



# BROAD PAVILION

COME TO LEARN AT THE BROAD PAVILION



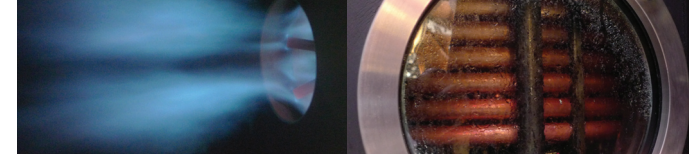
## What is the biggest exhibit in the Shanghai Expo? BROAD non-electric central air conditioning.

Below is the Expo map with red spots indicating the 22 BROAD non-electric central air conditioning machine rooms, which provide central air conditionings to all 200 Expo pavilions.



## How can fire create cooling?

A small sized, non-electric air conditioner provides cooling to the entire BROAD Pavilion, and doubles as a demonstration site, where visitors are free to witness the process of creating cooling with fire: watch the flame from the burning natural gas, feel the 7°C refrigeration water flowing inside tubes. Since non-electric central air conditioning's main principle is to directly change heat into cooling, it can be 2 times as energy efficient as traditional electric air conditioning as it avoids energy losses from traditional electric air conditioning's five energy conversions required to produce cooling. At the Expo, Broad non-electric air central air conditioning reduces 73,000 tons of CO<sub>2</sub> emission, realizing the Low Carbon Expo concept. BROAD non electric central air conditioning reduces the CO<sub>2</sub> emissions of more than 70 countries around the world.



## What is the biggest exhibit in the BROAD Pavilion? The building itself.

Rome wasn't built in one day, but the BROAD pavilion has stood up in one day. From the 3 minute movie, visitors can see that on March 6, 2010 BROAD built this 6 floor, 2000m<sup>2</sup> building, including external walls, windows, floors and roofs, in 24 hours. All components were factory made and assembled by bolts, without traditional civil engineering and decoration. This is one miracle in human history, but a much bigger miracle is the "965201"

Level 9 Earthquake Resistance: diagonal bracing structure, light weight, steel construction, passed level 9 earthquake resistance testing

6x Less Material: even though the construction materials are much lighter(250kg/m<sup>2</sup>) than the traditional materials(over 1500kg/m<sup>2</sup>), the floors and walls are solid with surefootedness, airtight and sound-proofing

5x Energy Efficient: 150mm thermal insulation for walls and roofs, triple glazed plastic windows, external solar shading, heat insulation, fresh air heat recovery, LED lighting, yearly HAVC A/C energy consumption equivalent to 7 liters oil.

20x Purification: after 3 levels of purification, the purification efficiency for fresh air reaches 95%-99.9%; air exchanged 1-2.5 times per hour, and indoor air is 20x cleaner than out door air

1% Construction Waste: all components are factory made, construction waste, mainly package materials, result from on site set-up only and amount to 1% of the total weight of the building.

This is the first building in human history which combines almost all environmental friendly, comfortable and secure elements. So, we call it: Sustainable Building.

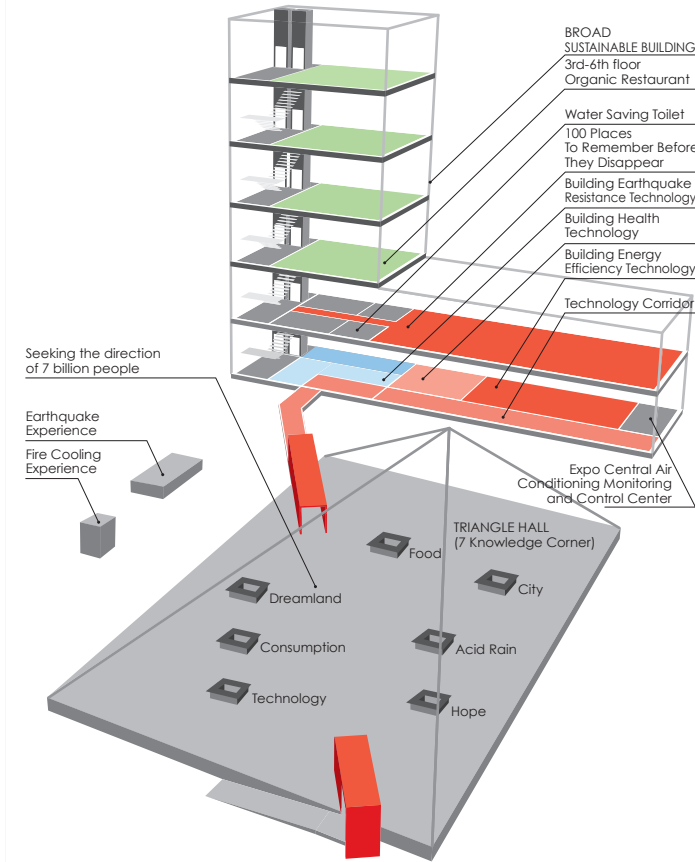
## What is the most impressive exhibit in the BROAD Pavilion? The Earthquake Experience Room.

This is an earthquake simulate device, and it can imitate the strength, direction and length of the Wenchuan, and the Yushu earthquake. Each time the room can hold 30-40 people, and our goal in creating this Earthquake Experience Room is to show attendees the signs and results of earthquakes and increase earthquake resistance design experience for architects.



## What is the most dazzling exhibit in the BROAD Pavilion? The multi-media pyramid and 4D globe.

Under the huge sky of the pyramid, visitors will experience all walks of life: one second they are in outer space staring down at climate change on earth and in the next second they are standing in an intersection in a metropolis. Visitors will discover the future of the world while buried deep within the crowd of 7 billion people.



BROAD Pavilion Address:  
Gate 3, Puxi Section,  
Shanghai World Expo site  
Tell: 86-21-33301588  
Fax: 86-21-33301  
E-mail: expo@broad.net

BROAD Air Conditioning Address:  
BROAD Town, Changsha,  
Hunan, China  
Tell: 86-731-84086688  
Fax: 86-731-84610087  
www.broad.com



For the sake of the forest, those who have no plans to keep the materials are welcome to return them to us.



## What is the main mission of the BROAD Pavilion? To spread important knowledge through exhibits and experiences to everyone.

### Earthquake Resistance Technology

On May 12th, 2008, an earthquake struck a remote region of China and took 90,000 people's lives. It would be too dreadful to image the results if that earthquake had happened in a large city. We can easily realize the highest earthquake-resistant level for buildings - level 9 earthquake resistance - by adopting light steel construction, diagonal bracing structures and weight reduction technologies.

### Health Technology

WHO verifies that 68% of human diseases are related to indoor air pollution, and the American EPA writes that indoor air pollution is on the top of the list of the 18 most cancerogenic substances. With enough ventilation and filtration, we can eliminate indoor air pollution.

### Energy Saving Technology

More than half of the energy in the world is consummated by buildings, but with thicker thermal insulation for walls, triple glazed plastic framed windows, exterior solar shading and fresh air heat recovery, we can save 80% of the building energy consumption.

The point is, all of these methods are easy to apply with very low cost. Then why they are rarely be adopted? This is the key to the question. Please visit the BROAD Pavilion with a mood of thinking instead of looking for novelty.



## Earthquake Resistance Technology Experiencing Hall

This hall reflects an actual scene of the 5.12 Wenchuan Earthquake in 2008. Mother was yelling "Honey, hurry to take mommy's hand". But the child had already left this world... Only by remembering the catastrophe that killed 90,000 people can mankind attach the importance to earthquake resistance building design. Now, let's see what BROAD has done in this respect.

Here is the test report from the China Academy of Building Research. It testifies that the BROAD-developed sustainable building can sustain a magnitude 9 earthquake. Until now, this is the only magnitude 9 earthquake resistance tested building in China. BROAD sustainable building realizes magnitude 9 earthquake resistance through four techniques.

**Steel Structure:** the whole building is a steel structure. Steel can't break abruptly.

**Slanting Support:** the damage from an earthquake is mainly from transverse thrust. No matter how stable the pillars in the building are, they can't resist transverse thrust. The slanting supports developed by BROAD weld the pillars and beams together. The whole building is protected by the slanting support, making the structure very earthquake resistant.

**Light Weight:** earthquake destructiveness = earthquake magnitude x building weight. The heavier the building, the more destructive it is. Therefore, weight reduction is a key to earthquake resistance. Stamp your foot on the same firm concrete floor. Our thickness is 3mm whereas that of traditional buildings 10mm - 20mm. Additionally, BROAD sustainable building with steel structure and light thermal insulation weighs 250kg - 300kg/sqm, which is only one sixth that of traditional buildings.

**Factory Fabricated.** Let's look at the integrated ceiling and upper building which is over 30m long and 10m wide. They were all factory fabricated and transported to the site as one piece for installation. Only through factory fabricated products can standardization be implemented, can every building match completely with the earthquake resistance tested building. Up till now, BROAD sustainable building is the only factory fabricated building in the world; it has updated human history.



## Health Technology Experiencing Hall

In the eyes of this cancer patient we can see his strong desire to survive. How do we reduce the incidence of cancer? The priority lies in indoor air purification. For the American EPA (Environmental Protection Agency) proves: indoor air pollution is on the top of the list of the 18 most cancerogenic substances.

In order to purify indoor air, good ventilation comes first, as indoor decorations, furniture and textiles release formaldehyde, benzene and a dozen other carcinogens. Moreover, fresh air must be brought in and filtered for air outdoors contains heavy metals and other carcinogens from power plants, factories and vehicle emissions. In Europe, there are 10-20 thousand particles/liter in the air due to the strict emission control, but there are usually 200-300 thousand particles in Asia. Here three methods of air purification are displayed:

The most efficient method is an in house fresh air system. Fresh air is brought inside and filtered three times, and 95-99% particles are eliminated. Fresh air is brought into bedroom, living room, study, and vented outdoors from the wash room or kitchen.

Another simple method is to purifying the indoor air: BROAD air purifiers are equipped with electrostatic cleaners which can absorb particles tinier than human cells, with active carbon filters to absorb formaldehyde and other toxic gases and with CO2 sensors to monitor indoor oxygen deficiency. If the oxygen level is too low, it shows the indoor ventilation is poor.

The third method is using indoor units with electrostatic cleaners to purify indoor air while air conditioning is provided. At the BROAD Pavilion, BROAD developed fresh air units are installed, and the air in every room is 20 times cleaner than that outside air. What's more, air is changed thoroughly twice per hour. You are invited to smell it: air inside BROAD Pavilion is much better than that outside.





## Energy Conservation Technology Experiencing Hall

The male engineer is holding thermal wall insulation material and a triple-glazed plastic framed window with solar shade. The female engineer is holding the fresh air heat exchanger. With only these four items, a building can cut its energy consumption by 80%.

Triple-glazed windows are 8 times more energy saving than single-glazed windows. In Shanghai, triple-glazed windows are recommended.

Please touch the three walls. The 30cm insulated wall doesn't feel cold, the 10cm insulated wall feels cold and the wall without insulation feels very cold. 10cm insulation is recommended in Shanghai, which is 5 times more energy saving than a wall without insulation.

Let's look at these two persons on the snowfield. The man in ancient times is warming himself by a fire, but he is still shivering with cold. The man nowadays is lying in the sleeping bag, and he feels very warm. This indicates how important thermal insulation is.

Let's touch these four window frames. The plastic and wooden frames are not cold, but the aluminum frame is very cold. We should not continue to use aluminum for window frames.

Let's see the BROAD developed heat recovery fresh air unit. As an air heat exchanger is used, the fresh air and exhaust air are exchanged, recovering up to 90% of the heat in the air. Common exhaust fans, on the other hand, waste huge amounts of energy.

These energy-saving technologies adopted at the BROAD Pavilion make the Pavilion 5 times more energy efficient than a common building of the same size. Please pay attention to every room inside, as there are none of the frequently-used air conditioners on the walls. All we see is a small air outlet, the room is not hot at all.

Let's look at these energy-saving materials. They are not BROAD products and they are easily purchased in the market. Using these materials, construction cost is USD15 more/sqm, yet the saving is more than USD4 or 5/sqm/year, paying back the investment within 2 or 3 years.

Building energy conservation is not a hi-tech endeavor. The problem we face in making buildings energy efficient is that the building industry and residents don't know how important energy efficiency is. Thus, using our common building techniques, we don't feel good in the buildings and much energy is wasted. This is the greatest mistake mankind has ever committed.



## Monologue of the 4D human body showing pollution & cancer

When I was young, my lung was rather red. Now, I inhale unclean air everyday, and my lung has become black. Pollutants in the air are finer than human cells. They can enter the blood through the lungs and penetrate cells all over the body.

Smog from power plants, factories and vehicles contains heavy metals. Furniture and interior decorations contain chemical toxins. Once those are absorbed by humans, they get through every organ in the body. The more harmful toxins an organ collects, the more likely the cells of that organ might be turned cancerous.

