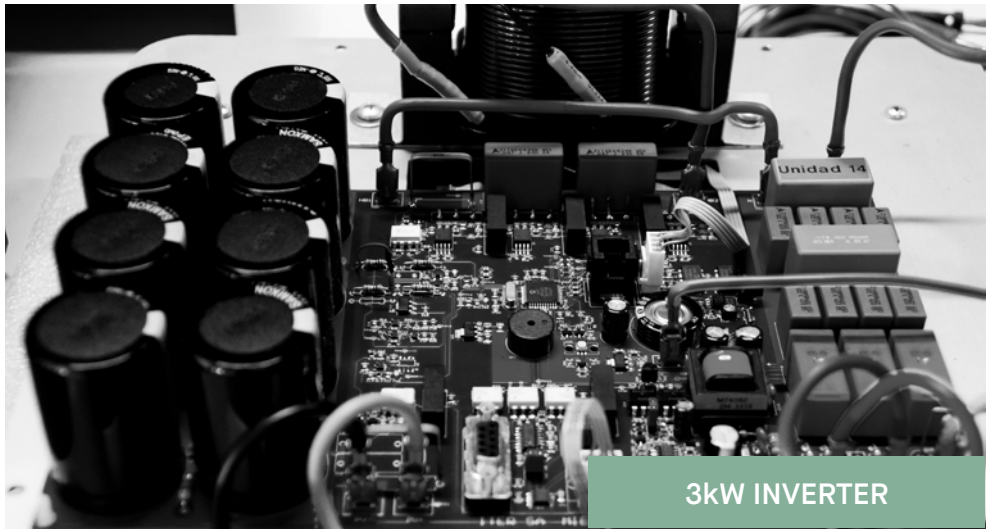
Micro-grid proposal

The addition of 3KW-ITER photovoltaic inverters to an autonomous battery inverter system to form an autonomous micro-grid is a proposal that has been developed in parallel. Grid injection and timing of the 3kW inverter to the voltage inverter was tested in laboratory conditions with satisfactory results. The inverters generate power from the photovoltaic plants and power not consumed by the loads on the micro-grid is delivered to the batteries by the grid generator inverter. The creation of the micro-grid means electrical compatibility of all subsystems and software development of management and control. The micro-grid will also provide a test operation platform and an opportunity to develop micro-grid management strategies.

A poster based on this proposal was presented at the 2015 European Photovoltaic Solar Energy Conference and Exhibition – PVSEC.

New technologies of embedded systems: control and communications

Keeping updated about new components and systems is an important activity in the Electronics department. Next generation power components have been tested. The need for improving the performance of ITER equipment has lead into lines of work with ARM processor-based systems, communication protocols for the IOT (Internet of things) and their integration into the cloud (such as "Thing Speak" and " HQTT "). The Electronics Department team has also worked in power line communication (PLC), which allows interconnecting inverters and battery management systems.



3kW INVERTER

THE RENEWABLE ENERGY TRAIL, VISITORS CENTRE AND D-ALIX DATACENTER - PARTIAL VIEW

Telecommunications

The ITER Group participates in the project ALIX, an initiative of the Cabildo Insular de Tenerife led by ITER in order to promote the competitiveness of the island of Tenerife in the face of global ICT market by eliminating the structural weaknesses in the sector of Information and Communications Technology in the Canaries.

As part of this initiative, the business unit specializing in communications infrastructure on which they depend both the Data Processing Center D-ALiX as different projects subsea connectivity (CanaLink) and terrestrial (Institute of Telecommunications is included Tenerife, SL).

The AITT (Tenerife Telecommunications Ring) access points

The Telecommunications Technology Institute of Tenerife (IT^3), is a neutral telecommunications operator created by ITER with the mission of promoting and developing the internal and external connectivity of the island of Tenerife by means of its participation in several local and international projects aimed at the expansion and promotion of the Information Society in the island of Tenerife and by extension, in the rest of the Canary islands.

During the years 2014 and 2015, IT^3 has participated in plenty of projects regarding the expansion of the telecommunication infrastructures of the Island Telecommunications Ring of Tenerife (AITT) to provide this infrastructure with the connectivity needed to offer its connectivity services to the wholesale operators, expanding its network in the municipalities of Candelaria, Granadilla de Abona, Arona and Adeje.

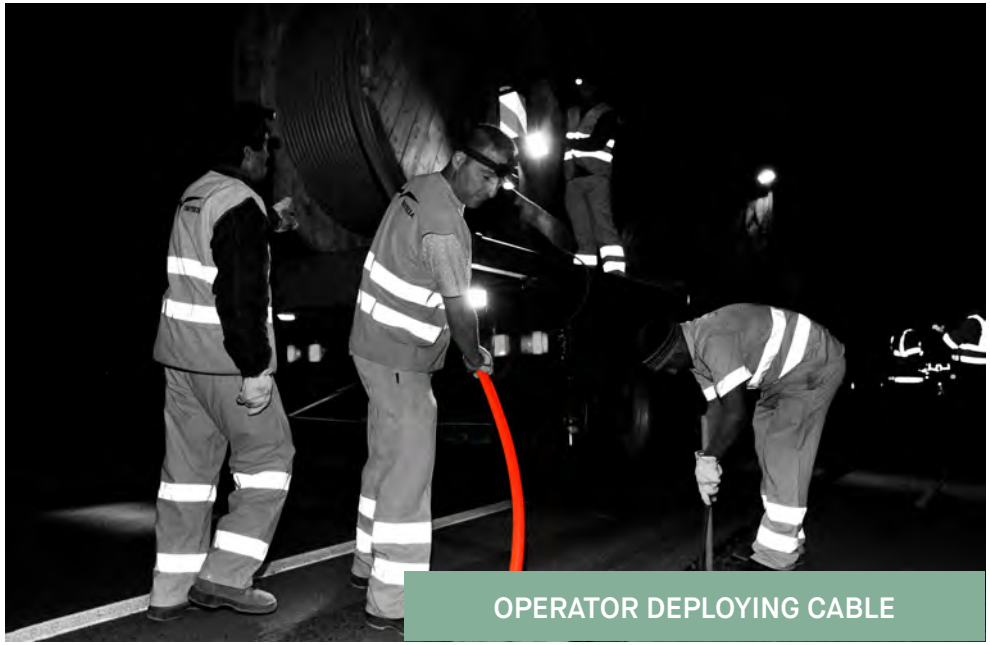
To this end, IT^3 has intense its commercial activity offering its services to several operators and has carried out the studies, projects, implementation and installation of the fibre optic required to provide such connectivity.

In this regard:

- IT^3 has carried out an active commercial work for the commercialization of its dark fiber services, which resulted in the signature of two contracts with two wholesale operators.

- New deployments have been initiated in order to adapt the IT^3 network to provide connectivity services to one of its new customers that entered into service in February 2015.

- IT^3 has developed network maintenance procedures in order to meet the high quality standards demanded by its customers.



OPERATOR DEPLOYING CABLE

MICRO TRENCHER

CanaLink

CanaLink is a submarine cable consortium between the Telecommunications Technology Institute of Tenerife (IT^3), whose mission consists in developing the alternative telecommunications core network between the Canary Islands and mainland Spain.

The CanaLink cables system connects Tenerife with mainland Spain, Gran Canaria and La Palma. This infrastructure has been deployed following the highest quality procedures and a solid network design responding to the technical and service needs demanded by international telecommunications operators and required to break down the digital barrier that currently exists between the Canary Islands and the rest of European regions.

In Tenerife, the removal of these entry barriers and, therefore, the appeal for ICT enterprises (telecoms and others) will be even more significant due to the presence of the NAP as connectivity hub and to the deployment of the terrestrial core network to all of the island's towns, which has been developed by the local government.

In the particular case of the actions carried out during 2015, ITER has worked and provided services for the proper operation of the system:

- Active participation in the delivery of services to customers that have increased capacity during the year.

- Support the works for the expansion of the network, including the receipt of equipment in the technical centres, design and development of the network engineering and configuration and register of communication circuits.

- Active participation in the project's operation and maintenance (O & M), including the continuous training of the O & M staff of the CanaLink system.

- Monitoring service of the control variables of the technical centres and network traffic through control centre 24x7 with specialized technicians. Moreover, customers contact is established from this center.

- Maintenance and management of the DCN network for the interconnection of the technical centres of CanaLink.

- Management and financial accounting of the company.

- Assistance and support in international projects: Canlink's new commitment to attract international systems requires the collaboration of ITER for the follow-up of these projects and the commercial activity. During 2015, the Tenerife's undersea fibre-optic cable was connected with the Africa Coast to Europe (ACE) undersea cable system, making Tenerife a strategic node of international connectivity.

CANALINK'S ROOM AT D-ALIX DATACENTER

D-ALiX (www.d-alix.com) is a datacentre providing TIER III+ category facilities framed within the Alix initiative. This infrastructure has more than 4500 m2 of installations, with more than 2000 m2 intended for IT equipment. It is also a base station of submarine cables, with beach manholes (BMH) and all the infrastructures needed to offer these services.

The main aim of the data centre D-ALiX (punto de acceso neutro de África Occidental-Islas Canarias SL) is to serve as basic infrastructure for its clients to develop their business model without having to make big investments, offering a rental model which will allow them a flexible growth while they benefit from the scale economies transmitted by ITER, promoter of the infrastructure. As an added value, D-Alix has a neutral Meet-Me-Room, where customers can freely choose their service/communications provider.

The aim is to offer customers high availability hosting services and a competitive environment of high-end communications with the outside world, prevailing by the following three concepts as the main characteristics to be offered to the information and communications technology (ICT) market:

- Very high levels of physical and logical security (24 x 7).
- High levels of electric availability, TIER IV electrical classification.
- Total redundancy in equipment and refrigeration distribution .
- Resistance to weather and autonomy in the event of disasters.
- Provide high levels of connectivity and quality of communications based on neutrality regarding the selection of the operator.
- Total monitoring and control facilities 24 x 7.

During 2015, ITER has continued with the implementation tasks of customers in the CPD D-ALiX (NAP). To the already existing clients (Instituto Insular de Informática y Comunicaciones, the Cabildo Insular de Tenerife, CanaLink, Telstra, ONO, Telefónica Soluciones, ATOS) the following have added in this past year; Vodafone, Blend Telecom, Thor Telecommunications and other clients of the telecommunications sector. D-ALiX has given support to the installation and maintenance of critical services for all users and their customers.

To this, it must be added that D-AliX also gives maintenance services and operability for the Teide-HPC supercomputer, second supercomputer in the country that provides multi-disciplinary services and high added value to public and private entities.

At the end of the 2015 an infrastructure improvement project began looking for a reduction of energy costs through the use of efficient cooling solutions. This project is expected that the project is in operation during the year 2016.

INSIDE THE DATACENTER

DATACENTER ENTRANCE

Dissemination and traning

ITER strives to make a good dissemination of its projects and investigation lines of work, carrying out dissemination tasks in energy, new technologies and environment so that the local population along with ITER´s visitors are informed about the researches carried out to promote renewable energy technologies and systems. Furthermore, being one of the ITER's main goals the contribution to the social awareness as for supporting a more sustainable development, it carries out also education and social awareness tasks.

On the one hand, ITER has one of the first educational equipment dedicated to Renewable Energies in Spain, which was launched in 1998, and it has been gradually extended with other installations, as the Visitors Centre and the Bioclimatic Houses. On the other hand, ITER participates in training activities, such us the Master Degree in Renewable Energies of the University of La Laguna, and also collaborate in the development of training practices, as well in Courses and Conferences. It develops specific dissemination programmes for its own projects or for contributing to the General Dissemination of Science contents, as the Radio Program Planeta Vivo Radio or the TV Program Teleplaneta.

ITER carries out Open door days and participates in both scientific and educational fairs and conferences. The Institute uses all the dissemination tools available, especially those based in new technologies such as websites and social networks.

DISSEMINATION AND EDUCATIONAL FACILITIES

The Renewable Energy Trail is part of the disclosure of the ITER's facilities, along with the Visitors Centre and the Bioclimatic Houses.

These facilities were developed with the main objective of disseminating and raising awareness about renewable energies, ITER´s research lines related to renewable energies, the environment and new technologies among both to the general public and students.

Additionally, ITER has another series of tools such as the Renewable Technologies Demonstration Unit to support training in renewable energies.

The Renewable Energy Trail

The equipment is working since 1998, becoming a leading installation in Spain in this field where visitors could experiment how renewable sources transformed into useful energy. The Trail vgreatly contributed to the approach of the population to energy generating systems that used renewable resources and helped in their social integration. This equipment is a useful complement for all stages of the education system (elementary, middle school, high school, university, professional associations, etc.), because it allows to the educational centres to make a complementary activity for the curriculum development in this field. The Renewable Energies Trail receives yearly about 10.000 visitors, including students and other guided visits.

Visitors Centre

Inaugurated in year 2004, it is a bioclimatic building mainly characterized by its integration with the environment. The Visitors Centre counts with a circuit of displays which encourages the visitor to learn about energy matters such as their most common sources, their impact in the environment, their limited characteristics, as well as the alternative use of the renewable energies. As well as dealing with contents related to the energetic problem, climate change and bioclimatism, the Visitor's Centre has access to the monitoring system that controls each house. It's a space where different activities both of technical and scientific nature can coexist and offer the local and the foreign visitor a way to participate actively. For this reason, the Centre also counts with a 200 seats auditorium, several multipurpose rooms, a gift store and a cafeteria.

In addition to being the starting point for ITER's guided visits, during 2013 the Visitors Center has hosted several events organized by others or by the own Institute; among them are:

The celebration of the 25th anniversary of the ITER which was chaired by the President of the Cabildo, Carlos Alonso; the President of ITER, Ricardo Melchior; the director of the Agencia Canaria de Investigación, Innovación y Sociedad

VISITORS CENTRE

THE RENEWABLE ENERGY TRAIL

de la Información del gobierno de Canarias, Manuel Miranda; the Mayor of Granadilla de Abona, Jaime Gonzalez Cejas, ITER´s director, Manuel Cendagorta-Galarza and the President of the World Council for Renewable Energy, WCRE, Wolfgang Palz. 16 September 2015.

Official visits of international visits of the government representatives interested in ITER´s projects and activities, in the possibility of establishing collaboration lines and to learn about the advantages of the Islands as logistical hub; Malta and San Marino (24 January), the Consul of Singapore (26 March), Ambassador of Mali (23 April) or the U.S. business mission (17 November).

The technical visit of a delegation of Morocco of the Region Souss Massa Drâa to establish contacts for possible collaborative projects based in the opening of the new funding programme of transnational cooperation projects, transnational cooperation Mid-Atlantic 2014-2020 programme. 25 March, 2015.

The Master Class organized by Banco Santander and given by the Director of the ITER, Manuel López Cendagorta-Galarza. 17 June 2015.

The celebration of the third edition of the intensive course in systematic innovation "Innovation, leadership and communication" organized by the Cabildo Insular de Tenerife, through the Parque Científico y Tecnológico de Tenerife (PCTT) and sponsored by ITER. From 17 to 25 July 2013.

And the day "The present and future of the major infrastructure in the South" organized by the circle of businessmen and professionals from the South of Tenerife (CEST). 1 October 2015.

Bioclimatic houses

This equipment, inaugurated in year 2010, is one of the most useful as a training resource. The Development comprises 24 different models of Bioclimatic Homes energetically self-sufficient (through the use of its own thermal and photovoltaic panels integrated in each house), in a zero CO_2 emission scenario. The development offers a wide exhibition of real and replicability solutions (both for the building sector as well as for the integration of renewable energies) that allows the visitor to check that is possible to choose more sustainable solutions without sacrificing aesthetic criteria and of course without giving up the comfort.

The uniqueness of this equipment is also increased for the fact that these houses are offered as accommodation, so that the visitors have the option to experience, in a more direct way, the comfort and singularity of living in these kinds of houses. Each house is like a small-scale laboratory equipped with different sensors that allows its monitoring and to show in real time its thermal behaviour; thus, the tenant can experience how small changes in the use of some of the elements presented in the house, can change that behaviour.

In July 2015, ITER´s Bioclimatic Houses hosted students enrolled in intensive course in systematic innovation "Innovation, leadership and communication" organized by the Cabildo Insular de Tenerife, through the Parque Científico y Tecnológico de Tenerife (PCTT) and sponsored by ITER.

Similarly, ITER continues with its program of guided tours for the guests of the bioclimatic houses, so that once a week the people who are staying in Bioclimatic houses have the possibility to join a guided visit to know the origin and aims of this project and the bioclimatic techniques applied in them (www.casas.iter.es).

The renewable technologies demonstration unit

Aware of the importance of raising public awareness about renewables and the role that technological facilities can play in training, ITER has designed and established a Renewable Technologies Demonstration Unit. The unit aims to provide support for teachers engaged in theoretical and practical training in the field of renewables and is available is available for use at ITER, only needing to be powered by its technicians, by formal request.

The Renewable Technologies Demonstration Unit consists of didactic equipment for demonstrating different types of renewable energy, isolated from and/or integrated in a power supply grid. The unit is fully equipped with the control devices needed to provide a comprehensive training programme. It can be used to simulate, to scale, a multitude of operational scenarios, in such a way that a wide variety of practical activities can be performed in a short time.

DEMONSTRATION UNIT

TRAINING COURSES

Aware of the need for practical training and learning, complementary to the theoretical teaching, of the importance that knowing about the work world and the needs posed by the new jobs and new professions, Cabildo Insular de Tenerife, the University of la Laguna and the Fundación Canaria General of the University of la Laguna has established a framework agreement of educational cooperation for the management of external practices for University students, in the Cabildo Insular de Tenerife, and its autonomous bodies and subsidiary entities.

In the scope of this agreement, ITER has welcomed during the year 2015 a total of 10 students who have conducted practices in the Areas of environment, technology and renewable energy.

The Institute has received 2 additional students within the framework of a specific agreement signed with the University of Florence and the Universidad Carlos III de Madrid.

ITER also collaborates in the training of students of educational cycle. In particular, during the year 2015, a specific collaboration agreement was signed with the IES San Matias to host internships of students of the 2nd cycle of FP of Renewable Energy and with the Functional Unit of Environmental Education of the Area of environment, Territorial sustainability, resources and waters of the Cabildo Insular de Tenerife for internships of students of Ciclo Técnico Superior de Educación y Control Ambiental del Centro Integrado de Formación Profesional "Los Gladiolos".

CENTRE OF EXCELLENCE IN DEVELOPMENT & INNOVATION (CEDEI)

The Cabildo de Tenerife, together with ITER, aims to give value to the infrastructure developed in the framework of the project ALiX with training and employment, endowing the island with professionals who can provide their services in companies of the sector in the Canary Islands, with a view to the international market.

For this reason, the center of excellence in development and innovation (CEDeI), has been designed and launched, a training plan to promote employment in the technology sector, especially in the field of the development of computer applications.

The main aim of the project is to launch software application development services, built on a dedicated training and employment programme able to adapt knowledge to the real demand of the companies.

With this paid training program the island will provide a set of highly qualified professionals trained in the latest technologies and development methodologies, which will benefit from a start in their professional career after the training process. Specifically, during the year 2015, more than 90 people have been trained in the CEDeI.

CEDEI

DISSEMINATION PROGRAMMES

ITER carries out specific programmes for achieving more visibility for its own projects and also for contributing to the general dissemination of Science.

Planeta Vivo Radio

Planeta Vivo Radio is a scientific dissemination programme of both, ITER and RNE in the Canary Islands, which is coordinated by the Division of Environment of ITER. This radio programme is 50 minutes long and is broadcasted weekly on Radio 5 for the Canary Islands and Radio Exterior de España (REE) for the rest of the world.

This initiative promoted by 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 Earth Sciences have in the consecution of a sustainable and balanced future in order to increase the quality of life and safeguard the planetary dynamic. Planeta Vivo Radio is cofinanced by the Spanish Foundation for the Science and Technology (FECYT) and the Insular Authority Cabildo Insular de Tenerife. All the programs are available in the website of the programme http://www.planetavivoradio.es

TELEPLANETA

Teleplaneta is a science education project established in 2009 in collaboration with the national public broadcaster (RTVE) in the Canary Islands. It consists of a television programme lasting 20 minutes in which various scientific topics are discussed, including natural hazards, science and technology, and is broadcast nationally by RTVE's Canal 24 Horas channel, as well as the international channel, and regionally by RTVE's La1 channel. The initiative provides direct mass media access to science news and discoveries of a scientific and technological nature, thereby offering the opportunity to enable the viewer to enrich their knowledge in these areas.

Teleplaneta, which is presented by the geologist David Calvo, was made entirely in the Canary Islands for the world, with the overarching aim of establishing itself as a programme that falls into the RTVE's "public service" category, helping to raise public awareness of the relationship between humanity and Planet Earth. The steering committee of the 12th edition of the government's "Science in Action" initiative in the area of short scientific programmes, educational materials and public awareness work, unanimously agreed to award Teleplaneta the prize for short scientific programmes, citing its relevance and importance in raising awareness of the risks of natural disasters and the measures that can be taken to protect ourselves from them. The "Science in Action" programme is an initiative of the government's scientific research council (CSIC), the Live Science (Ciencia Viva) initiative, the Spanish societies of physics (RSEF) and geology (SGE), and the national distance education university (UNED).

TELEPLANETA

The Night of the Volcanoes project

The 4th edition of the THE NIGHT OF THE VOLCANOES, which took place on 25 September 2015, was held in a total of 12 municipalities, seven of the Canary Islands (Fuencaliente, La Palma, La Frontera, El Hierro, Yaiza, Lanzarote, Puerto de la Cruz, Tenerife, Pájara, Fuertventura, Ingenio, Gran Canaria, and Hermigua, La Gomera) and five of mainland Spain (Almagro Piedrabuena, Argamasilla de Calatrava, Ciudad Real and Olot). The number of people who attended and participated in the NIGHT OF VOLCANOES 2015 was 14,493 people; a significant increase (113.13%) compared to the 6,800 people of the last edition.

The 4th edition of the night of the VOLCANOES, which took place on 25 September 2015, was developed in a total of 12 municipalities, seven in the Canary Islands (Fuencaliente, La Palma; La Frontera, El Hierro; Yaiza, Lanzarote; Puerto de la Cruz, Tenerife; Pájara, Fuertventura; Ingenio, Gran Canaria; and Hermigua, La Gomera) and five of the mainland (Almagro, Piedrabuena, Argamasilla de Calatrava, Ciudad Real and Olot). The number of people who attended and participated in the night of the VOLCANOES 2015 was 14,493 people; a very significant increase (113,13%) with respect to 6,800 people in the precious edition of 2014.

The main objective of THE NIGHT OF THE VOLCANOES is to bring the public closer to the researchers that work on the volcanic phenomena allowing the direct interaction meetings and the development of several activities. This celebration gives the attendees, and especially young students, the opportunity to meet researchers in a relaxed and festive setting, which include many activities and will be used to highlight the attractiveness of the volcanic phenomena, as well as a research career on one of the most attractive natural phenomena and rationale of our islands. Given the importance of tourism for Spain, and in particular for the Canary Islands, activities aimed at tourist were included in this 4th edition in order to offer them an additional cultural-educational-scientific during they visit to the islands. In this edition participated researchers from Spain, Germany, Argentina, Cameroon, Chile, Colombia, Costa Rica, Ecuador, USA, the Philippines, France, Indonesia, Iceland, Italy, Japan, Mexico, New Zealand, Portugal, United Kingdom, Switzerland, Taiwan, Trinidad and Tobago.

THE NIGHT OF THE VOLCANOES is a project promoted by La Palma Research Centre (LPRC), ITER and INVOLCAN, and was one of the 5 projects approved by the European Commission's Horizon 2020 programme for the celebration of the "European Researchers' Night" in Spain in 2014 and 2015.

THE NIGHT OF THE VOLCANOES is part of the activity known as "the night of the researchers," is co-financed by the Horizon 2020 Programme of the European Commission and is held annually in Europe and neighbouring countries on the last Friday of September. In 2015, these events took place on 25 September in 300 European cities and 24 European and neighbouring countries.

Visibility plan of the Bioclimatic houses

ITER has continued with the development of publications about the project and the bioclimatic techniques and continues offering technical guided visits to the bioclimatic houses, as well as guided tours for the general public and for the clients who are staying in them.

A close collaboration with national and international media has been maintained for the dissemination of the project on a larger scale. The project has also been presented at conferences related to energy efficiency in buildings, sustainable architecture, integration of renewable energies and sustainable holiday accommodation and is a good practice benchmark at national and international level, thanks to the recognition of the Habitat Committee of United Nations.

The Overnight stays in the houses have increased from 1.610 in 2011 to 5.083 in 2015, implying a consistent improvement of the database of the users' bioclimatic satisfaction and a greater knowledge of the project both nationally and internationally.

The official webpage of the bioclimatic houses http://casas.iter.es/ which includes the stay conditions, available services and bookings, received 27,009 visits during 2015. The Facebook page remains as one of the visible aspects of the project by means of the publication of easy-to-apply eco-advices and trying to be an informative and reference point.

WEBPAGES AND SOCIAL NETWORKS

Aiming to increase the visibility not only of the Institution but also of some specific projects, several webpages have been created along with their Facebook YouTube channel.

On the 25th anniverary, the Institute has launched a new webpage and its social networks have adapted to its new corporate image.

OPEN DOOR DAYS

ITER knows the importance of promoting the scientific culture among the population and therefore periodically celebrates "ITER´s Dissemination Days". During these days the visitors can go into facilities that are normally closed to the public and learn and participate in activities and projects that are being carried out.

During 2015 ITER has continued participating in European and national events such as the European Sustainable Energy Week (EUSEW) or the Science and Innovation Weeks.

Within the EUSEW 2015 ITER organized several theme days with the collaboration of the Tenerife Energy Agency (Days of Wind Energy, Days of renewable energies in islands, Days of solar energy and Days of sustainable architecture) involving various educational and collective centers on the island.

The EUSEW was launched by the European Commission in 2005, as a key to the promotion of renewable energy and energy efficiency within the Campaign Sustainable Energy Europe event. Therefore, participating in these Open Days is a recognition of the role of this equipment and its promoters in achieving a sustainable energy future for the island of Tenerife.

In addition to promoting the participation in European events, ITER is also committed to the popularization of science at national level. To that end, apart from participating in other events within the Science Weeks promoted by the FECYT, ITER organized several events in its facilities in collaboration with the Tenerife Energy Agency.

Thus, during several days in November, ITER organized Interactive sessions of the "¿Es posible una isla 100% removable?" project, Energy Gymkhanas, and Family energy days, with a total participation of 350 people.

Furthermore, at a local level, ITER participated in collaboration with the Tenerife Energy Agency in the Quality Weeks from 9 to 15 November and in the Science and Technology Campus of the University of La Laguna, organizing visits to its facilities to show first-hand the research activities carried out in the Institute.

XVII SCIENCE TRADE SHOW - LA OROTAVA

II SCIENCE AS A VOCATION TRADE FAIR

CONFERENCES AND SCIENTIFIC EVENTS

Canary Islands Innovation and Investment Forum fi2 organized by the Cabildo Insular de Tenerife through its programme TF Innova and Parque Científico y Tecnológico de Tenerife, the 22nd and 23rd January 2015 in TEA Tenerife Espacio de las Artes in Santa Cruz de Tenerife.

II Edition of the **Cyber Security Congress of the Canary Islands "Hackron 2015"**, celebrated during 13th and 14th February, 2015 in Santa Cruz de Tenerife.

"**Experimenta y Diviértete**" fair organized within the frame of the final of the FIRST LEGO LEAGUE, 22 March 2015. ITER participated in the fair with a stand about the ALiX Project.

Participation in the round table "Canary Islands as renewable energy R&D+i Hub" organized in the frame of the **First International Renewable Energy Summit CAN2015**, held on 25 March 2015 in Santa Cruz de Tenerife.

"Evolution and prospects of photovoltaic technology" oral presentation, framed within the program of events of **World Book Day 2015** organized by the University of La Laguna, 28 April 2015.

IV Fair of Young Researchers organized by the Association of Young Researchers of Tenerife (Jinte) and the Cultural Hall of Science Popularization (ACDC) of the University of La Laguna in la Concepción square, 6 June 2015. ITER participated with the workshop "Fibre Optics: traveling through the light" as well as with a talk about the Isla Renovable project and the importance of popularizing science and bringing science closer to young people.

Science and Technology campus of the University of La Laguna "Campus Cienci@ULL" organized by the University of La Laguna (ULL) and CIENCIA@ULL in the frame of which ITER received the visit of several groups of students, 9 and 21 July 2015. This practical and playful training program, primarily aims to boost the "scientific curiosity of secondary schools students of the Canary Islands", showing them first-hand the daily work developed by researchers of the University and R & D centres.

Conference on the development of geothermal energy in the Canary Islands, organized by the Volcanology Institute of the Canary Islands (INVOLCAN), held in Santa Cruz de Tenerife (Museum of Nature and Man, 28 July 2015) and in Las Palmas de Gran Canaria (Building Incube - INFECAR, 29 July 2015).

Xflow User Conference on the latest CFD simulation technologies and their applications in the automotive, aerospace, naval, civil engineering and energy sector, held in Madrid from 9 to 10 September 2015. ITER participated in this conference with the oral presentation "TeideHPC: using Xflow in a supercomputing infrastructure".

XI Seminar of the working group of the Ministry of Environment: "Respuestas desde la comunicación y la educación frente al cambio climático", 14-16 October 2013, Segovia, Spain. This seminar provides a forum for reflection, work and experiences' exchange between the people and institutions that work on the development of programs and awareness campaigns, education and citizens' participation on Climate Change.

OpenNebula Conference 2015 held in Barcelona, 20-22 October 2015. ITER participated in this conference that serve as a meeting point of cloud users, developers, administrators, integrators and researchers, with the oral presentation "OpenNebula implementation in TeideHPC infrastructure".

II Fair of Scientific Vocations and Careers of the Canary Islands organized by the University of La Laguna and its General Foundation, Santa Cruz de Tenerife, 22-23 October 2015. ITER participated in this fair with a demonstrative stand with the Tenerife Energy Agency, whose main objective is to increase the interest of young people in science, technology, innovation and entrepreneurship for the development of their professional future.

Science and Innovation mini-fairs promoted by the Government of the Canary Islands, through the Canary Islands Agency of Research, Innovation and Society (ACIISI), within the frame of the Science and Innovation weeks in the Canary Islands 2015, Santa Cruz de Tenerife. 19, 20 and 21 November 2015.

XII Science Fair of la Orotava organized by Cienciamania and the City council of

la Orotava in the Constitution Square of this town, 15 November 2015.

Africagua Canarias, International Business Meeting under the theme of Water and Renewable Energy promoted by the Chamber of Commerce of Fuerteventura and dedicated to facilitate business contacts on these technologies with African countries, Fuerteventura, 19 and 20 November.

Bioinformatics as a driver of Innovation held in Madrid, 12 November 2015. This event organized by the National Bioinformatics Institute (INB) together with two leaders in the IT sector, Intel and Atos will gather professionals working in SMEs, hospitals and research centres to explore new avenues of collaboration between the different actors.

"Cloud in the Teide (HPC)" oral presentation in the **XXVI RedIRIS Technical Conference** held from 24 to 26 November 2015 in the Auditorio of Tenerife "Adán Martín" in Santa Cruz de Tenerife. RedIRIS organizes this conference in collaboration with the Institute of Astrophysics of the Canary Islands (IAC), the University of La Laguna (ULL) and Cabildo de Tenerife, through the Scientific and Technological Park of Tenerife (PCTT). https://www.rediris.es/jt/jt2015/

COMMUNICATIONS TO SCIENTIFIC PUBLICATIONS

Corporative publications

"LessCO_2" ITER's news bulletin. This newsletter is published on ITER's website and is sent by email to over 400 organizations.

ITER's annual report. This document, which is published on ITER's webpage, describes the main activities and projects undertaken by the institute during the year.

Contribution to congresses

Authors: L. Marechal, J. Fernández, G. Moncho, C. Montes, M. Delgado, J. Rodríguez, M. Friend, M. Cendagorta
Title: **Building a PV Based Microgrid as a Smart Energy Solution for a Small-Size Touristic Village**
Type of participation: Poster
Congress: 31st European Photovoltaic Solar Energy Conference and Exhibition
Location: Hamburg, Germany

Authors: M. Cendagorta, E. Friend, G. Galván, M. Huebra, J. Martín, M. Torres, C. González, M.A. González, A. Jarzabek, A. Moreno, F. Martín de la Escalera
Title: **PRONTAS: Remotely Piloted Solar Plane Prototype**
Type of participation: Poster
Congress: 31st European Photovoltaic Solar Energy Conference and Exhibition
Location: Hamburg, Germany

Authors: J. Sachau, M. Cendagorta-Galarza López, M. Ney
Title: **Performance of Photovoltaic Power Systems under Grid Protection Constraints**
Type of participation: Poster
Congress: 31st European Photovoltaic Solar Energy Conference and Exhibition
Location: Hamburg, Germany

Authors: L. Ocaña, A. Linares, E. Llarena, C. Montes, O. González, D. Molina, A. Pío, C. Quinto, M. Friend, M. Cendagorta
Title: **Adaptation of a Crystalline Silicon Solar Cell Laboratory to Produce Perovskite Solar Devices**
Type of participation: Poster
Congress: 31st European Photovoltaic Solar Energy Conference and Exhibition
Location: Hamburg, Germany

Authors: C. Quinto, A. Linares, E. Llarena, C. Montes, O. González, D. Molina, A. Pío, L. Ocaña, M. Friend, M. Cendagorta
Title: **Screen Printing for Perovskite Solar Cells Metallization**
Type of participation: Poster
Congress: 31st European Photovoltaic Solar Energy Conference and Exhibition
Location: Hamburg, Germany

Publications in scientific magazines

IonGAP: integrative bacterial genome analysis for Ion Torrent sequence data. Adrian Baez-Ortega1,§, Fabian Lorenzo-Diaz2,3,§, Mariano Hernandez2, Carlos Ignacio Gonzalez-Vila1, Jose Luis Roda-Garcia4, Marcos Colebrook4,* and Carlos Flores2,3,5,*. Bioinformatics. 2015 Sep 1;31(17):2870-3. doi: 10.1093/bioinformatics/btv283. Epub 2015 May 6.

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Master dissertation and doctoral thesis defended

Geochemistry of diffuse emissions in volcanic systems: implications for geothermal exploration and volcanic surveillance in the Canary Islands. Facultad de Geología, Universidad Complutense de Madrid (UCM). Doctorando: Fátima Rodríguez. Co-Directores: Dr. Nemesio M. Pérez (ITER), Dr. Pedro A.Hernández (ITER) & Dr. Eleazar Padrón (ITER). Date: 30 October 2015.

Geochemistry of the emanations of hydrothermal-volcanic gases in geological buildings of Cape Verde and Canary Islands. Departamento de Química Analítica, Nutrición y Bromatología, Universidad de La Laguna (ULL). Doctorando: Samara Dionis. Co-Directores: Dr. Nemesio M. Pérez (ITER), Dr. Pedro A.Hernández (ITER) & Dra. Gladys Melián (ITER). Date: 3 July 2015.

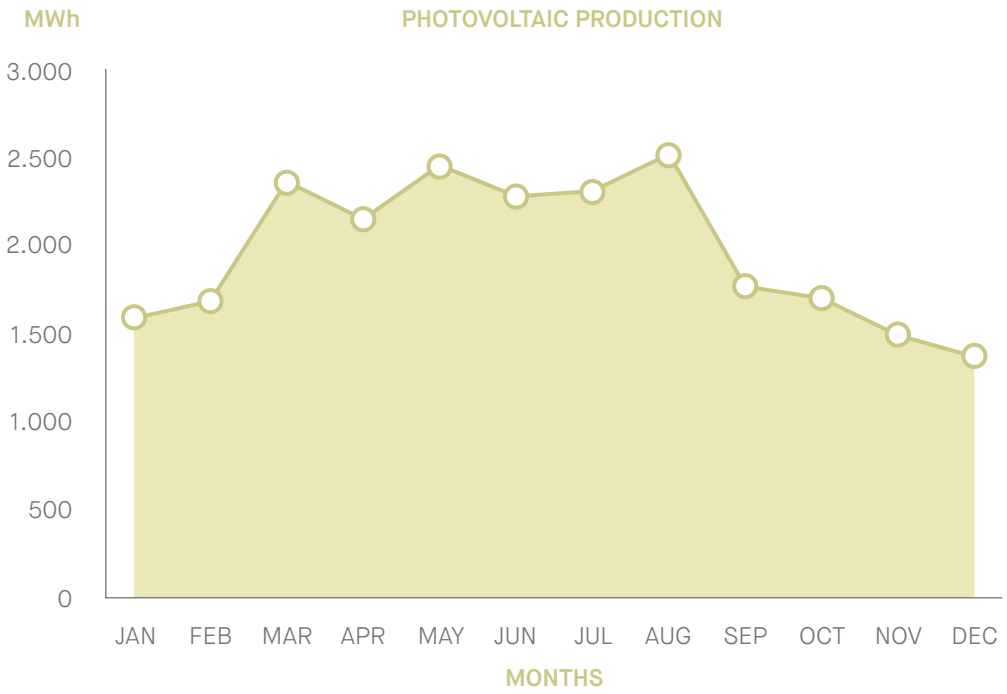
Energy production

ITER Group executes projects both of photovoltaic plants and of wind parks.

In the photovoltaic field, the Group has carried out the installation of 41MW, which corresponds to 46 % of the total photovoltaic power installed in the island.

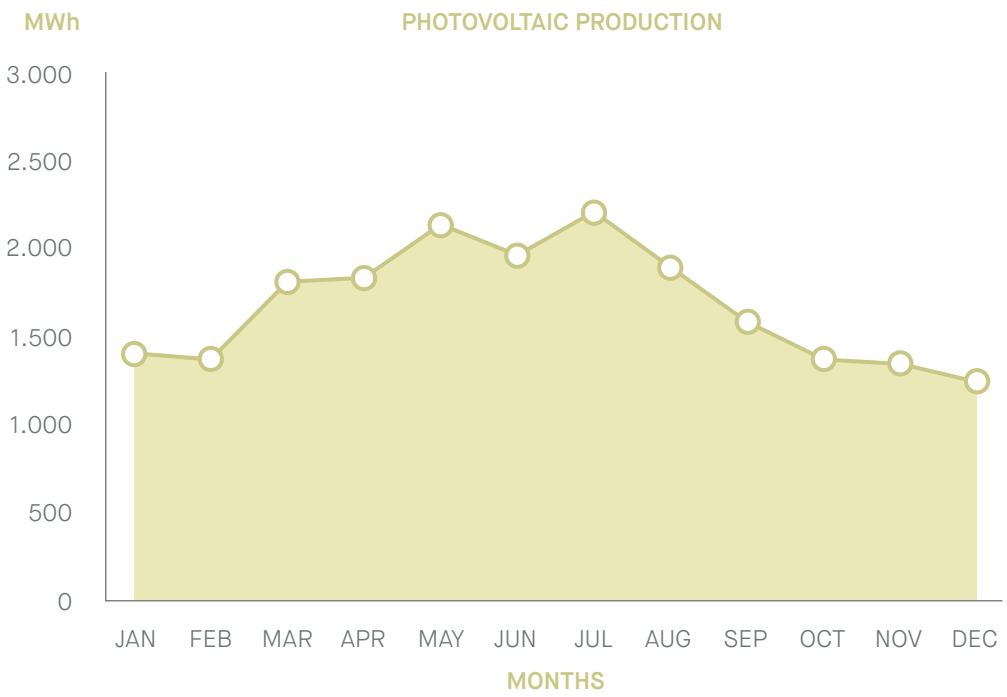
As for the wind power, the Group owns 13,16MW distributed in three wind parks and, after the power appointment in the last wind energy contest, ITER will install three new wind parks that will add up to a total of 55,2MW of wind power installed in Tenerife.

Below is the energy production information regarding the year 2015 and all the installations of Group ITER.



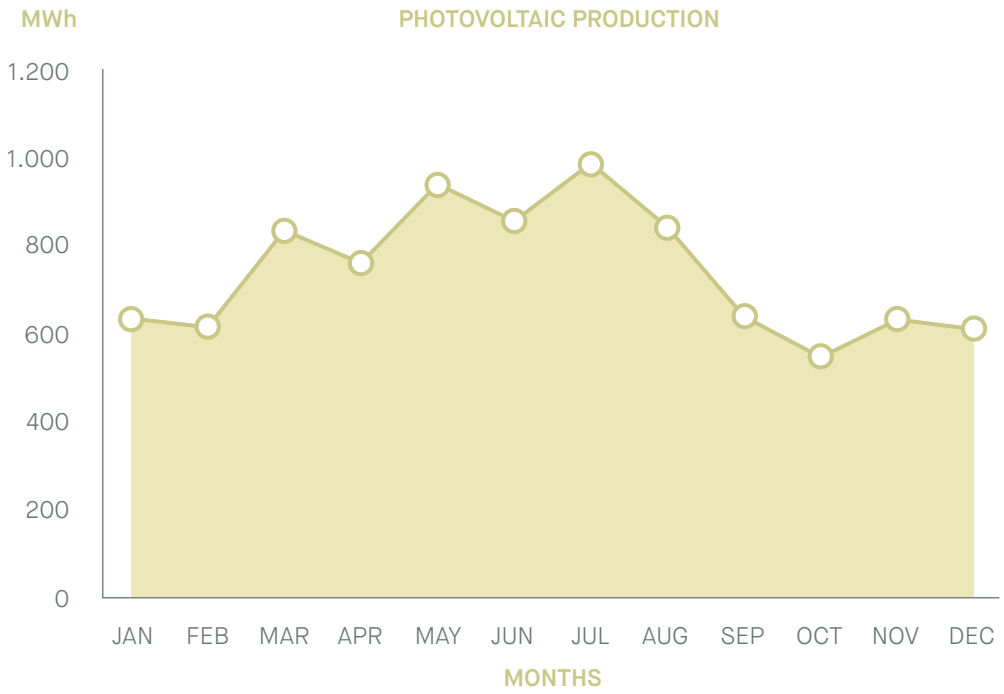
INSTALLED CAPACITY	13 MW
ENERGY PRODUCTION (YEAR 2015)	23,140 MWh
ITER'S SHARE	3.08%
EQUIVALENT CONSUMPTION	27,392 people
AVOIDED CO_2	12,850 Tn
LOCATION	ITER, Granadilla de Abona

SOLTEN I



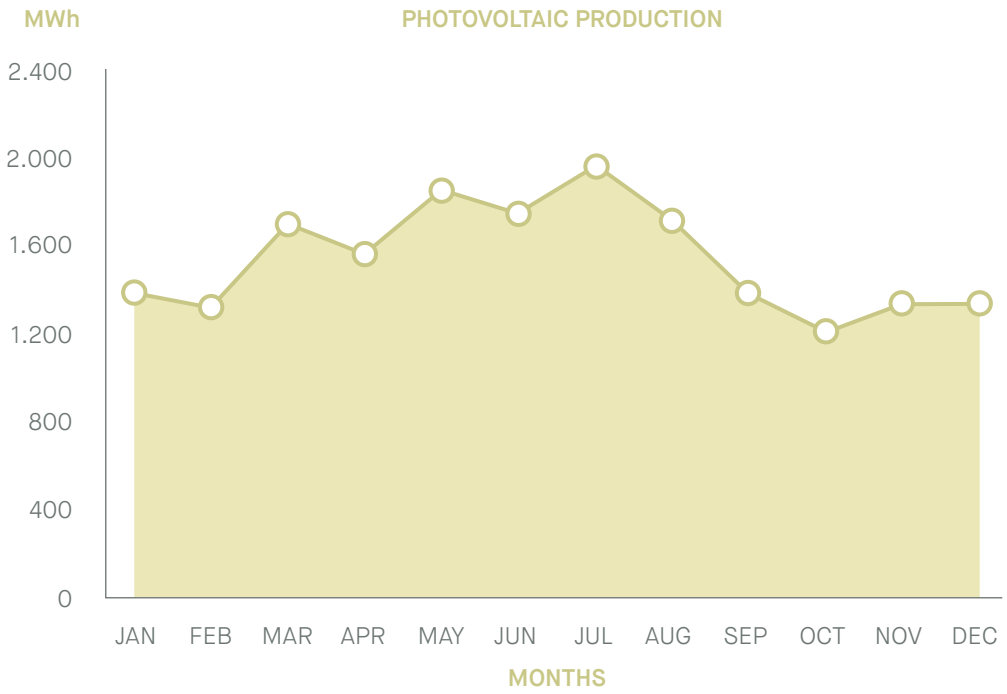
INSTALLED CAPACITY	11 MW
ENERGY PRODUCTION (YEAR 2015)	19,927 MWh
ITER'S SHARE	20.97%
EQUIVALENT CONSUMPTION	23,588 people
AVOIDED CO_2	11,066 Tn
LOCATION	ITER, Granadilla de Abona

SOLTEN II



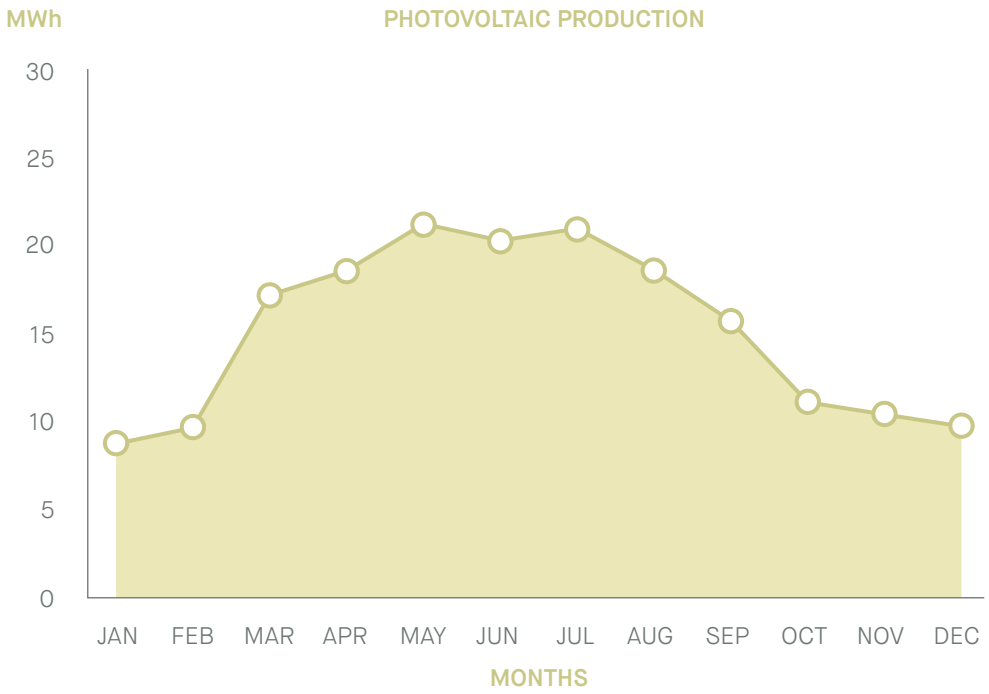
INSTALLED CAPACITY	5 MW
ENERGY PRODUCTION (YEAR 2015)	9,095 MWh
ITER'S SHARE	39.94%
EQUIVALENT CONSUMPTION	10,766 people
AVOIDED CO_2	5,051 Tn
LOCATION	Arico

FINCA ROJA



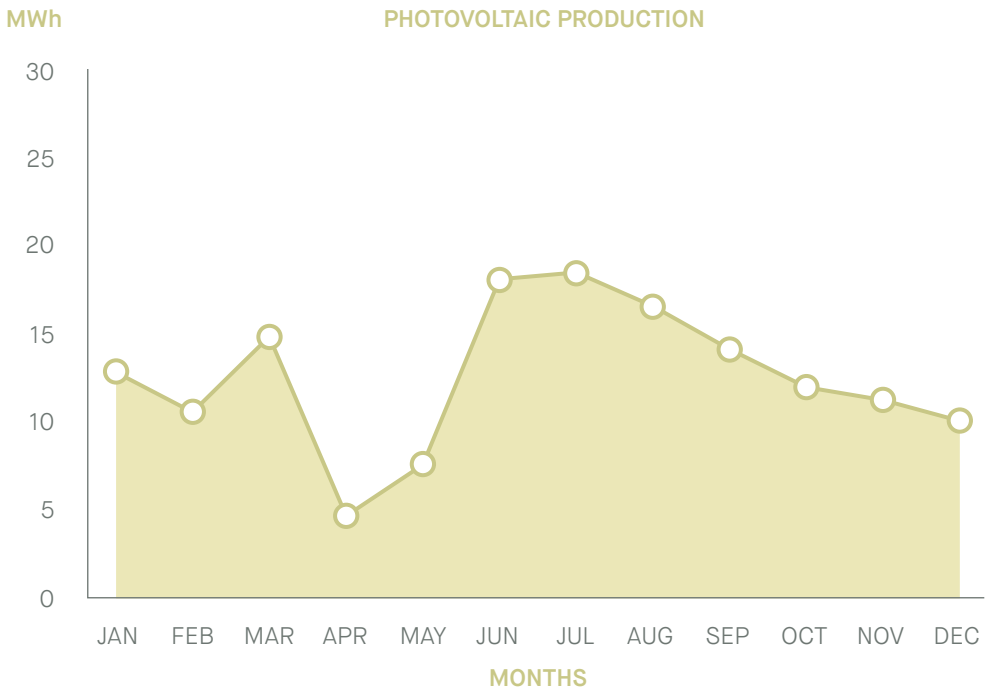
INSTALLED CAPACITY	9 MW
ENERGY PRODUCTION (YEAR 2015)	16,243 MWh
ITER'S SHARE	30%
EQUIVALENT CONSUMPTION	19,228 people
AVOIDED CO_2	9,020 Tn
LOCATION	Arico

FINCA VERDE



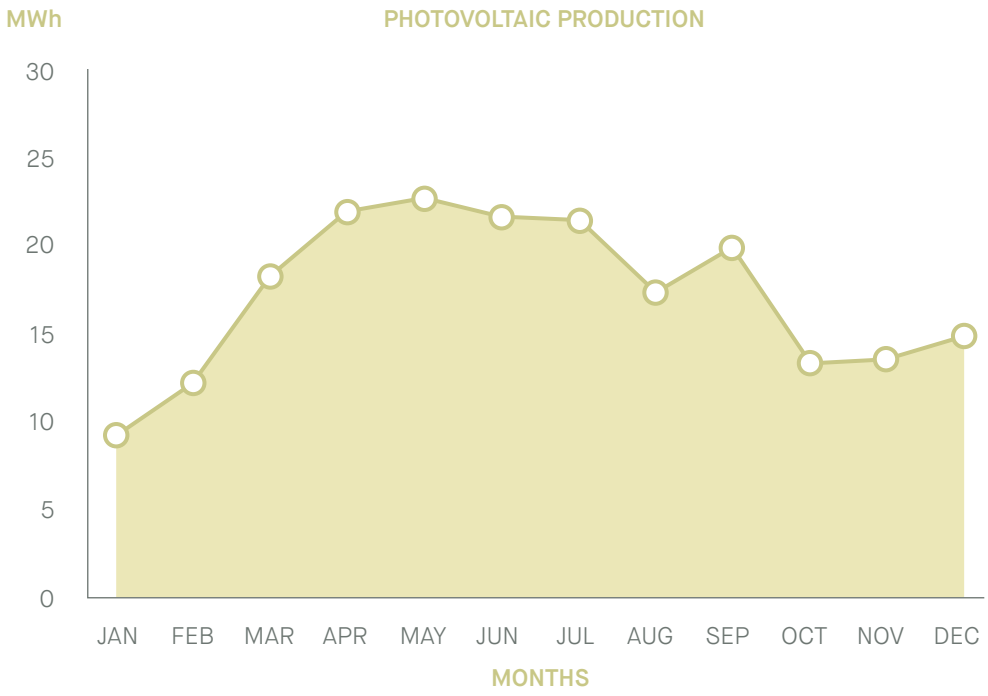
INSTALLED CAPACITY	0.1 MW
ENERGY PRODUCTION (YEAR 2015)	174 MWh
ITER'S SHARE	100%
EQUIVALENT CONSUMPTION	206 people
AVOIDED CO_2	97 Tn
LOCATION	Santa Cruz de Tenerife

MERCATENERIFE I



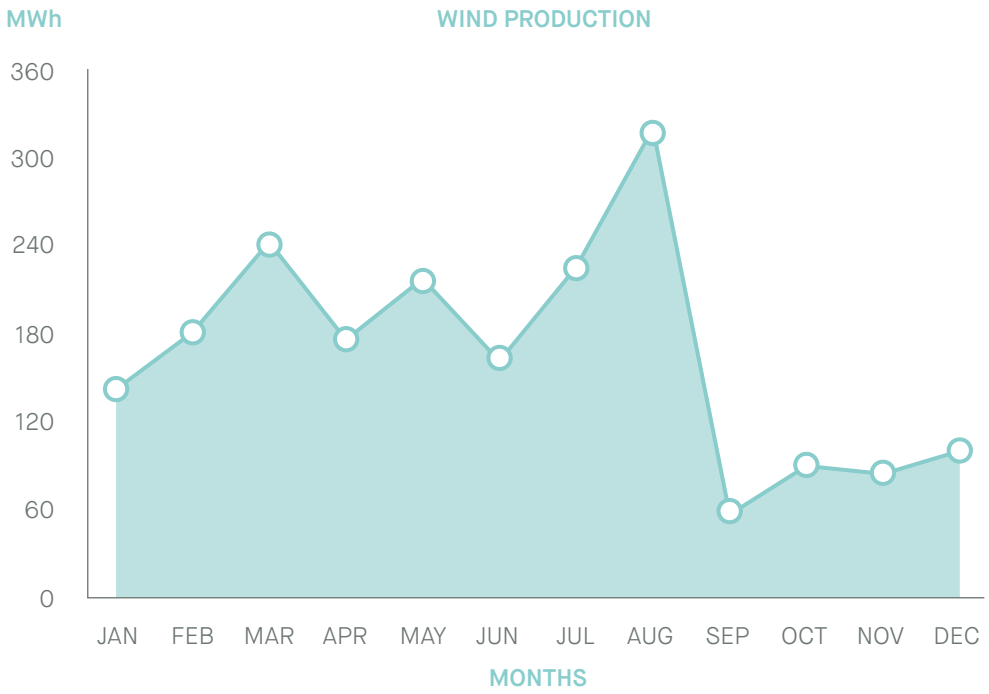
INSTALLED CAPACITY	0.1 MW
ENERGY PRODUCTION (YEAR 2015)	141 MWh
ITER'S SHARE	100%
EQUIVALENT CONSUMPTION	167 people
AVOIDED CO_2	78 Tn
LOCATION	ITER, Granadilla de Abona

PLANTA PILOTO



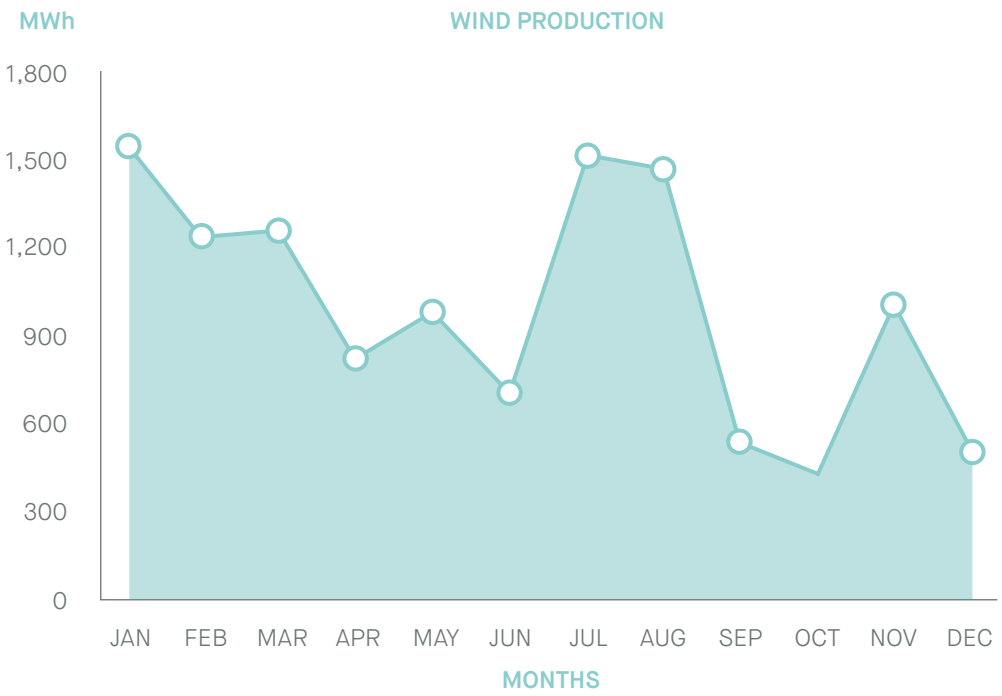
INSTALLED CAPACITY	0.2 MW
ENERGY PRODUCTION (YEAR 2015)	275 MWh
ITER'S SHARE	100%
EQUIVALENT CONSUMPTION	325 people
AVOIDED CO_2	152 Tn
LOCATION	Tacoronte

BODEGA COMARCAL TACORONTE



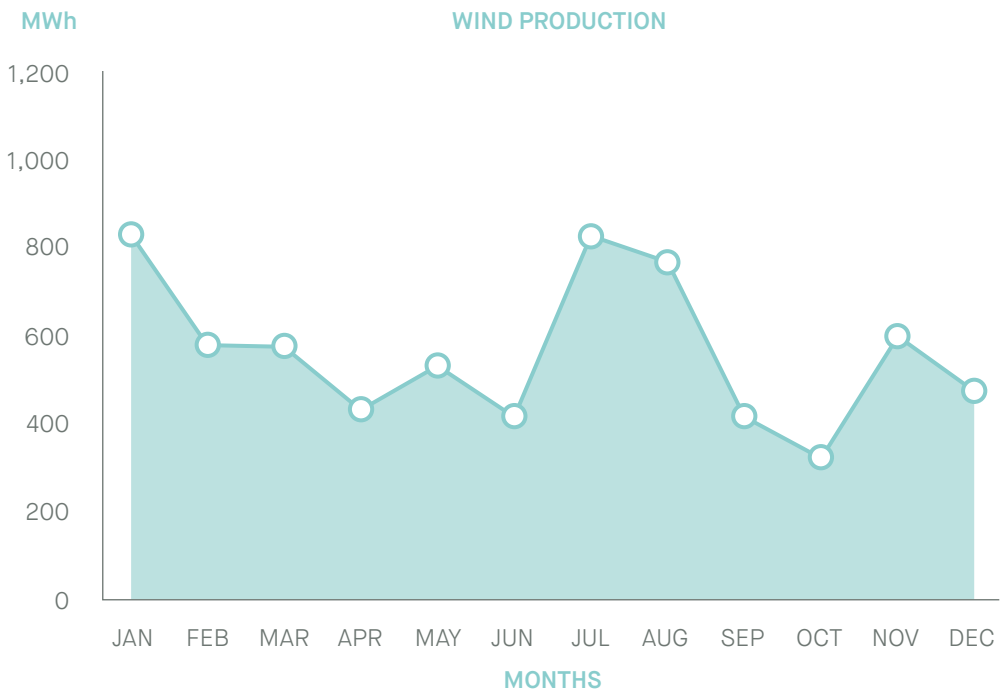
INSTALLED CAPACITY	2.4 MW
ENERGY PRODUCTION (YEAR 2015)	1,684 MWh
ITER'S SHARE	75.26%
EQUIVALENT CONSUMPTION	1,994 people
AVOIDED CO_2	935 Tn
LOCATION	ITER, Granadilla de Abona

EXPERIMENTAL PLATFORM



INSTALLED CAPACITY	4.80 MW
ENERGY PRODUCTION (YEAR 2015)	11,004 MWh
ITER'S SHARE	50%
EQUIVALENT CONSUMPTION	13,026 people
AVOIDED CO_2	6,111 Tn
LOCATION	ITER, Granadilla de Abona

MADE WIND PARK



INSTALLED CAPACITY	5.50 MW
ENERGY PRODUCTION (YEAR 2015)	5,612 MWh
ITER'S SHARE	100%
EQUIVALENT CONSUMPTION	6,643 people
AVOIDED CO_2	3,116 Tn
LOCATION	ITER, Granadilla de Abona

ENERCON WIND PARK

ENERCON, MADE AND EXPERIMENTAL WIND PARKS

PHOTOVOLTAIC ON BIOCLIMATIC HOUSE "LA DUNA"

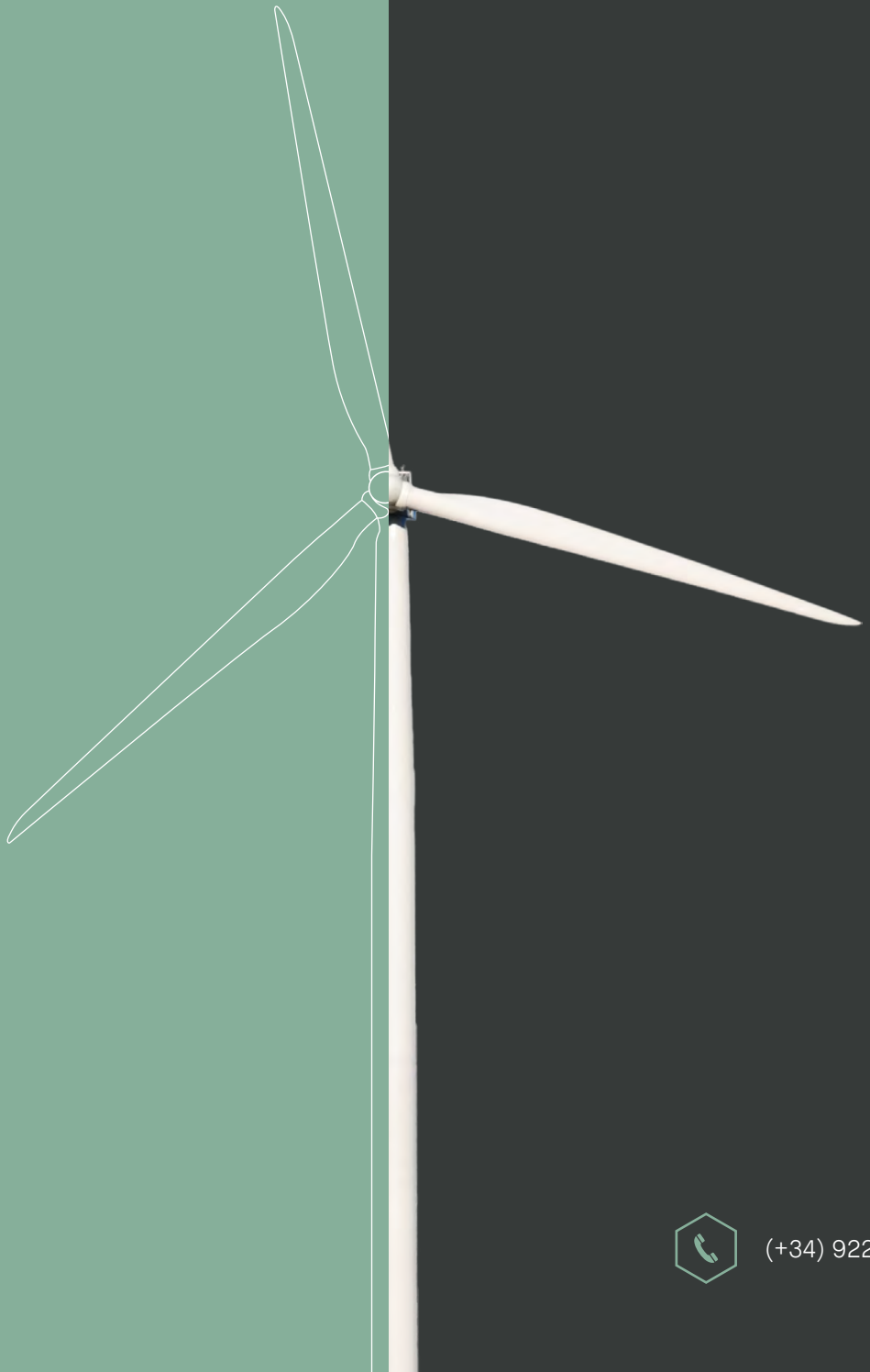
Economic data

Consolidated statement of profit and loss

Asset			
A. NON-CURRENT ASSETS	194,054,349.73€	A. CURRENT ASSETS	23,887,698.81€
I. Intangible assets	**20,856,622.90€**	**I. Non-current assets held for sale**	**0.00€**
II. Tangible fixed assets	**146,244,539.40€**	**II. Stock**	**1,233,879.82€**
1. Land and constructions	105,722,201.07€	**III. Trade and other accounts receivable**	**16,267,782.74€**
2. Technical installations and other tangible assets	34,307,151.96€	1. Clients from sales and provision of services	11,290,410.29€
3. Fixed assets under construction and advances	6,215,186.37€	2. Equity-accounted companies	0.00€
III. Fixed assets investments	-	3. Assets through ordinary tax	345.65€
IV. Long term investments in group companies and associates	**14,534,190.39€**	4. Other debtors	4,977,026.80€
1. Investments by equity method	11,377,990.40€	**IV. Short term investments in group and associated companies**	**87,614.75€**
2. Loans to equity accounted companies	0.00€	1. Credit for equity-accounted companies	0.00€
3. Other financial assets	3,156,199.99€	2. Other financial assets	87,614.75€
V. Long term financial investments	**9,844,407.22€**	**V. Short-term financial investments**	**253,989.68€**
VI. Assets by deferred tax	**2,574,589.82€**	**VI. Short-term accrual accounts**	**2,049,707.94€**
VII. Goodwill of consolidated companies	-	**VII. Cash and other equivalent liquid assets acquired**	**3,994,723.88€**
		Total assets (A+B)	**217,942,048.54€**

Net worth and liabilities			
A. NET WORTH	113,967,824.08€	B. NON-CURRENT LIABILITIES	77,505,809.06€
A-1. Own capital	111,677,202.90€	I. Long-term provisions	1,528,445.89€
I. Capital	20,816,236.00€	II. Long-term debts	41,513,161.24€
II. Share premium	1,608,057.62€	1. Bonds and other marketable securities	0,00€
III. Reserves and results from previous years	74,788,971.36€	2. Debts with credit institutions	36,900,825.07€
1. Distributable reserves	71,886,388.19€	3. Obligations under finance leases	0.00€
2. Non-distributable reserves	2,904,745.20€	4. Other financial liabilities	4,612,336.17€
3. Results from previous years	-2,162.03€	III. Long-term debts with the group's entities and associated companies	0.00€
IV. Reserves in consolidated companies	8,842,577.63€	1. Debts with equity-accounted companies	-
V. Reserves in equity-accounted companies	2,805,484.50€	2. Other debts	-
VI. (Shares and own equity and parent company investments)	-2,000,000.00€	IV. Deferred tax liabilities	1,060,354.72€
VII. Other contributions from partners	0.00€	V. Long-term accrued expenses	33,403,847.21€
VIII. Results from the year attributed to the parent company	4,805,875.79€	B. CURRENT LIABILITY	26,468,415.40€
1. Consolidated losses and gains	4,805,875.79€	I. Liabilities associated with non-current assets held for sale	0.00€
2. (External partners losses and gains)	0.00€	II. Short-term provisions	1,165,000.00€
IV. (Interim dividend)	0.00€	III. Short-term debts	18,516,663.09€
X. Other net equity instruments	0.00€	1. Bonds and other securities	0.00€
A-2. Adjustments for changes in value	0.00€	2. Debts with credit institutions	9,691,095.68€
I. Conversion differences in consolidated companies	0.00€	3. Obligations under financial leases	0.00€
II. Conversion differences equity-accounted companies	0.00€	4. Other financial liabilities	8,825,567.41€
III. Other adjustments for changes in value of consolidated companies	0.00€	IV. Short-term debts with the group's entities and associated companies	5,570.53€
IV. Other adjustments for changes in value of equity-accounted companies	0.00€	1. Debts with equity-accounted companies	0.00€
A-3. Received subsidies, donations and legacies	2,300,621.18€	2. Other debts	5,570.53€
I. In consolidated companies	2,300,621.18€	V. Commercial debtors and other payable accounts	4,987,675.09€
II. In equity-accounted companies	0.00€	1. Trade creditors	1,992.97€
A-4. External partners	0.00€	2. Trade creditors, equity-accounted companies	0.00€
		3. Liabilities by ordinary tax	0.00€
		4. Other creditors	4,985,682.12€
		VI. Short-term accruals	1,793,506.68€
		Total net worth and liabilities (A+B+C)	217,942,048.54€

Consolidated balance sheet	
A. CONTINUED OPERATIONS	-
1. Net sales figure	**23,612,386.36€**
a. Sales	766,247.61€
b. Provision of services	22,846,138.75€
2. Changes in inventories of finished goods and work in progress	**-4,725.00€**
3. In-house work for its assets	**180,172.53€**
4. Supplies	**-587,127.51€**
a. Consumption of merchandise	0.00€
b. Consumption of raw materials and other consumables	-60,268.40€
c. Work carried out by other companies	-526,859.11€
d. Deterioration of goods, raw materials and other supplies	0.00€
5. Other operating income	**1,293,556.40€**
a. Accessory and current operating income	354,906.37€
b. Grant income brought to the fiscal year profit	938,650.03€
6. Personnel expenses	**-5,024,445.28€**
a. Wages, salaries and similar expenses	-3,825,700.14€
b. Social contributions	-1,198,745.14€
c. Provisions	0.00€
7. Other operating costs	**-7,022,064.45€**
a. Losses, impairment and changes in trade provisions	540,000.00€
b. Other current operating expenses	-6,482,064.45€
8. Amortization of fixed assets	**-6,780,705.60€**
9. Allocation to profit or loss of grants related to non-financial non-current assets and other	**416,165.29€**
10. Excess provisions	**0.00€**
11. Impairment and loss on disposal of fixed assets	**0.00€**
a. Loss and impairments	-
b. Disposal and other results	-
12. Impairment and results by the disposal of consolidated participations	**0.00€**
13. Negative consolidation difference of consolidated companies	**0.00€**
A-1. Operating income results (1+2+3+4+5+6+7+8+9+10+11+12+13)	6,083,212.74€
14. Operating income	**301,678.22€**
a. Of equity instrument shares	998.11€
b. Of marketable securities and other financial instruments	300,680.11€
15. Financial expenses	-1,373,053.24€
16. Variation in fair value of financial instruments	0.00€
a. Trading and others	0.00€
b. Allocation to profit or loss on financial assets available for sale	0.00€
17. Exchange rate differences	**11,433.09€**
18. Impairment losses and income from disposal of financial instruments	**0.00€**
a. Loss and impairments	-
b. Disposal and other results	-
A-2. Financial result (14+15+16+17+18)	-1,082,808.11€
19. Participation in benefits (loss) of equity-accounted companies	**1,098,033.56€**
20. Impairment and loss on disposal of equity-accounted companies	**0.00€**
21. Negative consolidation difference	**0.00€**
A-3. Pre-tax income (A-1+A-2+19+20+21)	6,098,438.19€
22. Taxation of corporate profits	**-1,292,562.40€**
A-4. Yearly income from continuing operations (A-3+22)	4,805,875.79€
B. DISCONTINUED OPERATIONS	-
23. Yearly income from discontinued operations net of tax	**0.00€**
A-5. Consolidated profit for the year	4,805,875.79€
Income attributable to parent company	4,805,875.79€
Income attributable to partners	-



CONTACT INFORMATION

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