



energiaberria

Magazine of the Cluster de Energía
of Basque Country

www.clusterenergia.com

Nº36 - August 2011

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international
leadership

Opportunities
in Turkey,
an emerging
country

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GEMASOLAR
The first
commercialised
plant using central
tower and molten
salt receiver
technology.



Editorial

With this new edition, “Energía Berria” enters a new phase. The first copy of the magazine saw the light of day almost 12 years ago and after 36 issues the time had come for a face lift with a renewed design and cover. Just as our corporate logo changed three years ago, we felt that this new look should also be reflected in the Cluster de Energía’s main communication tools, among which the magazine without doubt plays a starring role. So we wanted to reinforce our new corporate identity to show our implicit values.

Consequently the new design of the magazine is inspired by the colours, typography and graphics of our logo. We have tried to introduce a new, more modern colour range which serves to “rejuvenate” the publication. The print has been modified to make reading more agile and the new design adopts newer and more dynamic graphics than our readers were used

to before. Finally, the magazine is a little smaller in size. In short, the general design has been modernised to reflect corporate values.

We realise the changes in issue 36 of Energía Berria will be a little surprise when our readers first receive it, but we hope they will soon get used to the characteristics and advantages of the new format. The contents of the magazine are the same, with the same sections, and the aim of the publication also remains unchanged – to be the spokesman for the Cluster de Energía of the Basque Country and at the same time be a way to communicate with our members. We continue to report on the developments of these companies, their initiatives and progress in research, their opinions and their positions in the sector. Indeed, a magazine which continues to be at the service of businesses working on the crucial strategic question of the immediate future of energy.



REVISTA DEL CLUSTER DE ENERGÍA DEL PAÍS VASCO

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CLUSTER NOTEBOOK

- **Offshore Europe.**
Aberdeen, Scotland, 6/8 Sep 2011
www.expopromoter.com
- **RAO / CIS Offshore.**
San Petersburg, Russia / 13 -16 Sep 2011
www.expopromoter.com
- **Eolica Expo Mediterranean.**
Rome, Italy / 14 -16 Sep 2011
www.expopromoter.com
- **The European Future Energy Forum 2011.**
Geneva, Switzerland / 10 Oct 2011
www.europeanenergyforum.com
- **Deep Offshore Technology International.**
New Orleans, Louisiana, USA / 11-13 Oct 2011
www.expopromoter.com
- **Shanghai International Wind Energy Expo.**
Shanghai, China / 16 -18 Nov 2011
www.expopromoter.com
- **12th Forum Solarpraxis.**
Berlin, Germany / 17 Nov 2011
www.solarpraxis.de
- **WindTech.**
Istanbul, Turkey / 17-19 Nov 2011
www.expopromoter.com
- **Offshore Wind.**
Amsterdam, Netherlands / 29 Nov - 1 Dec 2011
www.expopromoter.com

Euskadi has the first wave energy plant

The President of the Basque Government, Patxi López, unveiled on July 8th the wave energy exploitation plant in Mutriku, the first energy plant of its kind in Europe. This new facility, a world benchmark, opens the door for new marine power development and a new sector producing wealth and employment.

The plant in Mutriku is the result of the combined work of two departments within the Basque Government. To coincide with construction of a new sea wall in the port by the Department of Housing, Public Works and Transport, the Department of Industry, Innovation, Trade and Tourism, through the Basque Energy Board (EVE), looked at the possibility of including a renewable energy installation in the wall itself to produce electricity using the waves hitting the wall. This would at the same time give high added value to this major port work.

The Mutriku plant uses oscillating water column technology of the Scottish company Wavegen, part of the Voith Hydro group. It is one of the oldest wave energy exploitation technologies on the market. The turbines were made by the Basque organisation Voith Hydro Tolosa at its plant in Guipuzcoa.

The Mutriku plant is the first to be connected to the grid in both Spain and Continental Europe. It has 16 turbine chambers with an installed output of **296 kW**. The plant demonstrates the capacity of this power source, a pioneer in Europe given its newness and singular characteristics. A production of **600,000 kWh** is forecast, enough to supply the electricity needs of 600 people. This renewable and clean energy avoids the emission of 600 tonnes of CO₂ into the atmosphere, equivalent to the purifying effect of 80 hectares of woodland. ●

LOINTEK strengthens its management team and invests in innovation

Strengthen and grow. These are the two objectives which Lointek has set. A commitment to constant improvement which can be translated into figures: in 2010 the company poured 1.3 million Euros to I & D.

"We have adapted to the times we live in but we also consider that investment in innovation is the cornerstone of success," said Victor Zaldumbide, commercial director of the firm. An investment which last year led to a turnover of 36 million Euros and a portfolio of orders of 76 million in 2011.

Currently, Lointek is involved in numerous projects being carried out, half of them turnkey. "Our forecast is to invest more than 400,000 hours. To achieve this alliances have been widened and a new auxiliary workshop opened."

Internationalisation has played a key role in achieving these results. This business

area has been strengthened with the new incorporation of Joseba Uriarte as Head of International Sales.

Mr. Uriarte is an industrial engineer and worked previously for Babcock Power España (formerly Babcock Wilcox), where he was business manager in the industrial equipment division. His experience is in both the national and international area, and he has specialised in European and Asian markets, including the chemical, petrochemical and oil and gas sectors and gasification plants.

This new incorporation is one more step in the development of the strategic plan 2011 - 2012 of Lointek, particularly its overseas strategy. A marketing network has been established in strategic areas in the energy and petrochemical sectors. The company is now well positioned in countries such as Brazil, Saudi Arabia, Kuwait and Qatar among others. ●



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READY FOR YOUR CHALLENGES

Business News

ZIGOR commissions the largest roof-top solar plant in the United Kingdom

Zigor Corporación has just finished the commissioning of the largest, up to the present time, roof top solar plant built in the UK. The installation consists of a photovoltaic plant of nominal power of 400 kW built on the roof of a logistics centre in Ipswich, 75 km north-east of London.

The solar plant has been developed by Vigor Renewables and built by Going Solar. Zigor Corporación supplied the central inverters (4 units of inverter model Sunzet 100T), the string boxes (3 units of Sunzet String for each inverter), and the SCADA monitoring systems (SWS-1000) which will log all production data and allow a total monitoring of the solar plant through an Ethernet connection.

The Sunzet String intelligent string boxes are equipped with a current measurement system for every string of solar panels. Data is transferred to the Sunzet 100 T inverters via a RS 485 link, which allows the supplied current from every string to be monitored via a web server.

The SWS - 1000 monitoring system is connected to all the 4 Sunzet 100T central inverters which lets the PV plant owner monitor and check the right operation of every system within the solar plant: supply current of each string box (Sunzet String); supply current of each string of solar panels from the solar field; and working parameters and production data of each central inverter. ●

Basque representation at the international All-Energy in Scotland

The All-Energy Exhibition in Scotland saw 600 exhibitors from 20 countries participating. The Basque delegation was led by the Department of Industry, Innovation, Trade and Tourism of the Basque Government, through EVE and the Cluster de Energía, and was comprised of eight technology companies in the renewable area.

Over the two days of the conference the delegation from the Basque Country showed their capacities for technological development, for engineering and services for marine energy projects.

Principal representative of the Basque Government Oscar Zabala, Director of Energy, stressed the "excellent opportunity which an exhibition like All-Energy offers for Basque firms", as it reunites the sector's outstanding companies which are developing cutting edge pro-

jects. The Euskadi delegation were able to not only display their more outstanding projects and their ability in the field, but also generate business with international companies.

Precisely in this matter, Euskadi is in an advantageous position given the high grade of development of marine energy projects in the Basque Country, which are very advanced compared to its European neighbours. So the results of the Basque firms in this international presentation in Scotland had a great impact on the sector. Companies and organisations which offer high added value such as Sener, Elecnor, Oceantec, Cluster de Energía, Tecnalia, Zigor and the Department of Industry of the Basque Country through the Basque Energy Board (EVE) took part in the event and held over 50 work meetings over the two days of the exhibition. ●

GAMESA secures its base for offshore technology in Glasgow

Gamesa, world leader in the design, manufacturer and maintenance of wind turbines and leading wind power promoter, will create around 40 high value jobs this summer at its offshore wind power technology centre the company will install in Glasgow. So confirmed Jorge Calvet, Chairman and CEO of Gamesa to the Scottish First Minister following a meeting this week in Edinburgh.

The technology centre will be located in Strathclyde Business Park, 13 km from the city centre. The recruitment process has started and it will be completed with about 40 engineering staff by July/August, a number which could grow to more than 100 by the end of 2011 and rise to 180 within three years of the centre becoming operational. Gamesa estimates the new technology centre will be functioning in the autumn. ●

IBERDROLA to bid for French offshore wind

Iberdrola Renovables and the French company Areva have signed a memorandum of understanding to jointly develop offshore wind energy projects off the French coast. Both companies have agreed to bid for two of the five areas that the French government has offered for competitive tender in a first phase totalling 3,000 MW. The two zones could have a combined output of between

1,000 and 1,500 MW. Iberdrola Renovables has been conducting wind and feasibility studies in these regions for some years and consider these two areas to be among the best in the world for this type of energy project.

Under the agreement between the two companies, if they are awarded these projects, Areva will be the sole supplier of the

turbines of the wind farms while Iberdrola Renovables will be responsible for the start-up and operation of the facilities.

Iberdrola Renovables sees France as one of the most attractive countries for the development of this type of technology, as the French government announced its objective of reaching 6,000 MW of wind energy by 2020. ●

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La manera de ver el futuro

Who's Who



Founded: 1963

Activity: Stamping dies, automotive systems, components for renewable energy plants.

Clients: Electricity companies, public administrations, large businesses and private organisations.

Workforce: 1,100 employees.

Turnover: 160 million Euros

Central HQ: Torrea Auzoa 32, 48140 Igorre (Bizkaia) Tel +34 94 630 50 00. Fax +34 94 630 50 20

Branches and subsidiaries: Five in Euskadi (two in Igorre and also in Zamudio, Boroa and Urduliz), one in La Rioja and six in Portugal, Germany, Czech Republic, China, Mexico and Brazil.

Web: www.batz.com

Batz was founded in 1963 as a tools manufacturer, specialising from the start in stamping dies. At the beginning of the 80s a second activity began, aimed at the manufacture of automotive systems and from 2000 a globalisation process began. Since diversification in 2005, today the company is industrially active in the automotive sector and new activities related to sustainability.

Batz is part of the Mondragon Corporación Cooperativa, the seventh largest industrial group in Spain, employing almost 100,000 people, with more than 250 companies worldwide. This support give clients of Batz the assurance of working with a firmly established company.

Industrial Activities

Batz concentrates its business activity on industrial manufacture on an international level, providing clients with the engineering services necessary following standards laid out in each sector. Working alongside clients, projects begin with the concept, design and development of the product, including prototypes and validation, the elaboration of tools, definition of the manufacturing process, the making of stamping dies and other means of manufacture, and end with the commissioning of the installation according to the management of materials, with logistical aspects being equally important.

The company operates mainly in the automotive and energy sectors, which in turn makes for diversification of products and services: Batz Automotive (stamping dies, automotive systems, lightweight technologies) and Batz Energy (Sunreflect Systems, solar field assembly, DGEEn Systems).

Internally, Batz is organised as a group, the mother company being a Cooperative Society based in Igorre (Bizkaia), which houses the general management with departments of management and finance. There also exist other subsidiaries and interests, with 11 manufacturing plants, five in Euskadi (two in Igorre and one each in Zamudio, Boroa and Urduliz), one in La Rioja and another six in Portugal, Germany, Czech Republic, China, Mexico and Brazil. The company continues to reach agreements for its products around the world, and today is present in Turkey, Slovenia, South Africa,

India, Korea and Japan. Thus Batz is strategically positioned to deal with the global community.

In total, the company workforce exceeds 1,100 people, with turnover in 2010 of more than 160 million Euros. Still immersed in a growth process, in 2015 it will exceed 1,300 people and a turnover of 200 million Euros, mainly due to growth in the automotive sector in emerging markets such as Brazil and China.

Innovation and Promotion

As well as globalisation, another factor in the growth of Batz is its commitment to innovation, based on the participation of people and the values of trust and mutual respect, compromise, participation, teamwork, the quest for a job well done and a spirit of determination.

Batz has a close relationship with universities and other training centres through long term agreements, and it is the patron of several technology centres. The company therefore shows that it considers the training of its personnel as the safest investment to face the technological evolution in strategic sectors.

To complement its main activities in the automotive sector, Batz also explores new business opportunities following a strategy to supply industrial solutions to the worldwide tendency for sustainability.

Since 2005, the company has had a business unit working in renewable energies, mainly in concentrating thermal plants. It manufactures components for solar thermal fields, mainly supports for the reflecting surface and other parts, developed through in-house technology for the automotive sector, bringing quality, capacity of supply and competitiveness. For assemblies, Batz offers turnkey solutions from process definition of the solar thermal plant to logistic management to guarantee optimum plant performance. The company to date has worked on the installation of more than 500 MW.

Batz works on new developments in distributed energy, especially in the photovoltaic and mini wind turbine area. In this field too, the company employs the same philosophy and brings the advantages of its experience regarding the requirements and demands of the automotive sector. ●



Petronor ha plantado 10.000 árboles en 10 años

2011, Año Internacional de los Bosques



En 2001 decidimos plantar un cinturón de árboles en la periferia de la refinería

Hoy es ya una realidad

- Más de 130.000 € destinados al proyecto de repoblación.
- Más de 10.000 árboles plantados.
- Cuatro años realizando trabajos de mantenimiento.
- Cinco años realizando seguimiento de las actuaciones.
- Más de 180 ejemplares plantados en 2011, Año Internacional de los Bosques.

CELEBRAMOS CONTIGO EL AÑO INTERNACIONAL DE LOS BOSQUES

* El proyecto "Petronor 2001" para la plantación de un cinturón arbóreo en la periferia de la refinería fue oficialmente validado por el Ministerio de Medio Ambiente, la Diputación Foral de Bizkaia y el Ayuntamiento de Muskiz. Está en consonancia con la política del Departamento de Medio Ambiente del Gobierno Vasco y ha sido muy bien valorado por la Asociación de Forestalistas de Bizkaia.

Front page



CIC Energigune Committed to International Leadership

The Basque President (Lehendakari) Patxi López opened on June 10 the installations of the CIC Energigune in the Miñano (Álava) Technology Park, a new research centre in the energy area which aspires to become an international benchmark in the field. This new Cooperative Research centre will enable both public and private R & D & i efforts in an area in which the Basque Country boasts a highly competitive production sector at international level.

The new facilities are made up of a series of interconnected modular buildings, covering a floor area of 4,500 sq.m, approximately half of which is to be given over to the 13 laboratories. The infrastructure and the equipment is the result of investment of more than 12 million Euros. The centre has an Electrochemical Storage Unit and a Thermal Energy Storage Unit, along with a series of technological platforms of the highest quality that support research activities (electronic microscope platform, surface analysis unit, x-ray diffractometry platform).

The CIC infrastructures will provide 110 jobs, of which 100 will be research positions, and within its design particular attention was paid to flexibility and scalability, foreseeing future growth of the centre and its laboratories. Energy effi-

ciency, the reduction of landscape impact, and the environment and optimal comfort in the workplace are also features of the latest addition to the Miñano Technology Park.

The main mission of CIC Energigune is to become an international benchmark in the field of energy storage technologies, contributing in the long term to the industrial competitiveness of the Basque Country in an area that has cutting edge industrial sectors and engineering companies. In this manner, the centre focuses on meeting the following objectives:

- Harnessing and developing talent.
- The promotion of innovative infrastructures
- The promotion of a multi-disciplinary approach to achieve progress in new methods of generating electricity.
- Coordination of efforts and optimisation of the capacity of all players working in the energy field of the Basque Country.
- Presence in and collaboration with international networks of excellence.
- Development of transferral and collaboration projects with universities and technology centres.

The Challenge of Storing Energy

Initially, the CIC will focus its efforts on the storage of electro-chemical and thermal energy, two technological challenges that have great relevance nowadays. Two main areas of action have been identified: storing electrochemical energy via advanced batteries and super-capacitors, and storing thermal energy at high temperatures (phase change materials and thermo-chemical reactions).

Two collaborative research projects, aimed at stationary (incorporating renewable energy into the grid, support in sub-stations, remote applications...) and renewable applications, are already underway, along with others relating to thermal energy, one of which was presented in cooperation with the VII Framework Programme of the EU.

Leading international experts, specialising in various areas of energy, are now linked to the project through two scientific committees. The committee relating to thermal energy includes Michael Epstein (WIS Solar Research Unit in Israel), Greg Glatzmaier (National Renewable Energy Laboratory, USA), Rainer Tamme (Insti-



tute of Thermal Dynamics of the German Aerospace Centre), Manuel Tello (Professor of Physics at the Basque Country University and advisor to the EU), and Eduardo Zarza (Almeria Solar Platform). The electrochemical committee includes John Kilner (Imperial College, London), Imre Gyuk (US Department of Energy), Ander Laresgoiti (Director of the Ikerlan Energy Unit), Jean Marie Tarascón (Professor at the University of Picardie-Armiens), Hisashi Tskamoto (Quallion LLC) and Steven Visco (Lawrence Berkeley National Laboratory). The electrochemical committee is headed by Teófilo Rojo (Professor of Inorganic Chemistry at the University of the Basque Country) and Liya Wang (Doctor in Material Sciences, expert in lithium-ion batteries and electrochemical capacitors, formerly with the company A123 Systems).

Board

The Board of CIC Energigune is made up of public and private bodies based in the Basque Country which represent key players in the energy area at both national and international level. In addition to the Basque Government via the Basque Energy Board (EVE) and the Provincial Council of Álava, the Board is made up of the Cluster de Energía of the Basque Country, technology centres such as IK4 and Tecnalia, the Corporación Mondragon and the companies Iberdrola, Sener, Idom, Cegasa, Gamesa, Guascor and Naturgas.

Jesús M^a Goiri

General Manager CIC Energigune

“We want to carry out basic research, but aimed at an industrial application”

How would you define the role which CIC Energigune is going to play?

It is basically as a complementary element to Basque industry operating in this area, but with a long term view, doing something which technology centres have never done. Not only pure, basic research, more typical of the university, but also what we could call “oriented basic research”, with the idea that a final application could have an industrial character. It is about searching for ideas and patents to set us apart and create local wealth, as opposed to delocation to countries such as China or India.

Why has energy storage been considered as a priority area?

There is a general consensus the world over that storage has to advance rapidly so that discontinuous renewable energy can be put to normalised use. If in the future fossil fuels disappear and nu-

clear energy has fallen from favour, the question of storage becomes a priority. At the moment we are going to concentrate on high temperature thermal storage, and on batteries and supercapacitors, although perhaps in two or three years we can look at new lines, for example, something relating to energy capture.

What is the schedule regarding employing research personnel?

This year we will have around 30 people on the staff, with 23 or 24 being researchers, and the idea is that in three years we'll have some 110 people working at a fully functioning centre. We want an ordered growth.

How much will CIC Energigune contribute to the objective of making the Basque Country a benchmark in the energy sector at international level?

What we are doing falls in perfectly with and compliments Basque industrial and engineering activity, and we have great possibilities of acting in the world of smart grids and renewable energies. This contribution is possible, but we will see the results in the medium and long term. ●

The Minister for Industry Bernabé Unda, Managing Director of EVE José Ignacio Hormaeche, Vice-Minister for Industry and Energy Xabier Garmendia and the Minister of the Economy and Treasury Carlos Aguirre at the opening.



Internationalisation



Opportunities in Turkey

An emerging country, a bridge between Europe and Asia

Representatives of two of the main Turkish companies in the energy sector (Gama Enerji and Zorlu Enerji) visited the Basque Country and had a series of talks with local companies at the beginning of June. The visit was the initiative of the Department of Industry, Innovation, Trade and Tourism, via SPRI (Society for Competitive Transformation) and the Cluster de Energía.

The heads of purchasing and investment of both firms contacted companies supplying equipment and other firms interested in reaching agreements for project promotion both in Turkey and the whole Middle East region, as besides being plant purchasers and project developers, they also promote and invest.

Gama Enerji initiates and carries out projects in the areas of water energy and infrastructures in Turkey and neighbouring countries. The medium term aims are to have 2,500 MW of installed output and the management of 200 million sq.m of water resources. The company also hopes to grow in the area of renewable applications (wind power, hydroelectric, clean coal). It boasts a solid position in a country characterised

by a favourable economic situation with expectations of growth in its electric market. Gama Enerji is well positioned to deal with various types of generation, has a well-seasoned management team and noteworthy shareholders with knowledge of local and international markets. Company assets include 1,620 MW installed output with another 420 MW in the construction phase.

Zorlu Enerji Grubu, meanwhile, is involved in electricity generation and its commercialisation, the construction of generation plants and their operation and maintenance, and gas distribution. Besides operating in Turkey, it also works in Russia, Israel and Pakistan in the natural gas, hydroelectric, wind power and geothermal sectors. The installed output of its plants reached 738 MW last year, an increase of 75% in just three years. In 2014 the forecast is for 1,180 MW, 60% coming from renewable applications (21% wind power).

Seminar and contact with Basque firms.

The visit was divided into three parts. On June 1 an open seminar took place in Bilbao at the HQ of SPRI in the Plaza Bizkaia,

with the participation of its general manager Tomás Orbea, the director of the Cluster de Energía Juan José Alonso, the director of Invest in Turkey, Yasemen Korucku, along with Ingeteam, as a Basque company with experience in Turkey. Later individual meetings were organised between Turkish representatives and Basque firms from the energy sector. The meetings continued over the next two days, while visits to plants in the sector were also carried out.

Turkey is a country of great interest for the Basque Country. For this reason, SPRI has had its own office in Istanbul since 2007, to help promote business contacts between Basque and Turkish companies. In four years, it has supported 60 projects by Basque firms. Turkey is an important business partner, as in the last years it has occupied a position between 8th and 12th as a destination for Basque exports. In 2010 it was destination number 11, valued at 358 million Euros, only beaten outside the European Union by the economic powers of the USA, China or Brazil.

Furthermore, a total of 10 Basque firms have production or commercial presence in Turkey, and about another 120 companies

export to Turkey on a regular basis, usually products of iron, machinery in general, machine tools, automotive parts and railway equipment.

On the border between Europe and Asia, modern Turkey was founded in 1923 following the defeat of the Ottoman Empire in the First World War by Mustafa Kemal "Ataturk", who introduced wide socio-political reforms. Democracy has been interrupted on several occasions by military coups, the last being in 1997 after the electoral victory of an Islamic party. A member of UNO and NATO since their respective inceptions, since 1964 it has been an associated state of the EU, with which it continues negotiations for its definitive integration.

Macroeconomic Climate

Although agriculture continues to account for around 30% of employment, industry and services are entering more and more into the fray. An aggressive programme of privatisation has affected basic industry, banking, transport and communications and there is an emerging and dynamic entrepreneurial class. The traditional textile sector – under threat from globalisation – still takes up a third of industrial employment. The car industry, construction and the electronics industry are emerging sectors. Oil pipeline construction to transport oil from Central Asia and the Caspian to Europe has played a relevant role over the last five years.

The growth in GNP reached 8.2% in 2010, when exports recovered after the recession. The high current account deficit and the volatility of short term investment to finance business deficit are two of the problems for the Turkish economy, but new reforms and a possible deposit by the EU could be attractive for foreign investment.

Through the robust growth in the Turkish economy, it is predicted that electricity demand will grow by 7% yearly until 2019 until it reaches around 390 TWh (almost double the 200 TWh in 2010). The average annual internal demand for electricity was 7.7% between 1986 and 2008, during which period the Turkish GNP grew by around 5.2%.

Installed output currently is in excess of 50,000 MW, and it has doubled over the last 15 years. Renewable energies account for 15,000 MW, almost totally through hydroelectric. Thermal energy (coal, natural

gas and other combustible liquids) make up almost three quarters of generation.

Electricity Market

The Turkish electricity market has been deregulated over the last decade. The private sector has gone from making up 7.3% of installed output in 2000 to 25% in 2010. In the next 10 years it is forecast to reach 96,000 MW of installed output. The cost of investment in new generation infrastructures, privatisation and renovation is estimated at 100,000 million dollars.

At present, Turkey is in essence an "energy island", exporting electricity to Iraq, Azerbaijan and Syria, and importing from Turkmenistan and Georgia. However, connection infrastructures with Georgia, Iran, Iraq, Rumania, Egypt, Jordan, Syria, Libya, Lebanon and Palestine are in a phases of construction or project.

Regarding renewable energy, the new law envisaged bonuses of 7.3 cents per kWh for hydroelectricity and wind power, 10.5 for geothermal and 13.3 cents for kWh biomass and solar power.

The estimated output from wind power is estimated at 400 GW/h/yr, which is the third largest in Europe with hardly 1,150 MW installed output available at present.. Approved licences amount to 3,483 MW, with 1,377 in operation and 2,283 MW in construction. The authorities are studying projects worth another 8,474 MW. Connection capacity up to 2013 is 12,000 MW, but the objective for 2023 is for another 20,000 MW. The country also occupies second place in Europe regarding solar power potential, which is estimated as between 500,000 and 700,000 MW. As for hydroelectric, along with 14,600 MW installed and another 8,600 under construction, the theoretical output could reach 45,000 MW. ●

The Bosphorus Bridge in Istanbul, the link between Europe and Asia.

Turkey in Figures



Area: 783,562 sq.km (approximately 1.5 times the size of Spain)

Population: 78.7 million (70% in urban areas)

Natural resources: Wealth of a great variety of minerals (coal, iron ore, copper, chrome, mercury, gold...) and energy sources, mainly hydroelectric.

Industrial production: Textiles, food industry, automotive, electronic, mining, iron and steel, oil, construction, wood, paper.

Exports: Clothes, footwear, textiles, metallic goods, transport equipment.

Imports: Machinery, chemical products, semi-finished products, combustibles, transport equipment.

Currency: Turkish lira (around 0.43€).

ENERGY

Electrical energy production: 198.4 TWh (2008)

Oil production: 53,000 barrels/day (9% of consumption). Proven reserves of 262.2 million barrels

Natural gas production: 1 billion m³ (3% of consumption). Proven reserves 6 billion m³.

Wind power production: Still low (2,000 MW), but its potential is considered to be one of the greatest in continental Europe.



In action



Technological Innovation

ZIV begins massive scale installation of smart meters in Castellón, Madrid and Oviedo.

The ZIV Group, specialists in the design, manufacture and commercialisation of digital systems and equipment for protection, control, metering and communications for electricity distribution networks, has begun large scale smart meter installation in various Spanish cities. The company has participated in a project for Iberdrola on the point of completion in Castellón which number 100,000 units and is to work on projects of Gas Natural Fenosa in Madrid and La Coruña and Hydrocantábrico in Oviedo, which will add another 250,000 units set up in the short term in which ZIV Group will have a significant share.

For the company, based in Zamudio (Bizkaia), telemanagement has become a strategic area, both from the point of view of the technologies involved and the economic effect of sales, with growth predicted for the coming years. ZIV has invested in being on the front line in the deployment of smart meters and to using its experience in other foreign markets planning the same strategies.

The rollout of smart meters will acquire more and more relevance in the coming

years, illustrated by the fact that Iberdrola has announced massive implantations in cities such as Bilbao, Murcia, Valencia and Madrid, which will add up to more than a million units in 2012 for Iberdrola alone.

Furthermore, it must be taken into consideration that the present law dictates a complete change of type 5 meters (less than 15 kW power) for telemanagement meters by 2018, which means renewing around 25 million units. Additionally, Spanish electric companies have plans to extend the experience onto their European and Latin-American subsidiaries.

The Iberdrola project in Castellón was the first experience of massive scale installation of smart meters in a medium sized city (pop. 175,000), with the objective of automating medium and low voltage distribution grids. Each transformer has been automated through a concentrator, BT supervisory grid, remote supervision of the medium voltage grid, earth fault short circuit detector, I and U measurement on the Ethernet and WAN communication with the control centre. The project is in its final phase, the equipment installed and operative for the

most part and final testing of the system is being carried out.

Meanwhile, Gas Natural Fenosa and Hydrocantábrico have begun massive scale installation of this type of equipment in Madrid, La Coruña and Oviedo, with ZIV once again playing an important role. In both La Coruña and Madrid, Gas Natural will install 100,000 units, and over 50,000 in Oviedo.

Grupo ZIVsources say "The experience in La Coruña has been very positive considering the very high number of units at the moment of energising, the inter-operability with equipment of other manufacturers and the general functioning of the system". In the area of smart grids, the company used a team of 30 engineers and significant resources in the three years of development. Results are evident in the number of telemanagement cubicles being installed on a massive scale.

ZIV Aplicaciones y Tecnología was founded in 1993. It designs, manufactures and markets digital equipment and systems in the areas of protection, control, metering and communication for substation applications

in the generation, transmission and distribution of electrical energy. It also works in the engineering, services and integration of the systems. The Group consists of the following companies:

- ZIV Grid Automation, S.L.: Relays for protection of equipment and digital systems of protection, control and metering for MV and HV electric grids and industrial electric installations. Integral solutions for the automation or modernisation of all types of electrical installation, covering electricity companies or industry.
- ZIV Metering Solutions, S.L.: Electric energy meters and metering systems. Power quality equipment. Communication equipment for electrical and industrial environments needing maximum robustness and reliability.
- ZIV Communications S.A.U.: Analogical and digital power line carrier systems, analogical and digital teleprotection systems, switching and coupling devices and systems, communication equipment.

Furthermore, the Group has two subsidiaries in the USA and Brazil and an office in Dubai.



New Elecnor Photovoltaic Plant

On May 16 Elecnor opened its new rooftop photovoltaic power plant installed on top of the horticultural storage building belonging to Agrícola de Alginet, Sociedad Cooperativa Valenciana (Coagri) in the town of Alginet. Antonia Cejalvo, the Regional Government of Valencia's Director General of Energy, and Enrique Girona, the town's Mayor, attended the presentation. During the technical tour of the plant they were accompanied by Juan Gomis, regional director of Elecnor for the Valencian Community.

A total of 8,463 modules were installed in the two industrial plots occupied by the Coagri facilities, covering an area of 27,000 sq.m. The units in the plant were made by Atersa, the Elecnor subsidiary and at the forefront in Spain in photovoltaic panel production.

The two plots can create 2,000 kW of power, with estimated yearly energy generation of 2.6 GWh, producing enough energy to provide power to 800 homes per year, which is around 21% of the town's population. The rooftop panels will utilise solar radiation, generating energy without producing any CO2 emissions. This will prevent 1,400 tonnes of CO2 emissions being sent into the atmosphere.

The roof facility is unique, apart from the amount of power it will generate. In the words of Juan Gomis, "Installing the units was an immense engineering challenge. The roof is on two levels and has curving forms (vaulted arches) of different heights, which, in addition to the power it will gene-

rate, makes the facility unique in the Valencian Community".

Regarding the conditions of use, Elecnor is leasing the Coagri building roofs, and the cooperative will receive financial remuneration in the form of rent. Investment to set up the plant reached 6 million Euros.

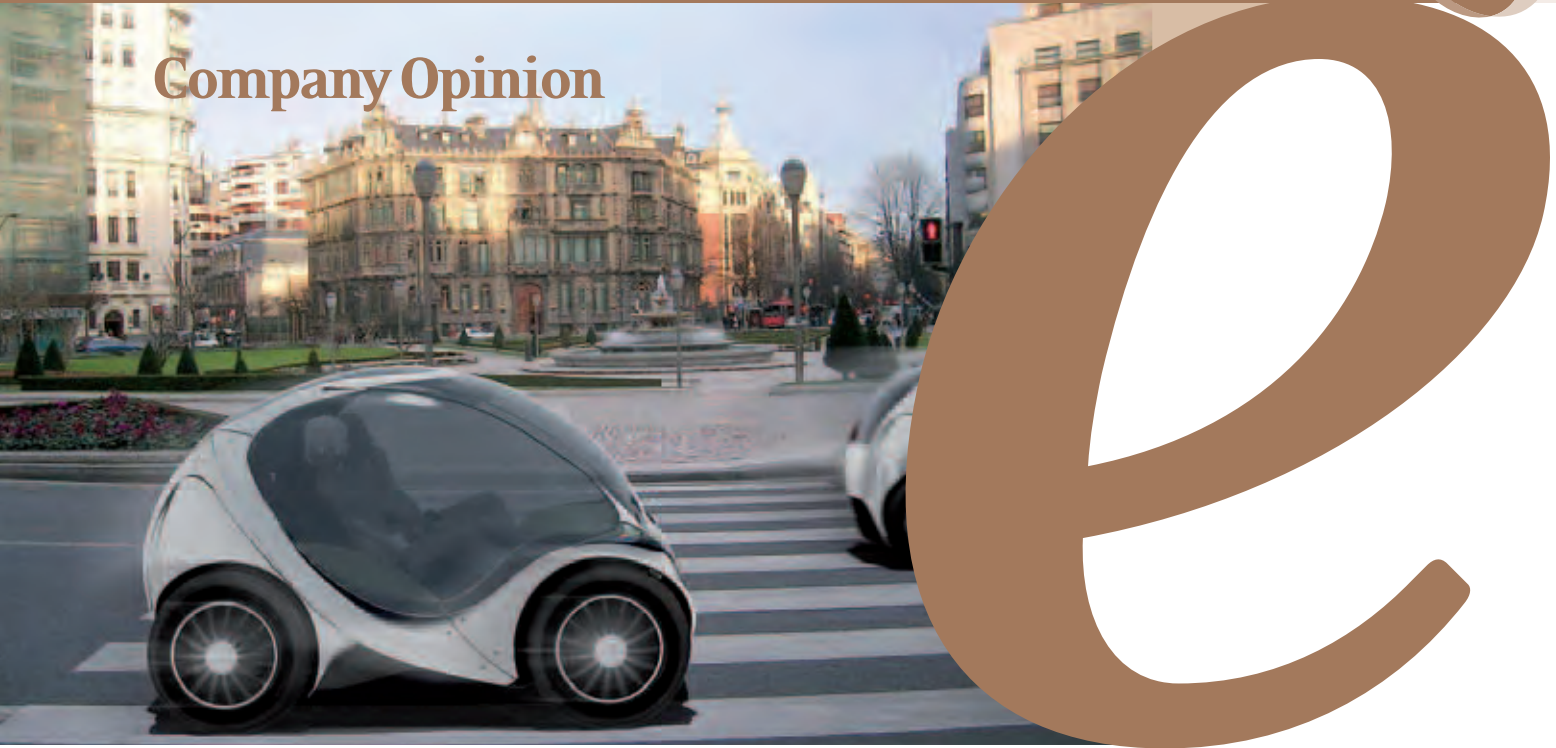
The new solar plant has started working before the plot has actually been moved into by Coagri, who don't plan to move into the new premises until next year for operational reasons, even though work has been finalised.

Elecnor has become a leading developer and turnkey contractor in the renewable energy sector, undertaking projects in the areas of wind energy, photovoltaic and thermoelectric solar energy and hydroelectric power stations. Due to this evolution, the Elecnor Group has gone from contracting supply and assembly packages to taking on the mantle of promoter, operator, and general contractor, thereby generating exponential growth, which is reflected in the Group's total revenue, where activity in renewable applications covers 36% of the total.

The company is making huge efforts in the solar power market along with its subsidiary Atersa. The experience and pioneering spirit of the subsidiary makes Elecnor one of the corporations with the most capacity for the production of all the components and equipment necessary for the configuration of any solar power system, either isolated or grid connected. ●



Company Opinion



Challenges for the Electric Vehicle

Energy consumption by transport is having negative and uncontrolled effects, becoming the second biggest energy user sector in Euskadi after industry. Immediate action is therefore needed to stop this growth. To this end, the Basque Government launched a strategy in 2009 to introduce the electric vehicle as a means of improving energy efficiency in transport and as a driving force for new business opportunities. This strategy hopes to achieve that, in 2020, 10% of all vehicles sold will be electric (pure or hybrid), which would mean 41,000 electric vehicles in circulation. Great steps have been taken over recent months, including the agreement signed by the government and Mercedes Benz to manufacture the Vito electric vehicle in Vitoria, the setting up of IBIL (50% EVE and 50% Repsol), which is a society for the construction and operation of electric recharging facilities, the creation of IBILEK Car-sharing to make the electric car more used and promote it at a reduced cost, and the signing of collaboration agreements with local councils and companies.

Electric vehicles have numerous advantages over conventional vehicles. They don't pollute the atmosphere, make no noise, and they optimize the energy demand curve. However, the challenges they present are also well known, both technological (improve the range of the batteries and

reduce costs, develop a recharge infrastructure, increase the offer of electric vehicles, standardisation) and non-technical (adaptation of legislation, gaining the trust of potential users). Companies and institutions in the Basque Country directly involved in developing the electric vehicle have given their opinion about the conditions which favour large scale use in the medium term.

Eduardo Giménez

Corporate marketing director at Ingeteam

"The speed of establishing the electric vehicle is closely linked to the development of demand management and Smart Grids for either model, be it slow charging or rapid charging".

Multiple factors are involved in Ingeteam's approach regarding electric mobility. From the technical point of view, the problems are by no means insurmountable, but technology is conditioned by the social use which the electric vehicle will have in the future. One model exists already, that of an urban, daytime model, used over short distances, with major speed restrictions and a range of 120 to 150 km. They are small, light, with low consumption, which are recharged fundamentally at night for several hours. The initiatives of the Basque government, EVE, Ibil and Repsol are fundamental at this moment to galvanise recharging infrastructure

and social demand for these vehicles, and promote their advantages in terms of the environment and energy saving etc. But for us, the recharging infrastructure is an inseparable part of a smart distribution network. Nocturnal recharging gives the grid more distribution capacity, but for the available power to arrive where it is needed, demand management is vital through smart grids, a field where much work is being actively carried out in Euskadi.

Anyhow, at Ingeteam, we are convinced that a model which confines itself to slow recharging very much limits electric mobility. Technology for rapid recharging exists too - vehicles which can be recharged by direct current, which we are in fact working on. A recharge time of 15 minutes with a range of 200 to 250 km, which is more habitual for the majority of private vehicle owners (with necessities much more irregular and uncontrollable than delivery service vehicles), would change people's approach and launch the electric vehicle definitively, although without doubt cause a problem through the growth of demand for energy at peak times. And here again, the smart grid can contribute to the solution regarding management of the power available in the grid.

We are speaking of medium to long term projects, but things are accelerating as

the various technologies advance. Just two years ago the first posts for rapid recharging were being forecast for 2015, and now we are talking of installing them at the end of this year.

In short, we believe the electric vehicle is here to stay, its establishment is irreversible through the new possibilities for electricity storage and smart grids and the inexorable evolution towards rapid recharging. Ingeteam is committed to the electric vehicle, because in the future there will more possibly be a combination of both slow and rapid recharging.

Aitor Arzuaga

Head of R&D at ZIV

and Mikel Zamalloa

Head of electric vehicles, ZIV

"It is vital to have smart recharging points and standardisation of systems".

At ZIV we see the electric vehicle (EV) as the thing which will speed up the introduction of smart grids, along with the integration of renewable energy applications, an improvement in energy efficiency and the quality of

supply, and the introduction of intelligent metering systems. This is because of the characteristics of the type of charge which this vehicle demands from the grid, needing a certain amount of power supply at a certain point in time which can be controlled fairly precisely if the infrastructure is in place.

If we can get to know with a certain level of detail the statistics for the power demands of an average EV in various environments (domestic, parking, electroline) at different periods (nocturnal/daytime, holiday/workday), the grid operator will be able to accurately plan the power demand efficiently and get the greatest benefit from renewable applications. If furthermore we deployed a recharging infrastructure capable of actively managing this demand (through pricing signals, delays in charge at certain times etc) we would be able to level out the demand curve, maximizing benefits from both the environmental point of view (optimal exploitation of renewable sources in demand curve troughs) to the point of view of the grid (optimising present resource capacity without the need for further investment).

To achieve this, it is vital to have smart re-

charging points which can control the charging power with the EV, manage tariff information and inform the user of any offers which could be of interest. That is to say, the recharge points must interact with the vehicle, the user and the electric system, which implies the use of smart metering. Another vital aspect will be the standardisation and integration of systems of different manufacturers into the recharging points or SW to enable roaming and non-discriminate access to recharging services throughout the whole EU at least.

Javier Alday

Director of Energy Technology, Cegasa

"Parallel use and application can result in business opportunities".

At Cegasa we are convinced that the electric vehicle will occupy a large portion of the automotive market within a relatively short time. As the battery is a common element of the vehicle regarding its characteristics (especially its range) and its price, we consider ourselves to be in an advantageous position in this sector, which is something we have been working towards over the last few years.



- Specialist in fluid control in CSP plants: Parabolic Trough, Central Receiver, Fresnel.
- Solar Field (balancing of loops), BOP, Heat Storage Systems
- More than 15000 valves in CSP plants.



Andasol I, II (2 x 50MW), Spain
 Extresol I, II (2 x 50MW), Spain
 Solnova I, III, IV (3 x 50MW), Spain
 La Risca (50MW), Spain
 Samcosol I, II (2 x 50MW), Spain

Gemasolar (19MW), Spain
 Loritja I, (50MW), Spain
 Manchasol I, II (2 x 50MW), Spain
 Valle I, II (2 x 50MW), Spain

Company Opinion



The volume of totally or partially electric powered vehicles on the roads in the medium term will pave the way for a certain number of suppliers, so Cegasa is investing heavily to occupy a slot in the area. With this in mind, and given the rich industrial fabric of the Basque Country, we feel having a local manufacturer of ion lithium batteries locally available is an element of added value for the region to cover all the value chain, and to have in-house technology available benefits the whole of Basque industry in the sector.

It is worth pointing out that the opportunities of the electric vehicle are not limited exclusively to the use of the vehicle itself. Battery silos to support rapid recharging points are an example of parallel applications and uses which could open a business opportunity and financial benefits in themselves. It is clear that the spread of technology in this field will generate synergies with other types of applications unconnected to transport, for example back-up systems, electricity microgrids, distributed feeding systems and others relating to energy efficiency in electricity generation and transmission. High performance batteries enable smart energy storage, both for generation and for distribution. This all enables the integration of renewable energies, as well as providing a solution for peak saving, stability of the grid, reserves following a power cut etc.

In this context, Cegasa has been working with various technological and industrial players, including a close collaboration with Cidetec-IK4, to develop in-house technology along the lithium ion battery value chain.

Enrique Monasterio Beñaran
Managing Director of Ibil

“We will see an authentic eruption of electric vehicles on the market”.

The electric vehicle is something real, something which you can acquire and utilise any day without fears or complexes. However, its penetration into the market and its appearance in the volume of traffic will be slow, because we are speaking of a product which has an average lifespan of fifteen years and which, therefore, has a fiercely inert updating period.

Those not involved day to day in the development of the electric vehicle may think that it has not yet begun, and begin to question whether this technology will ever be a reality some day, but the truth is that round the back in the kitchen, things are beginning to boil. Power companies are taking up positions, defining their business model in this new field and investing in markets and clients with great growth perspectives. The main car manufacturers now have plug-in hybrid or electric vehicles either on sale or ready for launch. Electric equipment manufacturers are speeding up developments

so as not to miss the boat and to compete at the forefront in the sale of recharging infrastructures.


In 2012 it will be more common to see these vehicles in the showrooms of well known carmakers such as Renault, Opel, Nissan, Peugeot, Citroën, Mitsubishi or Mercedes, and not-so-well known makes such as BYD or Tesla. Some of these manufacturers already incorporate the possibility of rapid recharging, which some saw a couple of years ago as something which wouldn't occur until 2020.

Regulations, which on other occasions slow down the introduction of new technology, are in this case advancing at great speed, thanks to the efforts of all the players and some administrations, who are acting like true engines pulling the train along. In just a year and a half we have seen important modifications to laws such as the Commonhold Property Act or laws in the Electric Sector favouring the installation of recharging points in communities of property owners, in the former case, and creating the figure of load manager in the latter. The Royal Decree has recently been published regulating the activity of the load manager and creating a new extra off-peak tariff. Soon the new ITC of the Low Voltage Electro-technical Regulation (REBT) will be published, regulating recharging facilities and, at an international level, standardisation committees are working to standardise connectors and methods of recharging.

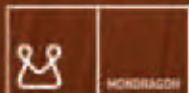
All this is going on behind the scenes, and I am convinced we will see an authentic eruption of electric vehicles on the market as a solution to a much more environmentally friendly method of transport. Not only through an inferior emission of polluting and greenhouse gases but also through a drastic reduction in the noise we are so accustomed to hearing and we must eliminate, a noise caused by so many internal combustion engines working at the same time. ●

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R&D




Gemasolar

First commercial-scale plant with central tower and receiver with molten salt technology.

On May 24, Torresol Energy, the joint venture between the engineering and technology firm Sener and Masdar, Abu Dhabi's leading future energy company, announced the commissioning of its flagship 19.9 MW Gemasolar Concentrated Solar Power plant in Fuentes de Andalucía, Seville. It is the world's first commercial-scale CSP plant with a central tower molten salt receiver technology and a system of thermal storage.

Gemasolar has been connected by high voltage line to the Villanova del Rey substation where its output, approximately 110 GWh/yr, will be fed into the distribution network of Compañía Sevillana de Electricidad (Endesa). It is able to produce enough electricity to supply 25,000 homes, at the same time saving more than 30,000 tonnes per year of CO₂ emissions.

Thermal storage system

The innovative molten salt heat transfer

technology deployed at Gemasolar helps to avoid fluctuation in power supply through a system that is capable of producing electricity for 15 hours without sunlight. This system accordingly allows the supply of electricity to the grid according to demand, independently of the amount of sunshine at that given time.

Concentrated solar power uses direct sunlight. It concentrates the sunlight, through mirrors, on a point through which there flows a fluid whose heat in turn generates steam which moves a turbine. In central tower plants, the heliostats (flat mirrors) reflect sunlight at a receiver located at the top of the tower where the fluid circulates, whereas parabolic trough technology uses cylindrical mirrors to concentrate sunlight on a central tube containing the fluid.

Thanks to Sener's storage system, these hot fluids, as well as generating steam, serve to store the excess heat in tanks of molten nitrate salts. In the tower plants,

such as Gemasolar, the salts are used as a heat absorption fluid. They circulate from the cold tank, through a pump, to the receiver at the top of the tower, where they are heated to 565 C, and they descend to the heat exchangers to produce water vapour. In surplus energy conditions when the heat radiation is more than sufficient to meet the demand of the turbine, some of the salts are stored in a hot tank, capable of conserving the heat for 15 hours, to be used at moments with low sunlight when it doesn't receive enough heat to generate steam directly. At this time, the stored salts act as a supplier of heat and water vapour continues to be generated.

At Gemasolar, Sener has been responsible for the supply of all the technology and the design engineering and has led the construction and commissioning of the plant. The technology developed by Sener includes state-of-the-art solutions such as the molten salts thermal storage system and

the receiver, which can absorb 95% of the radiation from the sun's solar spectrum and transfer the energy to the molten salts compound which circulates in its interior and which is then used to heat the steam and operate the turbine. Furthermore, each of the heliostats which makes up the solar field has a high precision solar tracker system also patented by Sener, which can concentrate sunlight at a ratio of 1000 to 1 in the central receiver. Finally, the molten salts used as thermal transfer fluid allow the generation of hotter and more pressurised water vapour for the turbine than parabolic solar trough technology, which significantly improves plant efficiency.

The experience of Sener in the concentrated solar power area has resulted in 20 plants already developed, including Gemasolar. According to Miguel Domingo, Solar Business Director of Sener, "Currently Sener is the only company in the world which has developed and put into operation a solar plant with central tower molten salt receiver technology."

The flagship project of Torresol Energy

Gemasolar is the flagship project of Torresol Energy, a company founded in 2008 as a joint venture between Sener, who own 60%, and Masdar, 40%. The company commercially develops, manages construction, and develops and operates concentrated solar energy plants in the global market. Activities focus on solar thermal plants in USA, the south of Europe, the Middle East and

the North Africa. In these areas, the company hopes to promote central tower receiver plants and parabolic trough technology through its experience acquired in projects developed in Spain and Abu Dhabi.

Currently, as well as Gemasolar, Torresol Energy is constructing two other plants in Cadiz, Valle 1 and Valle 2. They are twin facilities which will employ parabolic trough technology with a power generation capacity of 50 MW each, and also include a molten salt storage system. Each will be able to generate 3,950 hours of electricity a year, equivalent to the average consumption of 40,000 homes, or, in other words, the entire city of Cadiz. The two plants will start operating at the end of 2011. They will help avoid the emission of 90,000 tonnes of CO2 emissions a year.

Gemasolar is therefore Torresol Energy's first project to be commercially operative. From the start, Torresol Energy has worked closely with the local council of Fuentes de Andalucía and social bodies of the local community, resulting in initiatives to increase awareness of renewable energy in the town through special events, talks, schools competitions and guided tours of the site etc. True to the company's commitment to protect the environment for future generations, Torresol Energy has wanted to be, through Gemasolar, an active player in sustainable development in Fuentes de Andalucía. This philosophy is reflected in all its projects, both in Valle 1 and Valle 2 and other projects which the company is to launch in the future.



Enrique Sendagorta, Chairman of Torresol Energy, said on announcement of the commercial operation of the plant, "Gemasolar is a revolution in the concentrated solar power sector, as the standardisation of this new technology will mean a real reduction in investment costs for solar plants. The commercial operation of this plant will pave the way for other central tower plants with molten salt receiver technology, an efficient system which improves the dispatching of electric power from renewable sources."

www.torresolenergy.com

Adwards and Recognition

Gemasolar has awakened great interest from political bodies at home and abroad. Representatives of the governments of the USA, the EU, Australia and the Arab League have visited the plant during construction or enquired about its development. Likewise, it has won various national and international

awards, from the CSP Today award in the category "Solar Thermal Innovation", to the European Sustainable Energy Awards, where Gemasolar was finalist in the Production category, which recognises those projects which involve renewable energy generation or the production of energy efficiency. Addi-

tionally, its activity in Fuentes de Andalucía has resulted in receiving the Clean Technologies Award at the XVII edition of the Ones Mediterrània - CIE, and recently the company has been selected to represent Spain at the prestigious European Business Awards, in the category of Innovation.

Dossier



The sea as a Future Energy Source

The sea is a huge store of resources from which mankind has drawn abundantly throughout history. Now it is emerging as a viable alternative for supplying renewable energy through the great power potential contained in waves, currents and other forms of storage. Within the framework of the Sinaval Exhibition 2011 at the Bilbao Exhibition Centre, the 4th International Seminar on Ocean Energy on April 14 showcased the advances being made year by year in the ocean energy sector, involving leading companies in the field and organised by the Basque Energy Board (Ente Vasco de la Energía, EVE) and Corporación Tecnalia. The Cluster de Energía of the Basque Country organised a conference on the eve of the event in the same venue, entitled "Country Strategies in Relation to Sustainable Marine Energy, the Offshore Industry and the Shipbuilding Industry," which featured presentations from institutional representatives from Norway, the United Kingdom, Denmark and the Basque Government.

The 4th International Ocean Energy Conference boasted 12 speakers covering three large areas: wave energy, offshore wind energy, and the supply chain. Leading international companies such as Ocean Power Technologies (OPT), Oceanlinx, Fred Olsen, Voith Hydro Wavegen and Pelamis showcased the latest advances in harnessing wave energy, while progress in offshore wind energy was examined by the Iberdrola subsidiary Scottish Power, Gamesa, Fraunho-

fer IWES and Technip. The session looking at the supply chain featured contributions from Hydrogroup, NSW General Cable and the assessment and certification firm Bureau Veritas.

The conference rounded off with an evening session opening with a presentation of the "Guide to wave power capacity in the Basque Country" which has been made by and was presented by the Cluster de Energía and the Foro Maritime Vasco. This catalogue gives a quick overview of the "state of the art" and the value chain of wave power in Euskadi, looks at how Basque firms are present on almost all the links of the value chain, and presents the Basque organisations with capacity in the sector, giving details and descriptions of these companies.

After the presentation of this catalogue, which was distributed as a pen drive for the numerous audience members, many of whom being from abroad, the conference closed with a round table and open debate with a panel of Basque suppliers of products and services in ocean energy. The four companies involved were Ingeteam, the shipyard La Naval, Grupo Ormazabal and Vicinay Cadenas.

Estrategies to Develop Ocean Energy

The programme of events of Sinaval 2011 included a meeting of commercial attachés held on the eve of the conference and organised with the collaboration of the Clus-

ter de Energía of the Basque Country. The central question was an important one for the coming years, that of the development strategy for harnessing ocean energy. It is a field in which Basque industry has great opportunities for development and one in which public bodies have developed two pioneering projects in Arminza and Lemoiz.

The conference was entitled "Country Strategies in Relation to Sustainable Marine Energy, the Offshore Industry and the Shipbuilding Industry" and featured presentations from institutional representatives from Norway, the United Kingdom, Denmark, and the Basque Energy Board (EVE) representing the Basque Government.

The Strategy of Norway

The manager of Innovation Norway in Spain, Hakon Hauan, said his country has a long tradition of more than 100 years of exploiting hydroelectricity plants, which cover almost 100 % of domestic needs at 30,000 MW installed output, a yearly production of 140 TW/h and the potential to reach, theoretically, 205 TWh. Furthermore, since 1970, Norway has been exploiting hydrocarbon fields, which makes them the third biggest exporter of energy in the world, after Russia and Saudi Arabia.

This has not stopped the country having ambitious objectives in the field of renewable energies, which cover today 60% of consumption (compared to 8.5% in the

European Union), and with the aim of reaching 73% in 2020 (compared to the 20% objective of the EU). Norway has 2,600 kms of coastline, with great potential for offshore wind power estimated at 66 TWh and hardly exploited to date. The Norwegian representative said the problem was a lack of financial incentives, given that electricity is very cheap.

Mr. Hauan explained. " We have development programmes for wave and offshore energy, both anchored and floating, and in fact in 2012 a pilot plant was opened in the waters of the Canary Islands, although we have projects to develop others off the Cantabrian coast". He concluded by pointing out "We aim to be a benchmark in renewable energies and we are investing in other generation models such as geothermal, solar, tidal and osmosis".

The Situation in Denmark

Jakob Hanghoj, commercial attaché of Denmark, said "In thirty years the wind power industry has gone from non-existent to being one of the prime industries in the country" but in his opinion wave power is a possibility for the future, but technology has not advanced enough for it to be commercially viable.

In Denmark there are several developments worthy of interest, such as Wavestar (a 1.6 MW pilot plant) and another pilot plant featuring floating wind turbines. These sizeable projects are also moving the shipbuilding industry and resulting in the formation of synergies between different sectors and technologies for infrastructures, cables etc. "Offshore wind power is a huge investment, although we have learned the lesson of never to install a farm without the certainty that the technology functions."

Mr. Hanghoj added " Today we have 600 MW of installed output available, and this will be doubled in 2012, reaching 12% of the country's electricity production. For 2020, 40% of our electricity will be of wind origin, both onshore and offshore. The potential of marine energy in our country is the equivalent of 50% of internal consumption." He stressed the problem of the cost of marine energy and the need to reduce it, and also that it was necessary to solve the problem of compatibility with other activities such as tourism and fishing.

"Looking at the future" the Danish representative concluded, "it is important to think of a project of a great interconnected European network, which requires political decisions but which would achieve the objectives of energy self-sufficiency, industrial development, job creation, R & D etc."

The British Case

Derek Doyle, United Kingdom Consul in Bilbao presented the situation in the UK, which in the coming years will become the world leader in offshore wind power. The first steps were taken in 2001, in what is called Round One, an experimental process to demonstrate the possibilities of this energy source. Two more development Rounds follow. They are Round Two (in which the projects are no longer experimental, there are six in construction with an combined installed output of 2.2 GW, and another 5.3 GW in Scotland) and Round Three (which is aimed at having 15% of the energy of the UK derived from renewable sources in the year 2020).

At present the offshore sites which were awarded (12 GW in Scotland and 32 GW in the rest of the UK) are open for tender and bidders include EDP and Scottish Power, so that, according to Mr. Doyle, "Basque and Spanish companies which work with HC Energia or Iberdrola have the doors to knock on to gain access to a business of enormous dimensions. When Round Three finishes 10,000 turbines will have been installed in British waters, some of those 200 km from the coast and in seas up to 100 metres deep.

The United kingdom has no wind turbine manufacturers, so these plans mean a great opportunity for everyone on the supply chain. There is 120 million pounds available to develop offshore wind energy, and another 130 million (70 million in Scotland alone) to improve port infrastructures where assembly and loading will have to take place.

Mr. Doyle specified "as well as for wind turbine manufacturers, it is also a project equally interesting for all the supply chain, for firms which specialise in laying foundations, completely novel multi-structures which will be needed to install and maintain these wind farms, for the electrical installation sector, underwater cables, new styles of boats, maintenance companies, infrastructures for high seas technology, blades manufacturers, multipliers, generators,

transformers, transmission grids etc." The Consul also said " New knowledge is also going to be needed, new career studies, new technicians, and of course all the facets of financing and safety."

The View From the Basque Country

José Ignacio Hormaeche, CEO of EVE, closed the event. After hearing the contributions from the representatives of three countries which are leaders in marine energy, Mr. Hormaeche said " We in the Basque Country are envious of these ambitious projects which, through different reasons such as the size of the country or the absence of a continental platform on our coast, we cannot hope to imitate. But we know that we have the capacity and the knowledge to participate and take advantage of these opportunities when they open." ●





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