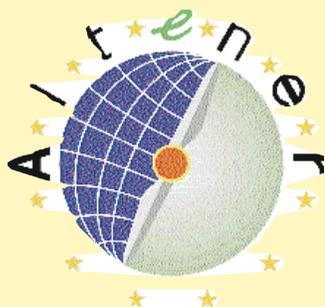




renewable energy journal



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Cover photo:

EXPO '98 in Lisbon was a show-case for energy conscious design. The cover photo shows EXPO's multi-purpose pavilion where pre-cooling of supply air by river water provides up to 1,500 kW of cooling power. See p.14

Photo-credit: EXPO '98/Homem à Máquina

A new momentum now underpins the global drive to accelerate the introduction of renewable energy technologies. Agreements reached in Kyoto and reinforced with November's "Buenos Aires Plan of Action" means that CO₂ emission reduction is now a world-wide priority. The development and transfer of technologies which can help countries to reduce emissions - either directly or through emissions trading - is now driven by binding agreement rather than fine ideals.

Through preparation at home, Europe has been able to take a strong lead in the global process. The White Paper on Renewable Energy Sources is just one of the initiatives taken to ensure that we can truly lead the way with our actions. Having set an indicative target of 12% contribution by renewables to Europe's energy use by 2010, it is gratifying to see the trend for Member States to adopt their own individual targets. Equally striking is the new investment being poured into renewables by some of Europe's largest energy companies. As new scenarios unfold for renewables, the role of the EU is to add value to the endeavours of Member States and individual organisations. This is achieved not merely through financial support but through the development of commonly agreed strategies through extended consultation. With ALTENER II (aimed exclusively at renewables) and the Fifth Framework Programme (covering all EU RD&D) both now in place, conditions are excellent for collaborative work in renewable energy taking us into the new century. ■

Editorial

Interview with Carlos Robles Picquer and Eryl McNally

EUFORES, the European Forum for Renewable Energy Sources, is a non profit association formed in 1995. Carlos Robles Piquer MEP is the President and Eryl McNally MEP is the Vice-President.

Mr. Piquer, you could briefly describe the main aims of EUFORES?

EUFORES aims to support and promote Renewable Energy Sources (RES) in the European, national and regional institutions in order to achieve wide implementation of Renewable Energy Sources (RES) in the EU.

Lobbying, in the best of senses, to influence decision-makers and public opinion, is essential for RES market penetration.. EUFORES proposes and launches activities focused on elected representatives at all levels, with the intention of prompting the bodies to which they belong to introduce positioning resolutions. In this way, decision-makers and public opinion can be reached and informed.

What progress do you feel the organisation has made since its beginning ?

Since its foundation EUFORES has developed a very intensive work

programme that has resulted in legal and institutional development within the EU framework. A notable event was the Inter-Parliamentary Meeting: RE in the EU, held in the Canary Islands in January 1998. 12 MEPs and 30 MPs (especially those engaged in energy and related issues), key EC and national energy Authorities, and representatives of the media, attended the Meeting. This high level event (see p. 9) aimed to contribute to the discussion of the White Paper on Renewable Sources of Energy recently delivered by the European Commission, and to promote a more homogeneous development of RE legislation throughout the EU. The Meeting also served to exchange points of view on recent developments in the fields of RES. The consensus reached on the issues discussed in this high level event is reflected in the document, the Canaries Declaration, agreed by all participants. It is sent as a message to all EU, national, regional and local elected bodies and institutions, so that they may exert influence on their governments and administrations to support and implement the actions and proposals contained in the White Paper.

What do you think is the significance of the Commission's White Paper on RE ?

I think that it is the minimum commitment needed at the EU level. Of course, it is a first step, and a lot of work is still to be done. This document is a consequence of the process started in Madrid in March 1994, and its Action Plan is indeed a detailed set of measures that have resulted from the discussions started then. This means that the European Commission knows that RES can play an important role in the energy sector and this awareness must now be transmitted to the producers, consumers and to society as a whole. ■



Sr. Carlos Robles Piquer, Spanish MEP representing the Group of the European People's Party (Christian-Democratic Group). Among his many Parliamentary responsibilities, he serves as Vice-Chairman of the Committee on Research, Technological Development and Energy.

Mrs McNally, how does EUFORES complement the work of other European networks working in the RES field ?

EUFORES is the only European network which has as its focus the role of the European Union in promoting renewable energy. It was established in response to the perceived lack of political and institutional activity and lobbying, especially at EU institution level. It was also responsive to the need to co-ordinate the activities of organisations within the EU, because many position papers or initiatives were duplicated or divergent. EUFORES has the advantage of bringing together Members of the European Parliament from very different political and geographic origins, who in turn can liaise with renewable energy groups in their own countries as well as national and regional representatives.

What are the priorities for EUFORES ?

Of course the action plan of the White Paper on Renewable Energy is our main priority. The promises made at Kyoto will have to be made very specific, and we increasingly see a synergy between renewable energy and energy efficiency. An idea which came originally from EUFORES is the need to have an EU-wide commitment by Member States to renewable energy, analogous to the Euratom Treaty which did so much to promote nuclear energy. This would probably be introduced in the form of a Charter, in the first instance. We shall be doing intensive work on this over the next year or so.

What link is there between your involvement with EUFORES and your work as an MEP ?

As I have already said, one of the main strengths of EUFORES is its

concentration on what can be done in the context of the European Union.

The legislative powers of the EU and its abilities to fund programmes such as ALTENER, JOULE and THERMIE are potentially of enormous benefit to renewable energy. I have found my links with members of EUFORES very valuable in the development of policies. I helped to organise the very successful EUFORES conference held at Milton Keynes in my constituency, for example, at which the then new British Energy Minister, John Battle, made his first and positive public references to renewable energy.

Why have you personally become involved in renewable energy ?

It has been clear to me for over twenty-five years that our profligate use of fossil fuels or reliance on nuclear power are not sustainable as energy strategies. My husband established a college course on alternative technologies in 1974 and did research into solar, wind and biomass for electricity generation. The more recent emphasis on global warming and climate disruption have only served to increase the relevance of renewable energy and I therefore ensured that I joined the European Parliament's Committee on Research, Technological Development and Energy as soon as I was elected in 1994, becoming its Vice-President. I am fortunate in having both the Open University and Cranfield University in my constituency and they have both been helpful in providing advice and research on renewable energy. I work closely, too, with a local group who are exploring the potential for renewable energy in our locality - think globally, act locally ! ■

For further information contact:

EUFORES Fax +34 91 3833159
E-mail: eufores@eufores.org



Mrs. Eryl McNally has been a UK Labour MEP since 1994. Her Parliamentary responsibilities include participation in the Committee on Research, Technological Development and Energy and the Committee on the Environment, Public Health and Consumer Protection.

World PV Conference, Vienna

The Photovoltaic (PV) industry is experiencing annual growth rates in the range of 40%. The 2000 people from 75 countries who attended the 2nd World Conference on Photovoltaics, held in Vienna in July had a special opportunity to see how this is affecting both business and research prospects around the world.

Regular conferences bring PV experts together on a regional basis in Europe, the US and Asia/Pacific, and in the 1990s the tradition was established of combining forces every four years. Thus the World Conference, co-sponsored by the European Commission, brought the global spotlight to Europe.

Conference chairman Professor Jürgen Schmid who delivered the keynote speech at the opening of the conference, was well placed to comment on the factors driving the expansion of the industry: *"In the 21st century, mankind will have to build up an energy supply by its own efforts will have to produce it like any other industrial product mainly by invest-*

Electricity can be provided cleanly to remote, off-grid locations. The Starkenburger Hütte (Austria), located at 2239m is equipped with a roof-integrated PV system to supply energy needs.



ing intelligence, capital and work. As a consequence, people will use electric power more efficiently, intelligently and selectively than before. Under these conditions, photovoltaics will be able to develop its potential to the fullest ... I assume that during the next 20 years the global market for photovoltaics will go through a period of rapid technical progress very similar to that experienced by microelectronics between 1975 and 1995".

Commercial perspectives

Underscoring the confidence expressed by Schmidt was the excellent exhibition, which involved 150 companies and organizations from 20 countries, and the buoyant mood of the business representatives. An interview with Dr. Fritz Vahrenhold, of Deutsche Shell AG, in connection with the conference, eloquently set the event in its commercial context:

"The world's energy appetite will triple during the next 50 years. The enormous growth will take place in the newly emerging industrial countries and the developing countries. According to the official world energy scenario drawn up by Shell, 50% of this demand will be met by alternative energy sources in 2050. Photovoltaics will have a 10% share in these tripled requirements"

Having established a new corporate division for renewable energy in 1997, Shell is investing \$500 million in the industry over a five year period. This industry response to opportunities in PV is now typical, rather than unusual, as insights from other European businessmen revealed.

ASE GmbH is currently making huge investments in new production capacity. Its objective is to double its present market share of about 5 % by the year 2000. Dr. Winfried Hoffmann, Managing Director

of ASE, spoke of his certainty that his company's high investments will pay off. "In recent years the photovoltaic market has recorded two-digit growth figures; last year it rose by an impressive 40%. On the basis of our knowledge of this market, we are confident that it will continue to grow by between 20% and 25% in the future. Reinhard Wecker, head of **Webasto AG's** Solar Technology Division, was also buoyant about market prospects. Webasto AG, an automobile supplier with a global labor force of nearly 4,000, is the world's leading supplier of sunroofs for cars and a major supplier of heaters and airconditioners for trucks, buses, recreational vehicles, etc. and delivers its products to virtually all the world's automotive companies. At Webasto's plant near Munich, sunroofs with integrated solar generators and other special modules are in production. .

"This year our production will be between 20,000 and 30,000 units. Globally, we are talking about an enormous market here."

Current trends

Conference participants had an excellent opportunity to hear what is happening in the PV market-place. With 126 MW of PV cells shipped in 1997, the 40% annual growth this represents can be attributed evenly to both off-grid markets and on-grid markets. The off-grid markets include telecommunications, consumer systems for homes farms and boats as well as small lighting systems for the developing world. The on-grid market is characterised by subsidized building integrated systems, notably in Japan, Germany, Switzerland and the US.

Single-crystal silicon continues to be the industry standard in PV markets, retaining a 49.6% market share in 1997 and accounting for 95% of Europe's production. Amorphous silicon, accounting for only 4% of Europe's production enjoyed increases in production but lost market share. Thin-film R&D show great promise



and is well-represented in plans for new manufacturing capacity.

While price/ performance of PV cells continues to improve, it was reported that demand caused cell prices to increase in 1997 from \$4.15/W to 4.20\$/W. The expansion of manufacturing capacity implemented in 1998 is expected to reverse this trend.

Europe's place

The European Union currently accounts for about one third of world-wide photovoltaic module production. The EU White Paper on Renewable Sources of Energy was a focus of attention during the conference, particularly its call for a hundred-fold increase of PV capacity from just over 30 MW currently in existence to 3 GW by 2010. The planned "Campaign for take-off" highlighted in the White Paper, promotes the installation of 1,000,000 photovoltaic roofs and facades by 2010, half in the Union and half for export. This mirrors initiatives underway in Japan and the US where government programmes promote solar homes through tax incentives and subsidies.

The 16th European PV Conference and Exhibition will be held in Glasgow, UK from 1-5 May 2000. ■

For further information contact:
WIP Fax: +49-89-7201291
 E-mail: renewables@tinet.de

During the PV Conference, the Commission of the European Communities awarded the Alexandre-Edmont Becquerel Prize for outstanding contributions to the development of Photovoltaic Solar Energy. Above: The Becquerel Prize was presented by Christos Papoutsis, the EU's Commissioner for Energy, to Dr. Walter Sandtner for his personal commitment to photovoltaics and his unflagging efforts to strengthen public budgets and support for it. Dr. Sandtner is the originator of the PV roof and façade programmes and was responsible for a first successful implementation on a large scale. He also promoted these programmes internationally with noteworthy follow-ups around the world.

White Paper follow-up

Following the publication of the White Paper on Renewable Energy Sources by the European Commission, the Council of the EU adopted a Council Resolution on Renewable Sources of Energy in June 1998. Meanwhile, Industry Associations and Member States are actively responding to the new scenario for renewables

The Council Resolution

As Council Resolutions are meant to be followed up by all governments of the EU's Member States, the Energy Council's June resolution which "Welcomes the general thrust of the White Paper on a Community strategy and action plan" provides a strong endorsement of the proposed strategy to promote a sustained and substantially increased use of renewable sources of energy (RES) throughout the EU.

The White Paper proposed the target of doubling the contribution of renewable sources to the EU's energy consumption - ie to 12% - by 2010. The Council have now accepted this as useful guidance, bearing in mind the need to reflect differing national circumstances.

Noting the competitive pressures on all sources of energy resulting from the liberalisation of Community energy markets, the Council stressed the need to reduce the relative costs of renewables. While the strategy for promotion of renewables should focus on mature technologies, the need to support research, development and demonstration

of not yet proven technologies is also underscored. The view is that EU funding for renewable energy sources should add value to national measures which may be chosen to suit the situation in individual countries. A key activity at Community level is the development of standards and certification schemes which will support rapid market penetration of successful technologies throughout the EU.

The Council Resolution stresses the important role of renewable specific programmes, such as ALTENER, but highlights the need to build renewables into other policies, where appropriate. With a specific focus on future policies for agriculture, waste management and environment protection, the significance for renewables of regional, rural development, research and technology, external competition and State aid policies is also acknowledged.

Campaign for take-off

A key part of the White Paper's Action Plan is a "Campaign for Take-off" aimed to raise interest among industry, investors and the public. Recognising that this will require mobilisation of private sector as well as public sector funds in Member States and the Community, the Council invited the Commission to bring forward proposals on how this is to be done. The Commission is currently drafting a paper for the Council and the European Parliament which should be published in the spring. Within ALTENER II, specific projects will be funded as from 1999 to initiate the "Campaign for Take-off".

National responses

The White Paper emphasized the necessity for Member States to take action on renewables at a national level, and to work in close cooperation with each other in this field. Already a number of countries have

*Renewable energy
technology photo to
be inserted here.*

established national targets for renewable energy use. Denmark very strongly supports the White Paper target, with a national Action Plan aiming at 8-9% RES by 2005 and 17-19% by 2010. In the Netherlands a national RES Action Plan provides for substantial action, the aim being to move from today's >1% to 10% by 2020. In Ireland, the national strategy includes targets per technology and the overall aim is for 14-15% in 2010. Greece has national objectives for 8 - 8.5% in 2005, and 10% in 2010. Italy has recently launched a national White Paper which also plans doubling by 2010, Spain is aiming at 12% RES in the same year, and the UK has adopted a target of 10% electricity from RES. Austria has had regional targets for RES development for some time, including one Federal State (Upper Austria) whose ultimate goal is 100% RES supply over the coming decades

Industry response to the White Paper

The last two decades has seen the formation and consolidation of European renewable energy industry associations. Many of these associations are now actively using the opportunities arising from the White Paper to highlight the particular needs and priorities of the industries they represent. For AEBIOM, for example - the European Biomass Industry Association - the publication of the White Paper provoked a White Paper "Implementation" report. In this, AEBIOM welcomed the White Paper, the European Commission's leading role in Kyoto and the commitment to CO₂ reduction, but highlighted the extent of change needed to achieve the stated targets.

"In accordance with the White Paper, 90 Mtoe or 83,6 % of the whole expansion of RES, should be delivered by biomass. This would mean a three-fold increase of the energy contribution of biomass from 44,8 Mtoe at present to 135 Mtoe in 2010.



The success of the White Paper depends on the successful mobilisation of the energy contribution of biomass on an appropriate scale."

The association calls for rapid expansion of *"the modern use of biomass ... in electricity and heat production, co-firing of biomass in coal power plants and production of liquid biofuels"*.

Meanwhile, in a working paper on non-food crops tabled at the end of 1998 with the Council

of Ministers in the run-up to the discussions on the AGENDA 2000 reform proposals, the Commission has stressed the importance of aid measures for short rotation forestry. It also recalls the support already expressed by a number of Member States for specific measures and aid for solid and liquid biomass. Forthcoming discussions in Council could result in further initiatives.

Other RE Industry Associations are also responding to the new challenges presented by the White Paper: see page 18 for contact details. ■

For a copy of the White Paper, contact:
EC DG XVII/C2 Fax. +32 295 5852
 E-mail: info@bxl.dg17.cec.be
 or download from: www.europa.eu.int/en/comm/dg17/599fi_en.htm

After the publications of the White Paper on Renewable Energy Sources, one hundred and fifty members of national and European parliaments met at Las Palmas in the Canary Islands in January 1998 to discuss the future of renewable energies in Europe. The goal of this meeting, organised by the EUFORES association, was to support and provide political back-up to the measures announced in the White Paper. Left: Delegates to the conference had excellent chances to see renewable sources of energy at work. Here they visit the Instituto Tecnológico y de Energías Renovables, S.A., Tenerife

Atlas Project Report

The ATLAS study was set up to provide future decision makers with independent information and help them to determine and prioritise the next steps in terms of RTD, demonstration and market stimulation activities in the energy field. The results are published in a report *“Energy Technology - the next steps”* published by the Commission’s Directorate General for Energy (DG XVII).

Developed by a team of national energy agencies throughout Europe, ATLAS aims to provide a comprehensive catalogue of state-of-the-art non-nuclear innovative energy technology and their prospects in line with market and consumer requirements. This involved the need to appreciate and reflect the European dimension and to synthesize information about all Member States.

Supply and demand side perspective

The information was gathered on selected innovative technologies and the study is organised to focus on both the supply side perspective (covering renewables, heat and power, and oil and gas exploration and production) and on the demand side (covering industry, buildings and transport).

The report covers the market status of the technology or process, the contribution to EU-level policy objectives, the technical and non-technical status of the technology and

the current RTD and future needs.

Markets for new energy technologies

Information on the current and future (2010) markets for energy technologies in the EU and worldwide, and on the competitiveness of European industries in those markets is presented in the ATLAS study. The information is based on a “trends continued” view of the future and takes into account the views of the key actors in the market.

Costs and benefits

The ATLAS study provides decision makers with detailed information on the costs, technology and potential benefits to society which might be gained from supporting further RTD on a particular technology, taking into account factors such as security of energy supplies, environmental sustainability and industrial competitiveness.

Conclusion

The ATLAS project concludes that markets for innovative energy technologies are growing and that European energy technology suppliers are well placed to compete in the global energy markets of the future. However, global competition is growing, so there is an ongoing need for initiatives and programmes at EU and Member State levels to support European producers of energy technologies. Further RTD is still needed to overcome the market barriers and to continue to reduce manufacturing costs, and this is often most cost-effective when managed at EU level. ■

For further information contact:
ETSU Fax: +44 1235 433066
 E-mail: jemma.howland@aeat.co.uk



The work was undertaken by a team of experts from the EnR (the European network of energy agencies), coordinated by ETSU, UK

Wind energy - the facts: a plan of action for Europe

This 330 page report detailing the economic, technical and environmental benefits of wind power was launched in June 1998 by the European Wind Energy Association. Produced with support from the ALTENER programme, the report shows that wind energy is a booming international business.

In Europe alone the installed wind power capacity has grown by 40% in the past seven years. Development in Europe has taken place since end of the 70's, supported by national programmes within EU-member countries as well as by the EU programmes JOULE and THERMIE. Now the region with the greatest expansion of wind energy utilisation in the world, by the end of 1997 some 4,700 MW had been installed - compared to 473 MW in 1990.

Current trends

The increase in available rated capacity of turbines (by about a factor of 3 from 500 or 600 kW to 1.5 MW) is striking and has shown a very rapid development since 1990. The arrival of the largest units is timely as the industry prepares for major developments offshore. Cost trends show the latest megawatt machines as competitive. Major offshore developments are certain in the early part of the next century. This next major step for the technology will result in a dramatic increase in potential, particularly in northern European waters.



*Off-shore wind farm
at Blyth Harbour, UK*

The cost of wind energy plant has fallen substantially during the last fifteen years, and this trend is continuing. Energy prices have fallen even faster, due to lower wind turbine prices, higher efficiency and availability, and lower operation and maintenance costs. Wind turbine prices fell by a factor of at least three from 1981 to 1991, and energy prices have halved in the last 9-10 years.

Developing the industry

The report highlights the success of the industry development model adopted in Germany and Denmark, with fixed premium prices paid for electricity delivered to the public grid. In general, the report advocates "a general fair price paid to the wind generators, reflecting the environmental benefits of producing electricity without emission of pollutants, taking place in a well organised institutional framework, in countries with planning regulations for wind energy in place". With this in place the industry can benefit from export to a world market expected to be at least twice that of Europe. ■

For further information contact:

EWEA Fax: +32 2 295 0150

E-mail: ewea@ewea.org

EC DG XVIII/C2 Fax: +32 295 5852

E-mail: info@bxl.dg17.cec.be

Large scale solar hot water plants

Much of the cost of installing a solar water heating system in an individual home can be traced to the inefficiency of installers providing single, "one-off" systems. To bring down the costs of solar water heating, it is essential to find ways of changing the scale at which system installers work. The Apeldoorn project in the Netherlands (see issue 6) gave a foretaste of the large scale approach to solar water heating. Since then, a further THERMIE supported project has begun which focuses on extending this approach to other EU countries.

Background

Currently about 500,000 m² of solar water heaters are sold annually and some 1.4 million households in Europe use solar hot water. However, as this represents only 1% of all European households, it is clear that the market is open for development in the coming

Solar water heating systems installed on a new development in Gorseinon, Wales

Photocredit: IT Power



years. While in 1994 the EU had an estimated area of 4.4 million m² of glazed collectors and 1.2 million m² of unglazed, the expected deployment of collectors by 2010 is estimated at 20 million m². Strategic action, enabled through THERMIE support, aims to help this goal to be achieved. One way to do this is to ensure that activities which are successful at a national level are quickly replicated in other parts of the EU.

The "project approach" team

The THERMIE project "A European Project Approach for Solar Water Heaters" aims to demonstrate the methodology developed by the consultancy Ecofys in the Netherlands. In this approach, which now plays a key role in the expansion of the Dutch market for SWHs, large numbers of SWHs are applied as a standard facility in new housing developments. To extend this concept to other parts of the EU, a number of consultancies are working to replicate it in their countries - Esbensen (Denmark), IT Power (UK) and Atlantis (Germany).

"Project approach" organisation

The national consultancies play a key role at *local* and *international* level.

At local level, they are responsible for forming a working group which includes bodies relevant to a specific project, such as property developers, local housing associations, municipalities and energy companies.

These groups are active in applying for national local subsidies, contracting, supervision of the realisation phase, quality control, monitoring of system performance and provision of user information. They are also responsible for integration in urban planning and in the preparation of the building process.

Local activities are complemented by the actions of the international project group who are responsible for the method whereby the solar water heating equipment is purchased. This is carried out in two stages. The first involves the "pre-qualification" of suppliers who are then placed on a select list. The select list is created on the basis of pre-qualification forms which are sent out to manufacturers and trade organisations annually in 1997, 1998 and 1999. Manufacturers must be able to provide installation and maintenance manuals in the local language as well as the necessary training of local installers. Criteria for selection includes not just cost but track record of the collector and system in the particular application. In the second stage, manufacturers who qualify for the select list are then invited to tender for the supply of equipment for specific projects. This process stimulates trade in solar thermal technologies within Europe while ensuring that individual projects have the best possible systems installed.

Working in Wales

The first projects to use this system were based in Wales. To date 72 solar water heating systems have been completed on two different sites in South Wales, with a further 28 to follow in the near future. The systems are all installed in rented properties, mostly social housing.

"The systems are installed as part of the building process", explained IT Power's project engineer, Rolf Oldbach.

"One of the objectives was to have the systems installed by the plumbing and electrical contractors on site, which cuts installation time and costs considerably. As these contractors had had no previous experience of solar systems,



Photocredit: IT Power

they were trained to install and maintain the solar water heating equipment. We did have some problems during installation and commissioning, so we worked with all parties to sort these out" Detailed monitoring of eight of the properties will show the energy contribution of the systems. With funding support from a charity, The Ashden Trust, IT Power is also providing information to tenants of the properties which aims to help them get the most out of their systems. Simultaneously IT Power is conducting quality assurance procedures which will be of use for similar projects in the future.

Benefits of the project approach

It is recognised that solar water heating is a mature technology - increasing its uptake depends on issues other than technology development. This "project approach" brings together many of the issues which must be tackled, from equipment selection and building integration to training of installers and support of users. ■

Solar water heating systems installed on a new housing estate in Barry, Wales

*For further information contact:
IT Power
Fax. 01189 730820*

*For further information contact:
EWEA Fax: +32 2 295 0150
E-mail: ewea@ewea.org
EC DG XVII/D2 Fax. +32 296 6016
E-mail: info@bxl.dg17.cec.be*

EXPO `98

EXPO `98, hosted by Lisbon, has been the catalyst for one of the largest urban renewal programmes ever implemented in Portugal, and is now a global show-case for energy and environment planning in cities. The European Commission, in particular the Directorate General for Energy (DG XVII), set up a joint work programme with EXPO `98 in order to optimise the energy planning and definition and implementation of the best available technologies.

*The EXPO `98 site:
Top - the original
derelict waterfront
site of the early
1990s
Below - after work
was completed.*

Photo credit:
Expo `98/CCE



The achievements of EXPO `98 were unveiled at the European Conference "Building the city of tomorrow: the energy dimension" in May. Demonstrating an overall energy consumption reduction of 50%, the EXPO site exemplifies the important role which energy planning will play in shaping the cities of the future. The development of EXPO `98 by Parque EXPO `98 SA was carried out within the context of a "Global Strategy for Energy Environment" which was implemented from the very first design stages of the



exhibition and strove to follow the principles of Agenda 21 drawn up at the UN Conference on Environment and Development in Rio in 1992.

Co-funded by the THERMIE programme, and encompassing expert contributions from several European resource centres, the Global Strategy for Energy and Environment is a results-oriented set of actions ranging from urban planning to final building design and beyond, based on the principle that renewable energy, seen as an environmental or background resource, can displace large quantities of conventional energy. Key activities included actively quantifying, assessing and promoting the potential for environmental energy use as well as collecting and processing site-specific environmental information useful for designers of buildings and urban space.

Terms of reference for urban planning

The general aim of the urban planners at EXPO `98 was to create a healthy and dynamic new urban centre, seamlessly integrated into the surrounding city. Although energy and environmental objectives of the urban plan appeared as flanking supports to the overall aim, significant results were achieved. Notable features include low surface-to-volume ratio of the large neighbourhood blocks, provision of appropriate air-rights to all buildings and the effort to guarantee predominance of north/south orientations.

Terms of reference for buildings

The Terms of Reference for Buildings and Indoor Climate Control Systems were defined as a guide to the design of buildings at the EXPO `98 site. The aim was not to produce a strict set of rules, but rather to set objectives for performance criteria - namely that yearly

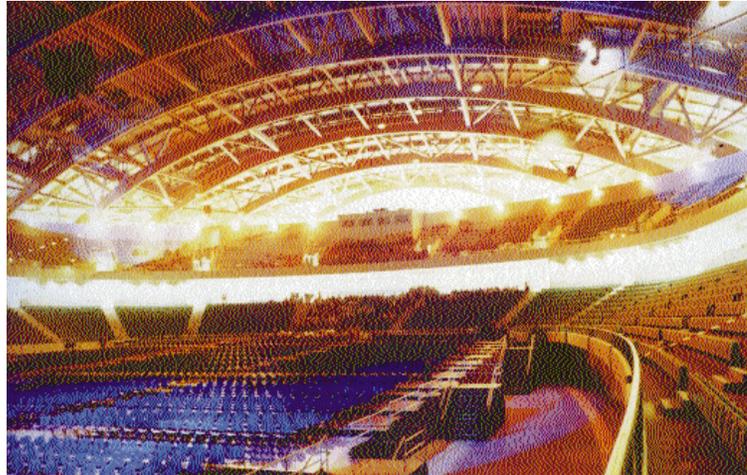
energy consumption should be no higher than 50% of the values required by the Portuguese regulations for passive systems and the installed power should be no higher than 60% of the values indicated by the Portuguese programmes. Precedence was given to simple, reliable and inexpensive passive solar means such as direct gain, thermal storage in walls and floors, passive cooling through external shading, followed by more sophisticated active solar means and only last by commercial energy systems.

The approach promoted implied a commitment to integrated multi-disciplinary design in preference to the prevalent additive design routines.

Notable buildings

The *Administration Building* is a low energy, naturally ventilated general-purpose office building assisted by mechanical ventilation and air conditioning. A partner in the THERMIE Targeted Project "ExpoCities", the configuration of the building was to a large extent defined by the requirements for ambient energy use. Daylighting is promoted by layout, depth, ceiling height and generous windows of the office spaces, and by a glazed atrium. Daylighting is complemented by artificial lighting systems designed for visual comfort and energy efficiency, controlled by photocells. The shading devices are specifically designed for each facade. Among the features of building energy management is a displacement ventilation strategy employing night flushing, free cooling and heat recovery. Annual energy consumption of the building is estimated as 50 kWh/m², with an expected reduction of 70% of CO₂ emissions as compared with a typical prestige air-conditioned office building.

The *Torre Verde Building* is the first



privately promoted residential building at the EXPO '98 to apply predominantly passive solar technologies. Also included in the THERMIE Programme ExpoCities, the Torre Verde Building demonstrates the potential for the use of renewable energies in high-rise urban dwellings in a southern European climate.

A heavy, externally insulated building envelope, double glazing and movable external shading devices are the main passive features of the building. There are no air-conditioning systems. Space heating needs are satisfied by a hot water system connected to roof solar panels. Expected results are a reduction of more than 80% of thermal energy needs, of about 30% in electricity consumption and 70% in CO₂ emissions.

The *Multipurpose Pavilion*, also included in the THERMIE Programme EC2000, is one of the major anchors of the Exhibition, providing an arena for 17,000 spectators. The building meets high comfort standards by favouring low-energy, intelligent technologies that ensure selective use of locally available ambient forms of energy. For example, pre-cooling of supply air by river water provides up to 1,500 kW of cooling power. The overall energy performance exceeds the standards of excellence set by the exhibition organisers, Parque EXPO '98 S.A. ■

Interior of the multi-purpose pavilion constructed for EXPO '98

Photo-credit: EXPO '98 / Homem à Máquina

GLOBAL STRATEGY

CCE:
 Fax. 351 1 471 13 16
 E-mail: d mre.cce@mail.telepac.pt

EC DG XVII/D2:
 Fax. +32 2 296 6016
 E-mail: info@b xl.dg17.cec.be

EC2000

ECD:
 Fax. +322 734 7910
 E-mail: ecdebru@ibm.net

EC DG XVII/D2:
 Fax. +32 2 296 6016
 E-mail: info@b xl.dg17.cec.be

EXPOCITIES

EXPO '98:
 Fax. +351 1 831 9097

EC DG XVII/D2:
 Fax. +32 2 296 6016
 E-mail: info@b xl.dg17.cec.be

European biomass strategy

The project "Strategies for the Development of Biomass as an Energy Carrier in Europe", co-financed by the ALTENER programme, was carried out in 1997 by the national biomass associations of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Ireland, Italy, the Netherlands, Norway, Sweden and the Slovak Republic with coordination by the Austrian Biomass Association.

The project comprises two parts, an analysis of the status of biomass as an energy carrier in the different countries and an assessment of its possible future development.

The aim was to present possible ways of introducing biomass into the energy systems, bearing in mind the challenging goal of the White Paper on RES.

The project identified the low temperature heat market as the most important for introduction of biomass in Europe. The reasons for this are:

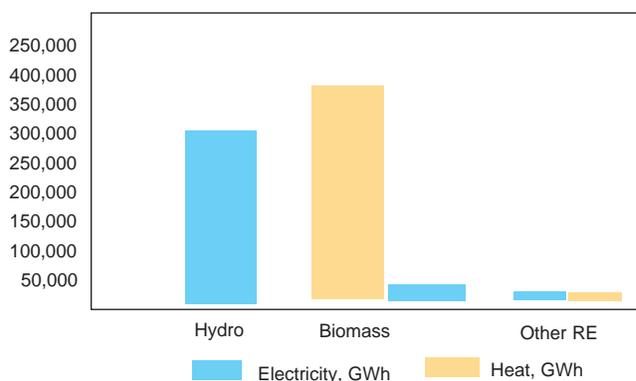
- Biomass is a dispersed source of energy with a relatively low calorific value, resulting in high transportation costs. It is therefore well adapted to decentralised heat and/or power production.
- Biomass is generally a cheap energy carrier for domestic heating, but relatively expensive for electricity production.
- Biomass is already present in the heat market and is socially well accepted.
- Technologies for providing heat for space heating and hot water have been improved considerably in the past ten years.

Nevertheless, the use of biomass in this important market for low temperature heat is decreasing. Depending on the baseline situation of the different countries, and the existing heating systems to be replaced by new biomass installations, different ways of introducing biomass and of changing this trend seem possible. The most important barriers against installation of modern wood systems are:

- higher investment costs, as compared to fossil systems;
- lack of knowledge among professionals and possible customers;
- lack of infrastructure for fuel supply

To overcome these barriers, specific measures are needed, matched to the situation in the respective countries. These include subsidies for investments to start up market growth, measures for information of professionals and potential customers, and establishment of regional markets for biofuels. The study highlights action which needs to be taken to stimulate uptake of biomass energy solutions. ■

The current contribution of biomass to Europe's energy needs, relative to other renewable sources of energy.



For further information contact
Austrian Biomass Association
 Fax. + 43 1 533 07 97 90
 E-mail: forum@netway.at

Fifth Framework Programme

1999 sees renewed funding for R&D and demonstration in the field of renewable energy technologies, with the adoption of the specific programmes and definition of key Actions within the Fifth Framework Programme.

A total budget for the Fifth Framework Programme, which sets the terms for funding all EU supported RD&D from 1999-2004, has now been agreed at 13.7 billion ECU. Specific "Calls for Proposals" are expected in the early spring, but potential applicants can now become familiar with programme priorities.

The Fifth Framework Programme is organised into four thematic areas of activity, within which Key Actions are aimed at resolution of specific problems. For those working in the field of the renewables, the focus will be on Theme 4 "Preserving the Ecosystem" which covers environment and energy. Within Theme 4, the most relevant Key Actions are:

(v) *Cleaner energy systems, including renewables*: this includes development and demonstration of conversion technologies, as well as integration of renewable energy technologies into energy systems

(vi) *Economic and efficient energy for a competitive Europe*: this includes improvement of technology efficiencies and reducing the cost of production

For further information on programmes contact:
 EC-DG XVII Fax: +32 2 296 6017
 E-mail: info@bxl.dg17.cec.be

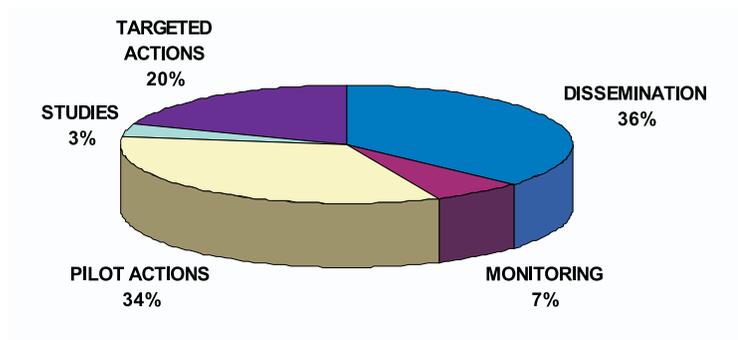
ALTENER II

The contracts for some 200 projects accepted for ALTENER II funding in 1998 have now been finalised, with the work plans scheduled to start in the first quarter of 1999.

Following on from ALTENER I, the aims of ALTENER II are firstly to help create the necessary legal, socio-economic and administrative conditions for implementation of The White Paper action plan for renewables (see pages 8 & 9), and secondly to encourage private and public investments in the production and use of energy from renewable sources.

Studies, development of standards, pilot actions, information dissemination and actions to increase confidence and RES market penetration "targeted actions" are eligible for partial funding in the five year programme (1998-2002). Meanwhile, the EU has adopted an Energy Framework Programme which will be the "Umbrella" Programme for all energy programmes outside the Fifth Framework Programme, with a total budget from 1998-2002 of 170 million ECU. It comprises ETAP (Forecasting and analysis), SYNERGY (International energy cooperation), SAVE (energy efficiency), CARNOT (clean coal) and SURE (nuclear safety) as well as ALTENER (renewables).

Breakdown of actions supported by ALTENER II further to the 1998 call for proposals. The next call for proposals is expected to be issued in autumn 1999.



Publications

Export Markets for European Renewable Energy Technologies

Contact: **ECOTEC**
 Fax: +44 121 616 3699
 E-mail: caroline_watson@ecotec.co.uk

Biomass - the Green Energy European Fora

Contact: **ZREU**
 Fax: +49 941 46419 0
 E-mail: fenzl.zreu@t-online.de

Solar collectors and their fields of application

Contact: **DG XVII**
 Fax +32 2 295 01 50
 E-mail: info@dg17.cec.be

Photovoltaic solar energy best practice stories

Contact **DG XVII**, B. Yordi
 Fax: +32 2 295 0577
 E-mail: info@dg17.cec.be

Investment in renewable energy: third party financing and company participation

Contact: **IDAE**
 Fax: +34 91 555 13 89
 E-mail: info@dg17.cec.be

Case studies on renewable energy in Eastern Europe

Contact: **EC BRECI/BMER**
 Fax: +48 58 3016636
 E-mail: ecbrec@metech.com.pl

Proceedings of the China-European Union renewable energy technology conference

Contact: **ETSU**
 Fax: +44 1235 433434
 E-mail: caroline.livingstone@aeat.co.uk

Events

Small Scale Biomass Resources in Indonesia (Business workshop)

February '99, Germany
 Contact: **ZREU**
 Fax +49 941 46 41 910
 E-mail: fenzl.zreu@t-online.de

Energy Efficiency and Renewable Energies Conference

February '99, Grenoble, France
 Contact: **AGEDEN**
 Fax: +33 476 44 18.75
 E-mail: ageden@alpes-net.fr

The 'THERMIE-ALTENER' yearbook, featuring key projects from both programmes is now available. Contact: **DG-XVII-C-2** Fax: +32 2 295 5852
 E-mail: altener@bxi.dg17.cec.be

Presentation of the 5th Framework Programme - conference and exhibition

25-26 February, Essen, Germany
 Contact: **EC-DGXVII** S. Pellkofer
 Fax: +32 2 296 6016
 E-mail: info@dg17.cec.be

1999 European Wind Energy Conference and Exhibition

1-5 March, Nice, France
 Contact: **WIP** Fax: +49 89 7201291
 E-mail: renewables@tinet.de

Business and Investment Forum for Renewable Energy in Africa

29 March, Harare, Zimbabwe
 Contact: **ADEME**
 Fax: 33 1 46 42 05 58
 E-mail: benedict.meyer@ademe.fr

Exploitation of Small Scale Biomass Resources in Indonesia (Business workshop)

March, UK
 Contact: **ZREU** Fax +49 941 46 41 910
 E-mail: fenzl.zreu@t-online.de

PV credit mobilisation symposium

March, New Delhi, India
 Contact: **EC-DG XVII**, A. Jahn
 Fax +32 2 296 6016
 E-mail: info@dg17.cec.be

Sustain '99 - The World Sustainable Energy Fair

25-27 May Amsterdam
 Contact: **EMM Ltd**
 Fax: +44 181 289 8484
 E-mail: sustain@emml.co.uk

Workshops to promote Small Hydro in Italy & Portugal

21 June, Florence
 July, Lisbon
 Contact: **ETA** Tel: +39 055 500217499
 Fax: +39 055 573425
 E-mail: eta.fi@agora.stm.it

ISES Solar World Congress

4-9 July, Jerusalem, Israel
 Contact: **Kenes**
 Fax: +972 3 514 0077
 E-mail: ises99@kenes.com

Executive Conference on Integrated Solar Energy Solutions for the Building Developer

1-3 Sept., Helsingor, Denmark
 Contact: **Grundfos** Tel: +45 8668 1400
 Fax: +45 86684245
 E-mail: annechristensen@grundfos.com

European RE Industry Associations

AEBIOM (Biomass)

Fax: +32 10 47 3455
 E-mail: jossart@ecop.ucl.ac.be
 Web Site:
<http://www.ecop.ucl.ac.be/aebiom/contact.html#ABA>

ASTIG (Solar thermal)

Fax: +31 182 599 127
 E-mail: 101520.1004@compuserve.com

EPIA (Photovoltaics)

Fax: +32 2 468 2430
 E-mail: sky51038@slynet.be

ESHA (Small hydro)

Fax: +32 81 600759
 E-mail: esha@arcadis
 Web Site:
<http://www.eurorex.com/viewassoc.asp?view3=N&tradeassocID=4>

ESTIA (Solar thermal power)

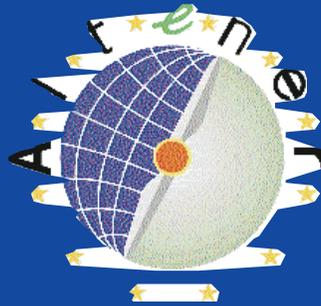
Fax: +44 121 459 8206
 E-mail: jesch@tfc-bham.demon.co.uk

ESIF (Solar thermal)

Fax: +30 1 496 9095
 E-mail: esifadmin@otenet.gr
 Web Site:
http://erg.ucd.ie/esif/welcome_to_esif.html

EWEA (Wind)

Fax: +44 171 402 7125
 E-mail: ewea@ewea.org
 Web Site: www.ewea.org/about.htm



Systèmes Solaires
146, rue de l'Université
F - 75007 Paris
France

Tel.: +33 1 44 18 00 80
Fax: +33 1 44 18 00 36
E-mail: systemes.solaires@wanadoo.fr

Publishing Editor
Alain Liébard

Printing Imprimeries
de Champagne

The Franklin Company Consultants Ltd
192, Franklin Road
Birmingham
B30 2HE- United Kingdom

Tel.: + 44 121 459 4826
Fax: + 44 121 459 8206
E-mail: info@tfc-bham.demon.co.uk

Publishing Editor
Dr Leslie F. Jesch

Printing John Goodman and Sons

European Commission
Directorate General for Energy (DG-XVII)
Unit C-2

Fax.: +32 2 295 5852
E-mail: altener@bxl.dg17.cec.be
<http://europa.eu.in/en/comm/dg17/altener>

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