



A GREEN PERSPECTIVE

BROAD non-electric air con and CHP systems provide green services for the First Universal Cultural Forum, Madrid Airport and Austin CBD

绿色启示录

远大非电空调及冷热电联产系统，为世界文化论坛区、马德里机场、奥斯汀市商务区提供绿色服务



IMAGINE NO BOUNDS THE CITY OF TODAY AND OF THE FUTURE

城市的现在与未来 的无限想象空间

Creation of the Universal Cultural Forum

The first Universal Cultural Forum (also known as Forum 2004) held in Barcelona, Spain from May 9 to September 26, 2004 spanned 141 days and 65,000 delegates who took part in a wide variety of performances, exhibitions, lectures and workshops. It was estimated that the number of visitors would reach five million and TV audience viewing Forum 2004 activities would reach one billion. The Universal Cultural Forum will be held every four years in different countries throughout the world. The application procedure is to be the same with that of Olympic Games.

The 29th UNESCO Conference set the themes of the "Forum" as follows: cultural diversity, sustainable economic development and world peace. The Spanish government, Catalan Autonomous government and Barcelona City Council hardly agreed on principles, values and codes which led the Forum.

There were many informative and colorful activities in the 45 round-table conferences and 50 exhibitions (including 5 large-scaled exhibitions, 9 medium-scaled exhibitions). Shows like "Different Voices", "Inhabitants in the world", "Mankind", "Terracotta Warriors" are the highlights. 56 concerts, 31 dramas, 300 films, 4 acrobatic shows, and 12 music and dance performances were performed.

The buildings and grounds of the "Forum" complex are 5 times that of the 1992 Barcelona Olympic Games.

世界文化论坛的由来

第一届世界文化论坛于2004年5月9日至9月26日在西班牙巴塞罗那举行，历时141天。6.5万人参加论坛的各类演、展、讲座和研讨，预计参观者将达500万人，电视观众将达10亿人，今后将每4年在世界不同国家和地区举办一次，申请程序类似奥林匹克运动会。

联合国教科文组织第29届大会为“论坛”确立的主题是：文化的多样性；可持续发展；世界和平。据此，西班牙政府、加泰罗尼亚自治区政府和巴塞罗那政府一致确定了主导“论坛”的原则、价值和行为准则。

论坛文艺活动丰富多彩，45场圆桌会议、展览约50个，其中大型展览5个，中型展览9个。最受关注的展览有“声音”、“民居世界”、“人类”、“秦兵马俑”。室内演出由56场音乐会，31台戏曲，300场电影，4台杂技，12台音乐舞蹈表演等活动组成。

论坛建筑和地面工程面积是1992年巴塞罗那奥运会工程的5倍。

What are the highlights of the Forum?

The definition of the Forum complex is a futuristic creative space for thinking and experiencing the main cultures and social conflicts confronting our 21st century world.

This futuristic space is located by the seashore and is regarded as the state-of-the-art in sustainable development. This environmentally friendly project has become the highlight of the Forum. The green infrastructure of the Forum complex showcases the world's cutting-edge technologies applied in very practical facilities like:

A sewage treatment plant.

A garbage recycling/regeneration plant.

A cogeneration plant.

A power heat recovery cooling system that provides air conditioning for the Forum complex.

什么是论坛活动的亮点？

本次论坛活动的定义是“一个为思考和体验二十一世纪全球面临的主要文化及社会冲突而设立的崭新的，富有创造性的空间”。

因而，主办单位将这个崭新的空间选择在城市面向大海的一个新区域上，把它作为可持续发展的示范项目，将环保工程作为论坛活动的亮点，为巴塞罗那建造了当今世界科技含量最高，同时又是最实用的环保基础设施：

一个污水处理站。

一个垃圾回收/再生工厂。

一个废热发电厂。

一个以发电余热为能源的制冷系统，为论坛区建筑提供空调。

BROAD non-electric air con driven by power generation waste heat serves tens of thousand people in Forum area.
利用发电废热的远大非电空调，为论坛区数万人服务





Waste/Energy Recycling Plant

Trash is selectively collected by the waste processing plant in the city area of Barcelona, then it is sent to the waste-to-energy recycling plant built at the foot of a hill in Nord Park, an eco-park in the Forum complex.

This plant anaerobically (that is, without the use of oxygen) generates biogas from decomposing waste.

Treatment capacity: 430,000 tons/year
Breakdown of recycled materials (in tons): 36,400 of organic matter, 8,400 of paper and cardboard, 5,600 of glass, 5,600 of metals and 2,800 of other materials.

District Cooling & Heating

Although there is a 40MW power plant in the Forum complex providing lots of electricity, the Barcelona government chose to use non-electric chillers which are not powered by electricity to supply the Forum Building, Convention Center, University Campus and hotels with air conditioning and heating.

This pioneering initiative in Spain, hailed for its vision and size, uses a small amount of the heat that the energy recycling plant produces. The plant will eventually be able to use the energy generated by the new sewage treatment plant and the combined cycle power plant.

It is estimated that the plant will be capable of fulfilling the heating, cooling and sanitary hot water needs of the public buildings in the area, as well as of the 800 housing units, should this be necessary. Hence, a reduction in CO₂ emissions will in turn reduce the pollution. It will also contribute to reducing the noise level of the vapor energy plant.

Reduction of primary fuel consumption through recycling of steam produced by the recycling plant is 32%.

垃圾回收/能源再生工厂

巴塞罗那市区垃圾处理中心将垃圾有选择地回收，送往论坛区生态公园——诺德公园的一个小山下，那里建有一座垃圾回收/能源再生工厂。

这座工厂通过对废物的厌氧分解（不需氧的分解），产生沼气。

处理能力：430,000吨/年
可回收垃圾年分解能力：有机物36,400吨，纸8,400吨，玻璃5,600吨，金属5,600吨，其他800吨。

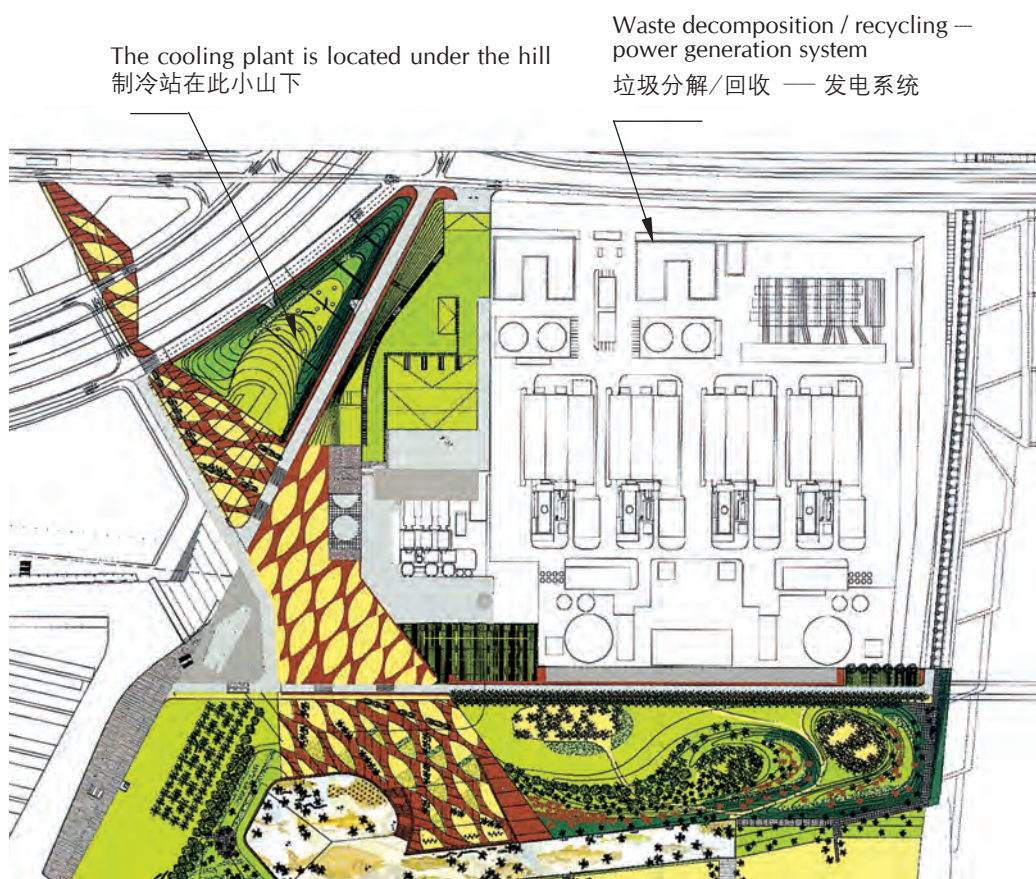
区域空调

尽管论坛区建有4万kW的电厂，可谓电力充沛，但巴塞罗那政府却选择不以电为能源的溴化锂非电制冷机，为论坛建筑提供空调。

使用的能源是能源再生工厂、污水处理工厂的热能，以及联合循环电厂的废热，这种先进的、大规模的废热制冷系统，在西班牙是首次采用，意义极为重大。

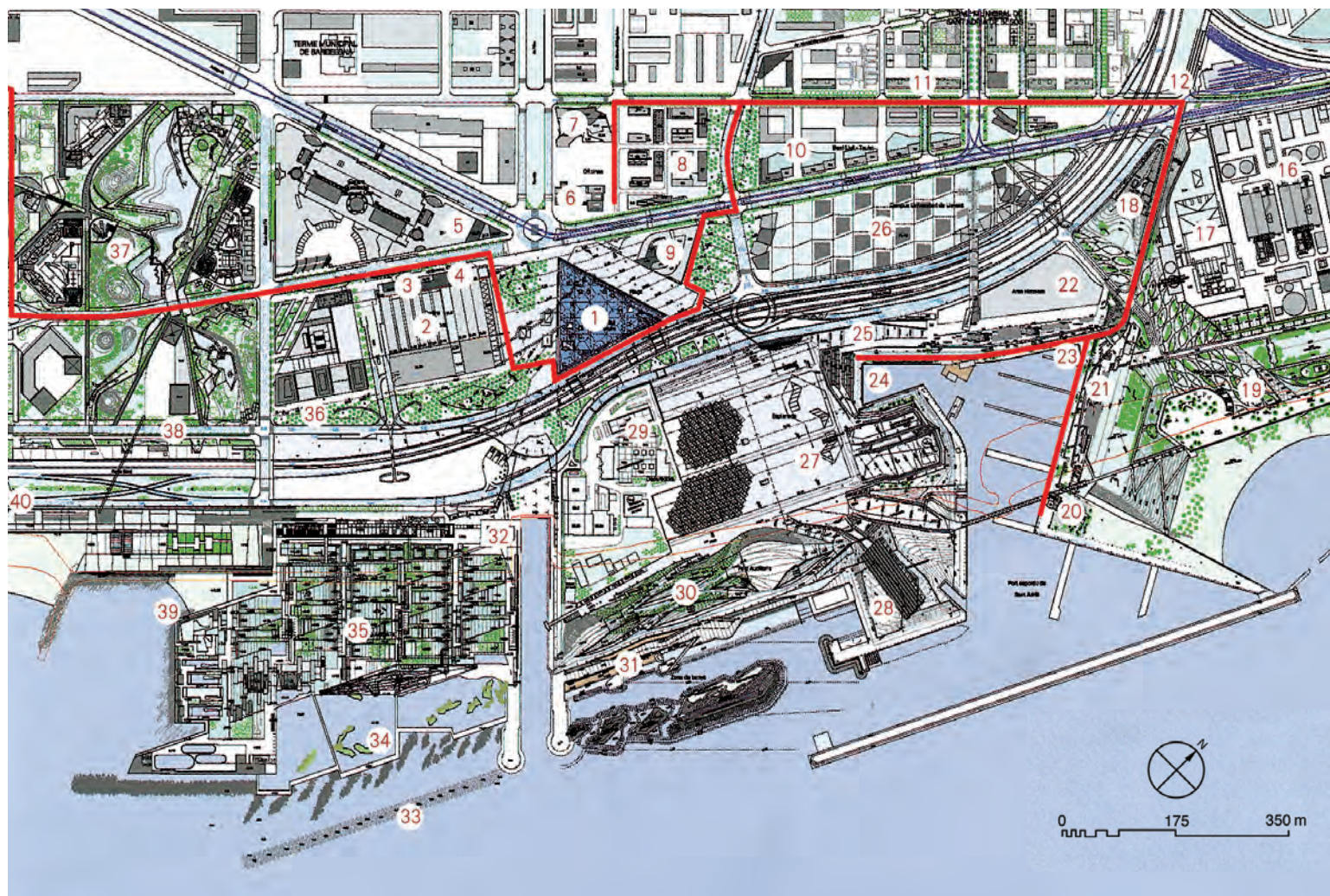
据测算，冷热站可满足该区域内全部公共建筑制冷、制热和卫生热水的需求。因此，可减少二氧化碳排放，降低污染。同时也有助于降低蒸汽电厂的噪音。

通过对废热的利用，可降低论坛区一次能源消耗32%。



This district cooling & heating system of Forum area serves tens of buildings and tens of thousands of people.

论坛区空调系统为数十幢建筑、数万人服务。



Red lines indicate the main pipes of the District Cooling & Heating System

Facilities using District Cooling & Heating System

红线为区域空调主管道

区域空调使用建筑

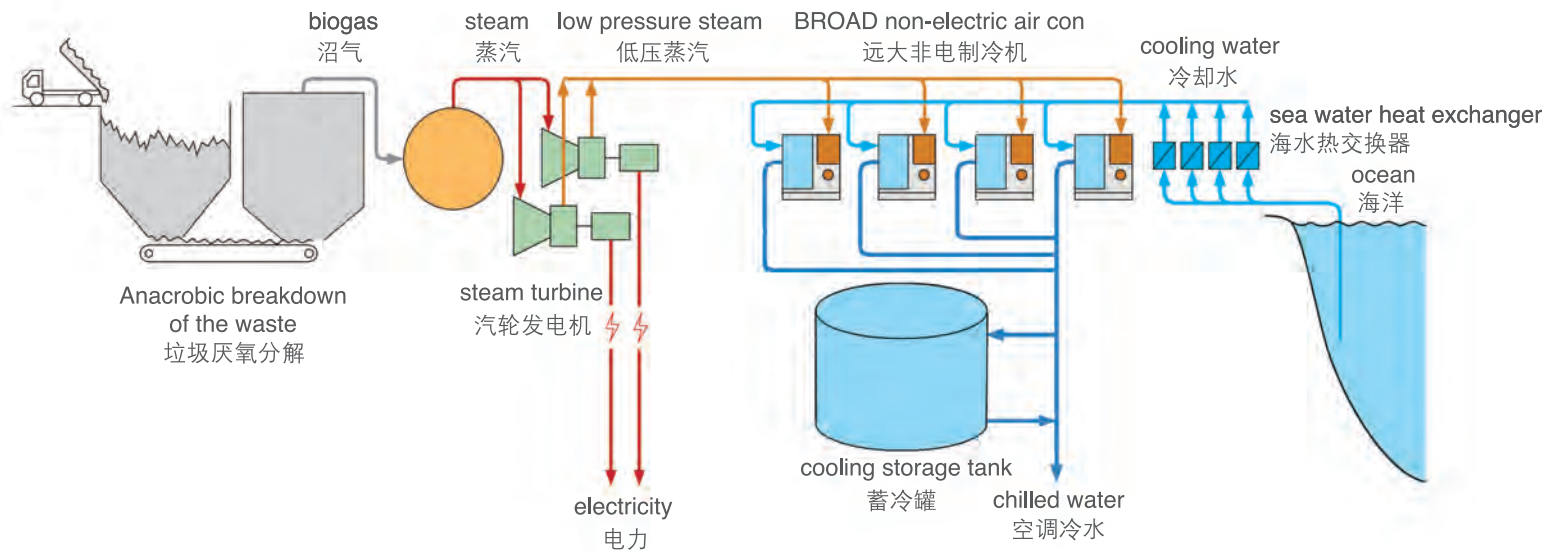
1. The Squares and the Building of the Forum.
2. The Exhibition Center
3. The Office Building (CZN)
4. AC Hotel
5. The Princess Hotel
6. Office Buildings at Diagonal - Prim
7. The Center of the Senior Citizens
8. Buildings at Llull-taulat
9. The Hotel of the Forum Squares
10. The Llull-taulat Residential Quarters
11. Road Infrastructures Llull-taulat Residential Area
12. Road Infrastructures Taulat Street/E. Maristany Brigde
13. La Mina
14. La Catalana
15. Regeneration of the Besòs River Bed (2nd Phase)
16. Power Plant
17. Ecopark
18. District Air Conditioning Machine Room (under the Grass Ground)
19. The Peace Park
20. Harbourmaster's Headquarters and Footbridge
21. The Walking Area and the Business Stores
22. Hotel Area

23. Marina of the North -East Zone
24. Marina of the South-West Zone
25. The Dry Seashore and the Parking Lot
26. The University City along the Coast of the North of the Mediterranean Sea
27. Forum Building and Forum Explanade
28. Marina Center, for Sailing and Underwater Activities
29. Sewage Treatment Plant
30. The Music Hall Park
31. Bathing Area
32. The Variety- Biology Hall
33. Recovery of the Marine Biotopes
34. Waterlands
35. The Ocean Park
36. Service Road Infrass. for Coast Belt Road / Mountain Side
37. The Diagonal Park
38. Park Garcia Faria
39. Zoo Area and Mova Mar Bella Beach Infrastructures
40. Service Road Infrass. for Coast Belt Road / Waterfront

1. 论坛大厦
2. 会展中心
3. 综合办公楼(CZN)
4. AC酒店
5. 公主酒店
6. 对角中心侧办公大楼
7. 老人中心
8. 约尔-塔乌拉特建筑群
9. 论坛广场酒店
10. 约尔-塔乌拉特居住区
11. 约尔-塔乌拉特居住区路政处
12. 塔乌拉特街/玛丽斯丹妮路政处
13. 拉米娜区
14. 拉加泰罗纳
15. 贝索斯河治理区(2期)
16. 发电站
17. 生态区
18. 区域空调机房(草坪下)
19. 和平公园
20. 港口总部及步行街
21. 散步区和商业店铺
22. AREA酒店

23. 东北区码头
24. 西南区码头
25. 干涸的海滨地和停车场
26. 地中海北部沿岸地区大学城
27. 论坛休闲区
28. 帆板及水下运动码头中心
29. 污水处理厂
30. 音乐厅公园
31. 海滨浴场
32. 生物多样性馆
33. 海洋生态治理区
34. 湿地沼泽区
35. 海洋公园
36. 海滨靠山路段路政服务部
37. 斜海公园
38. 加西亚 法里亚公园
39. 动物园及诺瓦玛贝拉海滩市政处
40. 海滨近海路段路政服务部

District Energy System Diagram 论坛区能源系统示意图



Features of the Air Conditioning System

The air conditioning system in the Forum complex is extraordinary. This model will be followed by cities around world concerned with sustainable design. Its technical details can be used as a reference for engineers from different countries. The main characteristics are as follows:

1. The utilization of waste energy:

After waste is collected in Barcelona, the system anaerobically generates biogas from the decomposing waste.

2. Waste heat power generation:

The high pressure steam produced by burning trash drives a steam turbine to supply electricity to the Forum district and city power grid.

3. Cooling by waste heat of power generation:

The high pressure steam becomes low pressure steam (0.6-1.0Mpa) after driving the steam turbine and enters the LiBr non-electric chiller for cooling. During this process, the non-electric chiller not only utilizes waste heat to generate steam, but it also reduces the outlet pressure of the steam turbine and thus improves the steam turbine's efficiency. In conventional turbine generators, heat from low pressure steam must be emitted to the atmosphere through a cooling tower, which leads to heat pollution.

4. Cooling use sea water :

The system pumps 24°C sea water through a Titanium alloy heat exchanger to take the heat away and then become 30°C water. This substitutes for the use of a traditional cooling tower with its unpleasant appearance and resultant heat pollution. The system thereby minimizes the cooling tower space, lowers cooling water temperature and improves cooling efficiency.

5. Machine room:

The roof looks like a hill. The edge of the roof is on the same level as the ground and is covered with soil and lawn, providing a place for public entertainment, which is harmonious with the surroundings.

6. District cooling & heating system:

The energy center supplies cooling and heating to all the surrounding buildings, which meets the air conditioning requirements for meetings, exhibitions, hotels, colleges, hospitals, supermarkets and residential buildings. Application of this heat recovery air conditioning makes the Forum district perfect example of a sustainable community in this world.

空调系统特点

论坛区空调系统是一个传奇，它的模式值得全球所有城市效仿，技术细节值得各国工程师借鉴。主要特点如下：

1. 垃圾利用：将巴塞罗那市区收集的垃圾进行厌氧分解（不需氧的分解），产生沼气。

2. 废热发电：垃圾产生的燃气加热蒸汽锅炉，驱动发电机，向论坛区及城市电网供电。

3. 发电余热制冷：高压蒸汽发电后衰减为低压蒸汽（0.6~1.0MPa），被引入非电制冷机加热溴化锂溶液，进行制冷。

在这段循环中，非电制冷机既利用了蒸汽余热，又帮助汽轮机降低了尾部压力，提高了汽轮机效率。而在传统汽轮发电机系统中，低压蒸汽的热量需要被冷却塔排放到大气中去，反而造成热污染。

4. 海水冷却：该系统没有采用惯常的冷却塔来释放热量，而是将附近的24°C的海水泵入钛合金热交换器，交换出30°C的冷却水。这样做既避免了冷却塔的热污染及不美观，又节省了冷却塔占地，且降低了冷却水温度，提高了制冷效率。

5. 草坡机房：房顶呈山状，边沿与地面一样高，上面盖土、植满草皮，形成一座供人休闲娱乐的小山包，与周围景观融为一体。

6. 区域空调网络：这个能源中心向周边建筑提供空调冷热源，满足了会议厅、展厅、酒店、大学、医院、超市、住宅楼的空调需求。由于使用废热空调，使论坛区成为当今世界最完美的社区。



Chillers Leading the World's Future Technology

To realize one of the Forum themes-sustainable development (environmental protection), the architects decided to use lithium bromide non-electric chillers, which do not use electricity, freon and other substitutions, at the Forum site.

To make the project quality and energy efficiency achieve cutting-edge levels of performance, in selecting chillers, the construction company decided to choose only the best technology, equipment and company.

After almost one year research by more than 10 experts, they finally chose BROAD as the sole supplier of non-electric chillers for the Forum Complex.

The organizer of the Forum 2004 stated that there were two major gifts from China:

- 1) "Warriors in Xi'an" which represents China's ancient civilization.
- 2) Broad Air Conditioning, which is a world leader in energy efficiency technology.

In Barcelona, BROAD products combine Oriental wisdom with Occidental technological advancement.

Thousands of visitors formed a long queue in front of the exhibition hall of "Warriors in Xi'an". To ensure that all visitors could appreciate exhibits closely, only 1,000 people were allowed to enter the exhibition hall per hour according to the press.

BROAD non-electric chillers, which were not displayed to the public, have however become the focus of many Spanish and other European media outlets. The chillers have been touted as "the Future of Development of European Air Conditioning Systems - a classic blend of the environmental consciousness with economy".

引领世界未来科技的空调产品

为了实现论坛三大主题之一——环境保护，区域空调建设方一开始就决定采用不需电、不需氟利昂及其替代品的空调设备——溴化锂非电空调。

建设方为了使论坛区工程质量及能源效率达到世界顶尖水平，在选择制冷主机设备时，决定抛开其他因素，选择世界第一水平的公司及产品。数十位专家经过将近一年的考察和论证，最后选中远大作为论坛区非电空调设备的唯一供应商。

论坛组织者宣布，这次论坛有2个亮点来自中国：一个是代表中国古代文明的西安兵马俑，一个是引领世界未来科技的远大空调。

在巴塞罗那，远大将东方智慧与西方文化焊接在一起。



西安兵马俑展厅前排队等候参观的人排成长龙，场面十分壮观。为了保证每个参观者都能近距离欣赏展品，每小时只允许1000人进入展厅。

远大制冷机不可能对外公开展示，但却成为不少西班牙及欧洲专业媒体争相报道的对象，被称为“欧洲空调发展的方向，经济与环境协调的典范”。



MADRID SETS A NEW STANDARD FOR WORLDCLASS AIRPORT DESIGN

马德里，树立全球机场设计新标准

Airport Dreamscape

On December 16,1999 the Spanish government announced expansion plans for Madrid Barajas Airport. International conferences, business travel and tourism sponsored or held in Madrid in the past decade have increased fourfold. In December 2003, Spanish Prime Minister Jose Maria Aznar cut the ribbon, opening the new airport one year earlier than planned. It seemed that the people of Madrid could not wait any longer. They were truly eager to see and use this dreamlike airport.

This is an airport of beauty and comfort boasting the highest check-in efficiency.

This is also an airport with the lowest energy consumption and maintenance cost.

English architect Richard Rogers and many other world-class airport designers, architects, structure engineers, mechanical engineers, HVAC engineers, energy and environment experts had made the dream of Madrid's people come true.

The project consisted 700,000m² of new terminal buildings, two new runways and support facilities cost 4.4 billion Euros in all. This has made the airport located in the 16 km east of Madrid one of the largest aviation centers in Europe. Europe's other three large aviation centers are in Paris, Frankfurt and London.

Expansion Project

	Before	Newly
Traffic per year	+ 25M	+ 70M
Traffic per hour	7,500	18,000
Area	198,000m ²	940,000m ²
Gate positions	35	+ 104
Parking lot spaces	9,050	21,800
Runways	2 runways	4 runways
Takeoffs&landings/hour	53	120

New Terminal Buildings

Area	470,261m ²
Public area	150,276m ²
Business area	20,967m ²
Office and repair department	299,016m ²
Mobile area and service dypass	64,149m ²

梦幻机场

1999年12月16日，西班牙政府公布了马德里巴拉哈斯机场扩建计划，在马德里举办的国际会议和进行公干旅游在最近10年里增长了4倍。2003年12月西班牙总理阿斯纳尔为新机场落成剪彩，比原定计划提早一年。看来，马德里人等不及了，他们急于看见自己梦想中的机场：

一个美观性、舒适度、登机效率最高的机场，一个能源消耗、保养成本最低的机场。

英国建筑师理查德·罗杰斯，以及众多世界一流的机场设计师、建筑师、结构工程师、机电工程师、暖通空调工程师、电气工程师，和能源、环保专家帮助马德里人实现了梦想。

新建候机楼约70万m²，加上新建的2条跑道及辅助设施，总耗资44亿欧元。使得这座位于马德里东郊16公里的机场，成为欧洲4大机场之一。其他3个分别在巴黎、法兰克福、伦敦。

扩建工程

	之前	扩建后
年接待能力	2,500万人	7,000万人
每小时接待能力	7,500人	18,000人
占地面积	198,000m ²	940,000m ²
机位	35	+104
泊车位	9,050	21,800
起飞场	2条跑道	4条跑道
起降操作/小时	53	120

新建候机楼

主体面积	470,261m ²
公共场所	150,276m ²
商务场所	20,967m ²
办公室和维修部	299,016m ²
机动区和服务通道	64,149m ²





Sunshine, Power, Cooling

Where does the greatest charm lie in this amazing 700,000m² Terminal Building?

The sun through the huge glass dome shines on every corner in the New Terminal Building, replacing many electric bulbs and bringing warmth in winter.

In summer the air conditioning is driven by the waste heat from natural gas power generators at the airport and uses zero-pollution refrigerant agent (LiBr + water) .

A Madrid Airport energy company called for a global bidding process and selected 6 BROAD mega-sized non-electric chillers only.

Why BROAD? BROAD chiller's COP (cooling coefficient performance) tops that of all other manufacturers in the world.

阳光 · 电力 · 冷气

这座梦幻机场70万m²的候机楼奇妙之处仅仅是外表吗？不，马德里机场拥有强劲的内在机能。

阳光透过巨型玻璃圆顶射入候机楼的每一个角落，替代了许多照明电力，并为冬季带来温暖。

而夏季空调的能源，则来自机场自备的天然气发电机排出的废热，并采用零污染的冷媒（溴化锂+水）。是一幢名副其实的绿色建筑。

马德里机场能源公司通过全球招标，选中远大作为机场6台大型非电制冷机的唯一供应商。

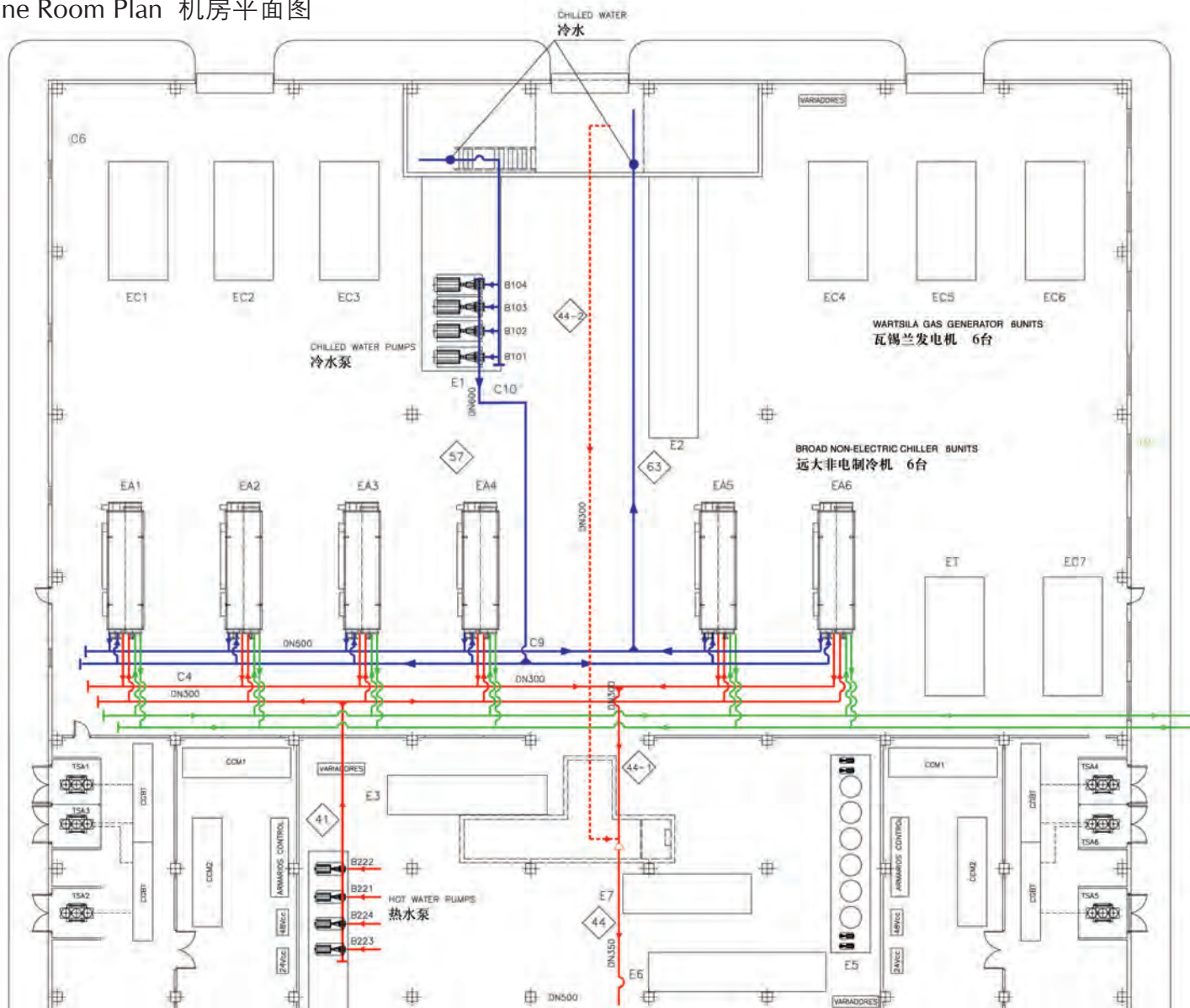
远大中标理由是：产品的制冷效率遥遥领先于全球同行业。





Power generation waste heat as the sole energy source of BROAD non-electric air con satisfies the air conditioning needs of this 700,000m² airport.
发电废热作为远大非电空调的唯一能源，满足这座七十万平米机场的空调需求

Machine Room Plan 机房平面图



Unconventional Spanish HVAC Engineers

BROAD products are operating in more than 30 countries today. When service engineers in those countries get together, they may discuss project design approaches unique to their respective country. As years have passed, BROAD engineers have drawn a unanimous conclusion as follows: South Asian project designs are simple with less automation devices, regardless of operation cost; Americans design very practically, for automation(it should be termed informatization)'s sake they do not care about the cost at all, on the other hand, cooling water pipes are not usually painted, without wasting even one additional dollar; Germans focus on long life design and even use stainless steel for cooling water pipes; However, Spaniards are always trying to be unique.

If you look at Spanish project design at first glance, you will notice – some complex points are too simple – what can not be done is asked to be done – what should not be done is done with too much money or time – yet if you have learned that inside out, you will be surprised at the fact that Spanish engineers are serious perfectionists! They never care what designers have done before them nor what other countries have implemented, what they care about is the perfection they themselves have envisioned in their own imaginations.

Let us take an air conditioning project for example, Spanish HVAC engineers always rack their brains to determine energy quality, invest in energy efficiency (including waste heat) at all cost and pursue precision temperature control, which seems almost impractical. Piping and control systems are always designed to be different, not even two similar systems can be found (while most American air conditioning projects are the same).

Regardless, their drive for perfection has been somewhat achieved. Not even one air conditioning projects we mentioned, designed by a Spanish HVAC engineers, has failed to achieve their projected goals, not even one project has failed to save energy and reduce operating costs. These projects, like Madrid Barajas Airport roof, are magnificent and meticulously done.

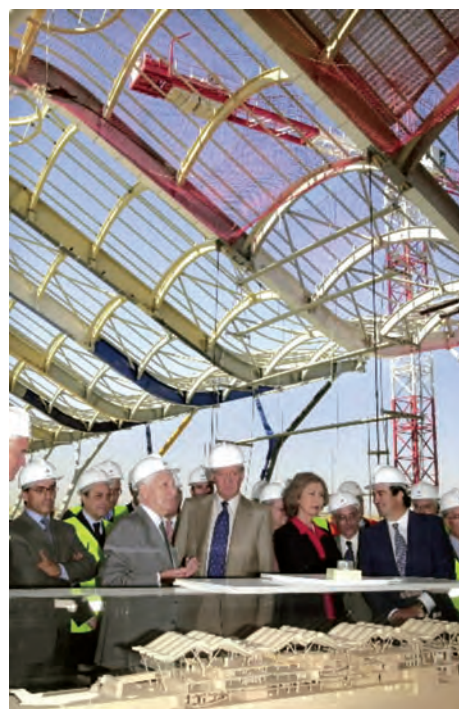
标新立异的西班牙空调工程师

远大产品已经销往全球30多个国家，服务于各国用户的工程师们聚在一起时，会讨论到各国工程设计的特点，几年下来，大家形成了接近一致的看法：南亚工程设计简单，少有自动化装置，不注重运行成本。美国工程设计务实，为自动化(应该称之为信息化)不惜血本，但却不给冷却水管道刷漆，一分钱也不多花。德国工程设计追求长寿，甚至用不锈钢作冷却水管道。而西班牙工程设计，总是标新立异。

初看西班牙工程设计，似乎该复杂的地方太简单，做不到的事他偏要你做，不该做的东西却破费太多的钱和精力。但你如果想透了，会惊奇地发现，西班牙设计师是100%的完美主义者！他们从不看前人是怎么做的，不看别的国家是怎么做的，只求自己想象中的完美。

比如空调工程，西班牙HVAC工程师对于能源品种的选择总是绞尽脑汁，对能源效率(包括废热的效率)不惜代价地投资，对温度控制精确度的追求近乎不现实。而管路系统、控制系统总是别出心裁，没见过两个类似的系统(而美国的空调工程多数是千篇一律的)。

不过，完美终究是完美。我们做过的西班牙空调工程，几经周折，最终都实现了工程师的怪想法，都达到了节能、节省运行费用的目标——控制精确、计量精细，每一点效果、每分钱能源都不放过。一如马德里机场的屋顶，气势恢弘而丝丝入扣。





GREEN ENERGY RESTRUCTURES THE U.S.A.

June 14, 2004 witnessed the ribbon-cutting ceremony of an advanced cooling, heating and power (CHP) plant featuring a BROAD chiller. The event was co-hosted by the U.S. Department of Energy (DOE), the City of Austin and Austin Energy Company. Austin Mayor William Wynn is pictured above (holding the oversized scissors) with other dignitaries opening the CHP plant.

This CHP plant is one of seven high efficiency projects awarded by DOE in 2001 following President George W. Bush's National Energy Policy. Remarkably, BROAD non-electric chillers are featured on the largest three of these seven projects sponsored by DOE.

绿色能源 改造美国

The Austin project is noted for its advanced modular design, producing 4.5 MW of electricity and also having the largest single non-electric chiller ever installed in America at 8,792 kW (2,500 RT). And also it is the biggest green construction project in America.

The chiller uses 100% exhaust energy from a gas turbine generator for cooling operation, saving natural gas 3 million cubic meters for customers annually.

The project appears complicated, but its key technology is the exhaust chiller which is easy for BROAD to manufacture. So far, BROAD is the only company capable of producing exhaust type chillers in the world.



2004年6月14日美国能源部，奥斯汀市政府及奥斯汀能源公司，共同举办了远大冷热电联产项目剪彩仪式，图中双手握剪者是奥斯汀市长维尔·威恩 先生。

这个冷热电联产系统是2001年美国能源部的7个高效能源项目之一，这些项目是遵循总统乔治·布什的国家能源政策而设立的。值得一提的是，远大独具非电制冷技术优势，占了能源部资助的7个项目中最大的3个。

本项目还因其先进的模块化设计而闻名，生产4.5兆瓦的电力及8.92兆瓦的冷量，是美国目前安装的最大的单台非电制冷机，并且是全美最大的绿色建筑项目。

本项目中，涡轮发电机尾气100%来制冷，每年为用户节省300万 m^3 天然气。

本项目看似复杂，其实，关键技术是尾气制冷机，对远大来说，是比较简单的。迄今为止，远大是全球唯一具有生产该类尾气制冷机能力的企业。



gas turbine, U.S.A.
美国涡轮发电机

BROAD non-electric air con driven by power generation exhaust gas serves the buildings of hundreds of thousand square meters in Austin CBD.

利用发电废热的远大非电空调，为奥斯汀商务区数十万平米建筑服务

Officials and experts' comment on BROAD

官员及专家对远大的评价

Ron Fiskum
(Integrated Energy Systems Technical Manager
Energy Efficiency & Renewable Energy
US Department of Energy)

This is BROAD USA. That's what we call it here in America, in New Jersey. This is the biggest chiller we've had in the United States and it's tied on to a major-sized turbine—a 4.5 MW turbine - and we take in the waste heat from that turbine and we power this chiller. And this will supply cooling and electricity to the part of the Domain establishment here, and we want to thank BROAD very much for their participation in the program. They probably make one of the best chillers in the world. They make only chillers, they don't make anything else but chillers, from 4-ton all the way up to 6000-ton.

罗恩·费斯科姆
(美国能源部 高效能源与可再生能源、综合能源系统 技术经理)

这是远大美国。在美国，在新泽西，我们这样称呼的。这是美国最大的冷水机组，并与一台4.5兆瓦的大型涡轮机相连，利用涡轮机的尾气作为机组的能源，为多蒙部分地区提供制冷和电力。在此，我们非常感谢远大公司参与了该项目。他们生产的机器也许是世界上最好的冷水机组之一。他们只生产冷水机，不做其它产品，制冷量从4冷吨直到6,000冷吨。

我们非常幸运能够在奥斯汀拥有一台这样的机组。作为一项开创性的技术我们对它寄予厚望，我们希望看到该技术能够在全世界得到推广，因为这项技术代表着未来。它洁净、环保，降低排放，将大幅度节省能源。我们十分感谢远大与奥斯汀能源在该项技术上的合作，我们期待取得巨大的成功。

问：您认为该机组的质量如何？

答：噢，我认为它是一流的。我说过它是全球最好的，不是吗？

And we are lucky enough to get one here in Austin. And as the first for this type of technology, interface, we are hoping for the best, and we hope to see this being duplicated and triplicated throughout the world because this technology is the future, and it's clean, the environment is going to be totally assisted, we will reduce the emissions and our energy savings on this, if things work, possibly will be very huge and very good. So, we are very thankful for BROAD for being a partner in this technology and with Austin Energy. We are hoping for a very big success.

What do you think about the quality of the chiller?

Oh, I think it's A-1. I told you it's the best in the world, did I not?

Cliff Braddock, CEM
(Director Energy Business Development
Austin Energy)

Ok. Hi! I am Cliff Braddock with Austin Energy, that's the city of Austin, Texas Municipal Electric Utility. I am really pleased today that we are introducing to the USA - to the world - the first application of a turbine whose entire exhaust is captured in the form of this 2500-ton absorption chiller, 2500 tons, free cooling, 45 degree Fahrenheit, chilled water available to serve our district energy system located outside the walls to my left.

And so standing beside this wonderful chiller gives you a sense of awe and appreciation of what we have come to expect - very high quality delivery of chilled water service year round, 365 days per year. And we are very excited that emissions will be reduced because of our output-based emission standard that we have in Texas. So, with this chiller we are not going to be operating probably the equivalent of 2500 kW of electric chillers. So, perhaps this is a wave of the future. Stay tuned and we hope to see more of this replicated, perhaps a little bit larger, hopefully a whole lot smaller. It could be used for hospitals, hospitality suites, convention centers, office buildings.

So, it's a great day in the U.S.A for energy efficiencies.



Ron Fiskum is one of the chief in DOE who are in charge of the distributed energy and CHP project

罗恩先生是美国能源部分分布式能源及冷热电联产项目的主要负责人之一



克利夫·布拉达克
(奥斯汀能源公司 能源业务发展总经理)

大家好！我是来自奥斯汀能源的克利夫·布拉达克。奥斯汀能源公司是德州奥斯汀市的电力部门。我很高兴今天能向全美国、全世界介绍一个首创性的应用项目：一台索拉涡轮机的所有尾气全部为一台2,500冷吨的吸收式空调所利用，提供2,500冷吨的免费制冷，45华氏度的冷水可为位于我左边墙外的分布式能源系统服务。

站在这台神奇的机组旁敬畏之情油然而生，同时你会感激它实现了我们期盼全年365天高质量冷水供应的服务。而且令人兴奋的是由于我们德州实施了限制气体排放量的政策，气体排放量将会减少。所以，有了该机组，我们相当于替代了2,500千瓦的电空调，这也许是未来的一个发展趋势。我们希望能看到更多这样的项目，也许更大规模，也可能整体规模会小一点。它可用于医院、社交场所、会展中心、写字楼等。

因此，这对美国能源效率而言，是伟大的一天。

Pat Hoffman
(Acting Program Manager
Distributed Energy, Energy Efficiency & Renewable Energy
U.S. Department of Energy)

The Department of Energy is very pleased to be involved in the partnership between BROAD, Solar Turbine, Burns & McDonnell and Austin Energy in this integrated CHP system. CHP is the wave of the future and it is very important to utilize the waste energy in the United States, with the BROAD chiller, to maximize the use of energy conversion efficiency. So we are very proud to be a part of this partnership.

帕特·霍夫曼
(美国能源部 分布式能源、高效能源与可再生能源 执行经理)

美国能源部非常高兴能与远大、索拉公司、彭斯和麦克唐纳公司及奥斯汀能源在这个综合冷热电联产项目上合作。冷热电联产是今后的发展趋势，使用远大的机组充分利用美国的废热，使能源转换效率最大化，这些都是十分重要的。作为合作成员之一，我们感到很自豪。



Pat Hoffman is the person in charge of distributed energy, CHP and energy efficiency project in DOE. 帕特女士是美国能源部分布式能源及冷热电联产、高效能源项目的主要负责人

Bob DeVault
(Program Manager
Cooling, Heating & Power
Oak Ridge National Laboratories)

This BROAD absorption chiller is the first of its kind in the world that would use what otherwise would be wasted energy from a gas turbine to produce chilled water, and we expect that in the next 20 or 30 years this kind of product, instead of being one of a kind, would become a major mainstream product throughout the world.

勃布·德·沃特
(橡树岭国家实验室 冷热电联产部 项目经理)

这台远大吸收式制冷机是世界第一台此类产品，利用燃气涡轮机的废热来制造冷水。我们期望在今后20或30年此类产品将不仅仅只是众多空调产品之一，而是成为世界的主流产品。



Richard Sweetser
(President
Exergy Partners)

I'm standing in front of a 2500-ton chiller made by BROAD Air Conditioning, in Changsha, China, and what you are really looking at is something that takes advantage of the waste energy exhaust gas from a gas turbine, a 4.5 MW Solar turbine, and turns it into chilled water. And if you look closely at this particular device you will notice it is rather large.

For the 2500-ton chiller is large, but if you look even closer you can look and see a very fine product. You are going to see good welding; you are going to see beautiful fit and finish; you are going to see perpendicularity and parallelism; all in all, this is quite a product. It's the first of its kind in the US as far as being able to use turbine exhaust and turning it into chilled water. But it is also quite a good piece of equipment. It's something that the partnership between BROAD in China and Solar Turbines in San Diego has gone a long way to help in reducing our imported oil, our natural gas situation, as well as, making our energy grid a little bit more reliable.

理查德·史威泽
(Exergy Partners 公司总裁)

我现在正站在一台制冷量为2,500冷吨的制冷机前，该机组由中国的远大空调有限公司生产。你们所看到的正是利用4.5兆瓦索拉燃气涡轮机产生的尾气废热来制造冷水的机组。如果走近这台特殊设备，你会发现它相当的庞大。

这是一台2,500冷吨的大型制冷机，但是如果你再走近些观察，你会发现这是一件工艺精湛的产品：焊接可靠；外观优美；线条清晰。总之，这真是件杰出的作品。这是美国直接利用涡轮机尾气制造冷水的第一台机组，的确是一台好设备。它是中国远大和圣地亚哥的索拉公司合作的产物。它帮助我们大幅度减少了石油和天然气的进口，让能源网更加可靠。





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