

## 綠色理想國度

## Greener, Cheaper, Better

Benefiting both stakeholders' interests and the planet, the advantages of energy-efficient buildings are starting to finally take hold in the Asian construction industry

高能源效益建築終於成功入主亞洲市場，轉變令人鼓舞，更造福整個建築業和我們的地球

Once the preserve of environmental activists, green practices are now entering Asian mentalities. Despite a belated start, Asian countries are prepared to address ecological issues, and perhaps even more seriously than other regions of the world. According to a survey carried out by Jones Lang LaSalle in cooperation with CoreNet Global and released in March 2008, "corporations in Asia Pacific are more pragmatic than those in the rest of the world about the costs of attaining sustainable real estate.

Twelve per cent of corporations in Asia Pacific versus only three per cent of companies across North America and EMEA are willing to pay double digit premiums to meet their sustainable real estate needs". One of the most interesting aspects of this evolution is the radical change of perception towards green practices. Only a few years ago, eco-conscious design was merely perceived as a constraining parameter whose chief advantage was to give a building an ethical plus. Today,

stakeholders are starting to see the economic benefits of sustainable developments — a simple realisation that makes a crucial difference and should significantly accelerate the adoption of green architecture in the next few years.

Directly linked to this practical approach, efficiency has become a key word. Borrowing from notions usually associated with business rules, a new thinking is emerging, paving the way for cost-effective solutions. Among green issues, energy consumption is, as a major source of greenhouse gas emissions and the main cause of climate change, the first one to tackle. Energy efficiency is not an entirely new notion, since the prospect of rarefied resources and increased costs led many countries to revise their strategies in the last decade. Policies thus shifted from a focus on the supply side — with the objective to secure energy — to a strategy of energy efficiency — with the intent to achieve a more rational utilisation of energy. In November 2007, a book titled *Building Energy Efficiency* was released by the Asia Business Council, which is a Hong Kong-based, independent association of chief executive officers from leading Asian companies and multinational corporations with major Asian operations. The result of extensive research, the book was published to increase awareness among policy makers and practitioners, and to demonstrate both the necessity and indisputable advantages of designing and implementing energy efficient buildings. According to Mark Clifford, executive director of Asia Business Council, "It's a no-brainer. It's four to six times cheaper to build a building right than to cool, heat, and light an inefficient building. If you get the kind of return on investment that most people say that they get, then there is a payback period of somewhere between six months and seven years. The question is, how do you take it from this theoretical policy level down to the practical level?"



Photo © Simone Giostra-ARUP-Ruogu

In Beijing, Simone Giostra and Partners' GreenPix-Zero Energy Media Wall is equipped with a photovoltaic system that transforms the building's envelope into a self-sufficient organic system, harvesting solar energy by day and using it to illuminate the screen after dark

Although the economic advantages of green designs and processes are clearly established, governments have a decisive role to play. "I think governments should work with both business and civil society. Building developers might have a different interest than that of a green NGO but this really is an area where we can all work together. With a modest increase in initial costs, you can end up with a very rapid payback period. As you raise the bar — through regulations or voluntary initiatives — and as more and more people start building and using green techniques, the costs fall dramatically until there are no additional costs. Simply because there is a lot of learning by doing on the part of everyone, designers, architects, and improvement in the materials supply chain."

Initiated by countries like Japan and Singapore, the Asian 'green revolution' was pursued by Korea, Taiwan, and Hong Kong — although, it is generally considered that the latter could do better. Significant evidence of Asia's step forward is China's recent interest in the issue. "A year and a half ago Hu Jintao started talking about climate change and China's responsibilities. It seems that there is a lot of serious work being done. Another thing is that China has a strong state; it may not be a strong state down at the local level but certainly at a national and regional level and in the big cities, it has a tremendous capacity for policy making,"

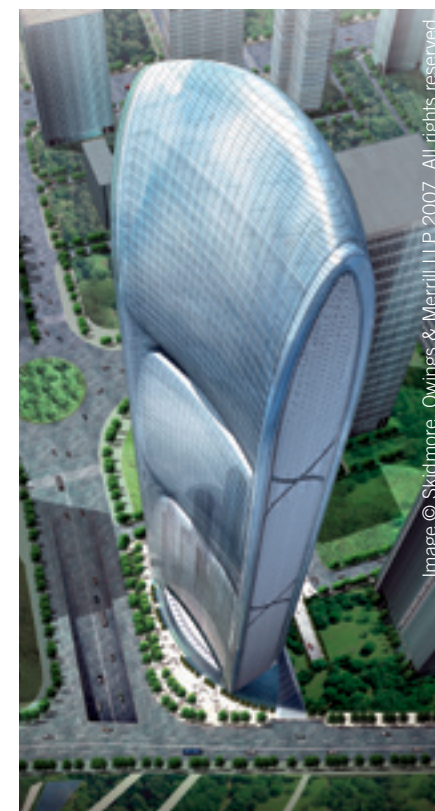


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SOM's 71-storey Pearl River Tower is expected to be the world's most energy-efficient supertall office tower upon completion

The façade of the Pearl River Tower features turbine inlets that harness prevailing winds and speed up the wind's velocity two-and-a-half times

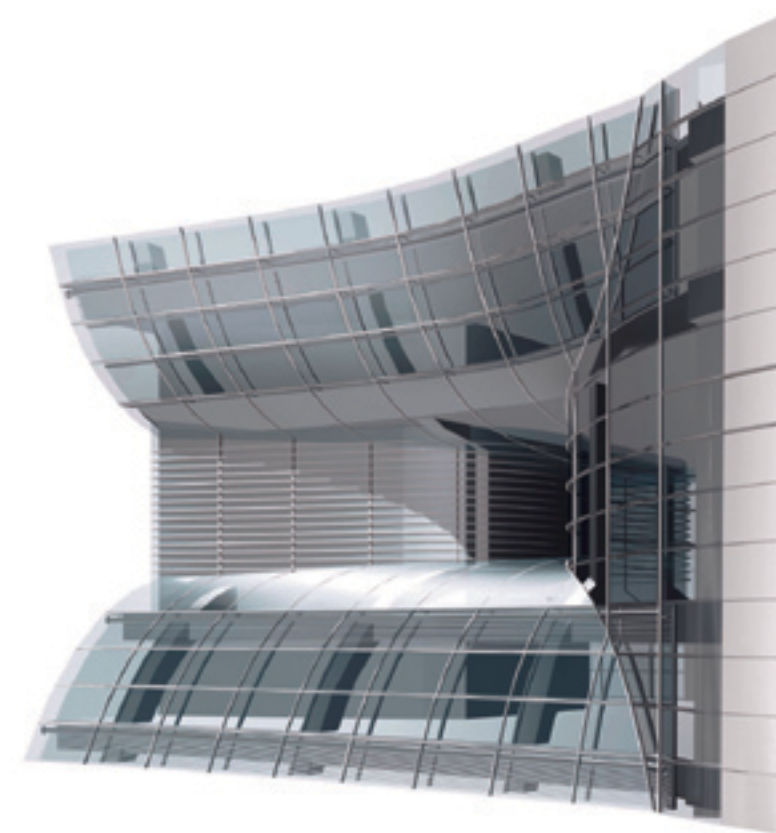


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**80%** Over 80 per cent of the nearly two billion sq-m of new buildings constructed each year

in China are categorised as high-energy buildings, consuming two to three times more energy per unit of floor space than those in developed countries

(Source: "Building Energy Efficiency: Why Green Buildings are Key to Asia's Future", Asia Business Council, October 2008)

says Clifford. "I'm optimistic about Asia. There is much greater sensitivity and concern for this than there would have been even two or three years ago. It's not as far advanced as Europe but it's moving in the right direction and it tends to be moving pretty quickly," he continues.

A perfect illustration of the energy-efficiency trend is SOM's Pearl River Tower in Guangzhou. When completed in 2010, the 71-storey building is expected to be the world's most energy-efficient super-tall office tower. Characterised by its sleek, aerodynamic shape, the Pearl River Tower was designed to make the most of the solar and wind patterns around the site. Combining a number of

highly innovative technologies, the building demonstrates the importance of an integrated design which maximises the capacities of its components through careful coordination, while ensuring a high degree of comfort for its occupants. The tower includes two vertical-axis integrated wind turbines which harness prevailing winds from the south and the north and generate energy for the heating, ventilation, and air conditioning systems. The building's curvilinear form helps funnel air through the turbine inlets. The Pearl River Tower also includes a dynamic high-performance building envelope featuring a photovoltaic system which transforms the sun's energy to usable AC



## X2

## Asia's share of global energy consumption doubled in 30 years

(Source: "Building Energy Efficiency: Why Green Buildings are Key to Asia's Future", Asia Business Council, October 2008)

current, and an internally ventilated high-performance double skin façade — complete with a triple-glazed façade incorporating external shades and automated blinds within the glazing cavity, on the east and west elevations. Other technologies such as displacement ventilation, radiant panel cooling, chilled beams, efficient air and water delivery systems, and optimised building management systems are complemented by a series of more classic measures such as maximising day-light or retaining rainwater for grey-water usage.

Although the Pearl River Tower is not a 100 per cent zero-energy skyscraper, it opens promising prospects. "Working on the Pearl River Tower certainly proved to me that 'Net Zero Energy' is very possible and I am sure I will see it built within a few years' time," says Roger Frechette, director in charge of Building Services and Sustainable Engineering at SOM. "The cost of such a project will likely be very high. This high cost will not be because of increased labour, advanced materials, or even from the use of cutting edge technology. It will be driven by the fear of the unknown and the perceived risk of deviating from the norm." If sophisticated materials or technologies can contribute to the creation of more efficient designs, by no means should they be seen as a panacea. "We often look for one technology to offset the negative impact of another technology. For example, the inclusion of elevators, electric lights, and electric typewriters created very warm buildings. Air conditioning technology was developed to offset the associated negative effects. Now we look for technology to offset the effects of air

conditioning...and so on. I think the message should be 'less is more'," he adds. Sensible, energy-efficient solutions may indeed be closer to us than we think — in our everyday life and habits.

Many specialists estimate it will take another ten years for eco-conscious practices to become mainstream in Asia. According to the Asia Business Council's report, "buildings use 30 per cent-plus of all primary energy in the world". It is easily concluded that widespread energy-efficient construction would have a tremendous impact on the global situation.

JDS Architects' Logistic City in Shenzhen comprises two towers — 1,111m and 666m high respectively — and a shopping centre. According to the architects, this massive urban intervention intends to "re-insert the mountain experience" and will "be used as a tool for reforestation in the city". Wind turbines will be integrated between the programmatic spaces to create energy and to turn the 5.1 sq-km project into a self-sustainable vertical city.



Image Courtesy of JDS/JULIEN DE SMEDT ARCHITECTS



Image Courtesy of JDS/JULIEN DE SMEDT ARCHITECTS

As to knowing when green features will be the norm and will no longer have to be explicitly required, Frechette answers: "I hope it will be a never ending pursuit. Imagine if everyone instantly started to provide 'great design', it would no longer be considered great. We would need to redefine what 'great' means then start over again. Similarly, we must continue pushing green design until all our projects are not only sustainable, but regenerative. It is dangerous to spend much time admiring our accomplishments, we must keep pushing forward."

以往在亞洲，綠色守則只是環保行動者的玩意。時至今日，亞洲人都開始有意識去奉行真正的環保生活。亞洲在保護生態環境這方面起步較慢，但勝在有誠意，現在搞環保工作比其他地區來得更認真。2008年三月，仲量聯行（Jones Lang LaSalle）與國際企業地產協會聯手進行一項調查，研究結果顯示，亞太區企業權衡建造可持續發展物業的成本時，比世界其他地區的同業更加務實。百分之十二亞太區企業願意支付雙位數字溢價，令物業達至可持續發展的需要。相比之下，北美和東歐/中東/非洲地區的比率只有百分之三。亞太區在環保方面確是跨進一大步，最舉世矚目的是當地人對綠色守則的觀念迅速革新。近至數年前，環保設計往往被視為限制，充其量只能在道德上加分。然而，今天大家的眼界已擴闊很多，地產發展各權益方開始體會可持續發展項目能創造的經濟利益。就是因為這個簡單的心態轉向，一切也迥然不同，估計未來數年，愈來愈多項目會採用綠色建築手法。

這種務實態度背後的重要動力，是效率。全新思維現正興起，而根本概念也離不開商業原則，這股力量推動大家開拓更多具成本效益的方案。在眾多環保問題上，能源消耗量一定需要優先解決，因為這是二氧化碳排放的主要來源，也是氣候變化的元兇。能源效益其實不是全新意念，打從十多年前地球資源缺乏和價格上漲開始，許多國家便修訂策略，能源政策不再以穩定

能源供應作為重點，轉而推廣合理善用能源。2007年十一月，由區內多家亞洲及跨國大企業行政總裁在香港組成的獨立商會「亞洲企業協會」出版了一本刊物，題為《建築物能源效益》。這本書紀錄一項廣泛調查研究的結果，希望提高決策者和營運者的意識，同時說明設計及實施高能源效益建築物事在必要，並一一列舉所有無庸置疑的益處。亞洲企業協會董事總經理Mark Clifford表示：「這筆賬簡單得小孩子都懂得計算，建造一座設計完善的樓宇，比起為非環保樓宇提供冷暖空調和照明，成本足足低四至六倍。一般人投資若取得如此回報，已算很滿意了。事實擺在眼前，投資環保建築物，回收期短則六個月，長則七年，實在划算。問題是，我們該怎樣從理論政策層面，落實到運作層面？」

綠色設計的經濟優勢顯而易見，然而要大力推廣，政府必須扮演關鍵角色。Mark Clifford續稱：「我認為政府應多與商界和民間團體合作，物業發展商與非政府環保組織的利益取向當然不同，但在這個問題上，大家的確可以互相合作。只要略為提高初期成本，便可享受有非常快速的投資回收期，而隨著政府立例或業界自願提高水平，更注重環保技術的項目便愈來愈多，漸漸成本也會持續下降，最終更可發展至不涉及任何額外費用。老實說，大家都處於學習階段，設計師、建築師與整個物料供應鏈亦如是。」

在日本和新加坡帶頭下，南韓、台灣和香港

等亞洲地區正掀起「綠色革命」，當中香港視為大熱，預計可創出最好的成績。中國近年對環保建築亦非常關注，更見證了亞洲的綠色大躍進。

Mark Clifford說：「約一年半前，胡錦濤已開始談論氣候變化和中國的責任，國內似乎正在加大力度解決環境問題。與此同時，中國的管治能力極強，地方政府或許不然，但國家及地區政府和大城市當局的行政管治非常到位，在制訂政策方面具有震懾權力。我對亞洲前景很樂觀，相比兩三年前，現時普遍的觸覺和關注水平均大大提高。當然目前還未趕上先進的歐洲，但發展方向卻絕對正確，而且步伐頗快。」

SOM建築事務所所在廣州的「珠江城」項目正是能源效益趨勢的鮮明典範。這座樓高七十一層的大廈預計在2010年落成，估計會是全球最具能源效益的超高摩天大廈。「珠江城」外型纖巧流麗，設計著眼於盡量善用地盤周圍的太陽能和風能。大樓結合多項高度創新的技術，以綜合式設計方案作為重點，透過周全協調各元件，將效能發揮到極致，與此同時確保用戶置身其中感到舒適。「珠江城」設有兩部豎軸綜合風渦輪機，從南北兩面採風發電，驅動採暖、通風和空調系統。大廈的弧形曲線有助空氣從渦輪機的入口疏漏。此外，「珠江城」採用動態高效建築物外殼，特設太陽光電能系統，可將太陽能轉化為可用的交流電，雙層外牆結構則屬內部通風的高效設計，東西立面設有三重玻璃外結構，玻璃窗腔裝設外部簷篷及自動簾。其他技術特色包括置換通風、輻射頂板冷卻空調和冷凍樑、最佳化空氣及水輸送系統、最佳化大廈管理系統等，再配合多項最基本普遍的措施，如盡量使用日照採光或收集雨水作洗盥水等，務求發揮最大的能源效益。

「珠江城」雖然不是百分百的零能源摩天大廈，卻開展了嶄新的前景。SOM建築服務及可持續發展工程部總監Roger Frechette表示：「珠江城證明了『淨零能源』絕對有可能實現，我肯定不出數年，這種新建建築類型便會面世，不過造價會很高。成本高昂不是因為勞動力增加或採用高科技物料，甚至不是因為選用尖端技術，而是人們對不熟悉的事物感到恐懼，以及不願意捨棄習慣、冒任何風險的心態所致。」採用先進精良的物料或技術，當然可以創造效益更高的建築物，但這不是萬試萬靈的對策。Roger Frechette補充：「我們經常因為採用了一種技術，而須另找一種技術來抵消它的弊端。舉例說，自動扶手電梯、電燈和電動打字機等會產生熱力，使室內環境暖化，空調技術就可以消滅這些負面影響，但我們又要找尋另一門技術，來抵消空調的弊端，如此類推。這一切帶出的訊息就是：少即是多。」理智而富能源效益的方案可能比我們想像中容易達到，可能只要改變一下日常生活習慣就可以。

許多專家估計，亞洲還需十年才會廣泛接受環保是主流作業守則。亞洲企業協會的報告指出，建築物耗用了全球所有主要能源逾三成，由此可見，大規模推廣高能源效益建築，對全球環境確實帶來重大幫助。至於環保特色何時可以成為標準元素而無須特別要求，Roger Frechette回答說：「我希望這方面的發展永不停止。試想人人都可創造出所謂偉大的設計，那就沒甚麼了不起了。我們必須重新界定『偉大』，然後重頭開始。綠色設計也如是，我們必須不斷推動，直至所有建築物都可持續發展而且生生不息。停下腳步看著宏偉成就洋洋自得，是很危險的舉動，我們需要的是不斷前進。」+

## 1.8 BILLION

Green buildings can reduce 1.8 billion tons of CO2 per year, close to three times the amount scheduled for reduction under the Kyoto Protocol

(Source: "Building Energy Efficiency: Why Green Buildings are Key to Asia's Future", Asia Business Council, October 2008)



Image Courtesy of JDS/JULIEN DE SMEDT ARCHITECTS