Building Brand Identity: Sustainable yet Iconic High-rise Design for China’s Power Companies

Ming Zhang

Senior Partner / Design Partner, MulvannyG2 Architecture, 1110 112th Avenue, NE, Suite 500 Bellevue, WA 98004 USA

Biography

Ming Zhang offers a special talent and creativity in the design of high imagery projects. That talent, combined with his special ability to address each client’s specific needs, earns him a distinguished reputation as a world class designer. With over 22 years of architectural experience in the United States, Asia and the Middle East, Ming’s design and planning experience encompasses a broad range of project types including office, mixed-use, retail, hospitality, high-rise residential, high-tech, and public spaces.

In the realm of high-rise building, Mr. Zhang has designed several award-winning projects in China including: Fujian Provincial Power Company Headquarters, Fuzhou City Power Company Headquarters, Shanghai Shi Dong Power Company Headquarters, Jiangsu Power Headquarters, China Construction Bank Center, and the Fudan Crowne Plaza Hotel and Academic Exchange Center.

Mr. Ming has received numerous honors and awards—including the 2006 Top 20 Most Influential Designers in China Landmark Award from the Chinese Research Center for Urban Development and Environment. His influence has literally created a new image for major cities throughout China. Ming is a sought after speaker, particularly in the topics of environmental architecture, smart building design, working relationships in China, and culture and design.
Building Brand Identity: Sustainable yet Iconic High-rise Design for China’s Power Companies

Ming Zhang

Senior Partner / Design Partner, MulvannyG2 Architecture, 1110 112th Avenue, NE, Suite 500 Bellevue, WA 98004 USA

Abstract
MulvannyG2 Architecture (MG2) has designed four electric power company headquarters in China. What has made MG2 successful in these design endeavors is a solid understanding of the needs of the clients’ wishes as they seek to express their success not only as stable, powerful, utilities, but also as innovative companies with a commitment to energy conservation. This paper will explore four successful Chinese power company designs and five key factors of success, including: 1. low cost, energy efficient and green high-rise design; 2. expression of the clients’ high-tech, state-of-art characteristics; 3. efficient and comfortable interior office environment and public space; 4. integration and improvement of the urban/cultural context; and 5. provide an iconic landmark for the client and the city. Through these experiences, MG2 has developed several unique design solutions that meet their clients’ primary goal: to create a healthy, sustainable working environment in a building symbolic of the modern Chinese power company.

Keywords: Electric power, iconic design, green building, energy conservation, branding identity

Introduction
Power generation is a critical aspect of 21st century China. It is a key ingredient in the nation’s new identity as the manufacturing and high-tech hub of the world. It is also an increasingly cherished commodity as worldwide energy prices have exploded. Companies who deal in energy have to walk a tight rope between providing a constant, uninterrupted and inexpensive stream of power to companies and individuals, and demonstrating themselves as an environmentally friendly steward that respects natural resources and develops innovative technologies. Simply put, China needs energy and environmental protection both.

The flip side of a rapidly developing economy is that there can be some steep costs. In China the price of development is taking its toll on the nation’s environment through its heavy reliance on coal, though cheap and plentiful, it is one of the dirtiest energy sources available. This only begs the fact that the nation must find cleaner and more sustainable energy for it to continue developing at its current pace and, at the same time, take part in a global effort to reduce global warming.

In fact, the Chinese government has made substantial efforts in reducing non-sustainable energy sources. For example, hydro power capacity has increased 12 percent since 2005. Similarly, China's installed wind power capacity that is expected to reach 122 Gigawatts by 2020, which could put China in one of the world's top three wind energy markets in about a decade. As concepts in sustainable design are implemented, the nation has raised its earlier 2010 target to 8,000 Megawatts (MW) from 5,000 MW.

It has already committed that non-fossil fuels will account for 30 percent of China's energy consumption by 2050, compared with 10 percent today.

Another good example is the constant improvement of the existing Thermal Power technology. Per China State Power Information Network, Over twenty-two years from 1980 to 2002, even though the thermal power installed capacity had increased at a staggering growth of 4.7 times, the flue dust emission has substantially decreased. In 2003 flue dust emission was only 70 percent of what it was in 1980, even though production rates were much higher.

Turning to conservation of resources, from 1980 to 2003, the net coal consumption rate decreased by around 15 percent. In addition, with increases in efficiency, coal equivalent savings reached 120 million tons in 2003, as compared to 1980 levels. The comprehensive utilization rate of pulverized coal ash has been continuously kept above 60% in 2003.

Water resources can also be saved through a commitment to clean energy. In 2002, water consumption of thermal power plants was about 1/3 lower than the averaged water consumption rate in the 1980s. The yearly water saving by thermal power amounted to 1.03 billion m3, and the industrial water reuse rate reached 69%.

Given these realities, it is imperative that the architect tasked with the design of power company headquarters use a vernacular that will express the unique iconic features of these buildings as pillars of development and at the same time highlight a commitment to energy conservation, environmental protection, and technological innovation. This paper will explore the design decisions made by MulvannyG2 Architecture in its handling of four Mainland Chinese energy clients.
Fujian Provincial Electric and Power Company, Jiangsu Provincial Electric and Power Company, Fuzhou Electric and Power Company and Shanghai Shidong Power Company are companies which manage the power grid in some of China’s fastest growing regions. As regional headquarters, their functions include: public service, administrative offices, dispatching center facilities, employee activity centers, and mechanical and parking facilities. The design focuses on maximizing the high-tech and energy features of an electric power company as an iconic landmark, while providing the client with a highly efficient, comfortable and green corporative office environment.

In all of these projects the design solutions focus on these five key objectives:

1. Explore a low cost, energy efficient and green high-rise design;
2. Express the high-tech and unique characteristics of the Electric company;
3. Provide a highly flexible, efficient, healthy, comfortable interior office environment and inviting exterior public space;
4. Respect and improve the urban context and character of the locale;
5. Provide a landmark icon for the client and the community;

The exterior walls of a high-rise building comprise the largest area of heat disbursement, as such it a key target for energy savings. A highly energy efficient semi-transparent quality silk-screen glazing was used in the Fujian Power building, it also helps cut glare and eases visual strain when employees are exposed to the relatively large glass windows. In the cases of Jiangsu

1. Explore a low cost, energy efficient and green high-rise design

To a developing country like China, which is thirsty for energy and power and determined to take the road of sustainable development, promoting environmentally friendly, green building design is necessary. This is particularly true where power companies are concerned, as they want to be seen as the standard bearers of energy use and sustainability.

Often green buildings and environmental design are associated with costly high-tech solutions. However, there are many innovative solutions that require few and even none of the cost premiums associated with green design. These solutions are explored in many of the power headquarter buildings’ design. They are especially suitable for Power Companies in China, which run under severe budget restrictions that are part and parcel of state owned enterprise operations.

Much of China belongs to a sub-tropical region with hot summers and cold, damp winters, therefore it is important to comprehensively consider building design as it applies to energy savings. Most towers are in South/North orientation to take advantage of the least heat gain in summer and maximize warm gain in winter. All four projects use double pane, Low-E insulated windows in the exterior walls. This treatment helps the buildings to achieve long-term energy savings. All projects have natural ventilation systems either through operable windows, or an even better idea: in Fujian Power, an aluminum revolving ventilation assembly was used instead of conventional operable windows to provide a natural ventilation system. By using these cost-effective, yet advanced ventilation systems, the architect was able to achieve a natural ventilation system without compromising the aesthetic intent and avoiding any potential liability issues associated with operable windows in a high-rise building.

The exterior walls of a high-rise building comprise the largest area of heat disbursement, as such it a key target for energy savings. A highly energy efficient semi-transparent quality silk-screen glazing was used in the Fujian Power building, it also helps cut glare and eases visual strain when employees are exposed to the relatively large glass windows. In the cases of Jiangsu
and Shidong, the facades of the buildings use dense vertical metal fins, which effectively protect the building from afternoon sunlight therefore reducing heat gains.

Plants can have a remarkable affect on interior environment; they add an aesthetic element to the interior as well as help regulate air quality. Fujian Power, Fuzhou and Shidong all integrate plantings into the interior building design. A sky garden is set every two floors to adjust the microclimate. Specifically, Shidong Power utilizes plantings in the main square in a spiral along the roof of the annexes, and enters the open-air garden on the third floor of the main building. It helps to maintain an even temperature inside and creates a roof garden.

In reinforcing the message of energy conservation and usage of innovative technology, Shanghai Shidong Power implemented solar panels to be placed on the south and east portions of the building on the top of the exterior façades. This will ensure a renewable energy source for part of the thermal power for uses such as hot water heating. Likewise, most of the building materials are local, including the latest technology of Low-E silk screened glazing system. This not only reduced the cost up to one third of the imported material, but also consumed much less energy in making and transporting the materials.

In the case of Jiangsu, Fujian, Fuzhou and Shidong, fine reticular metal strips and/or copper material are used for the main building and communications tower. These details help represent the characteristics of electricity such as conductivity. Meanwhile, the Fujian Communications tower uses polished stainless steel metallic fabric, which not only achieves structural flexibility by allowing wind to pass through, but also augments the strong, unique and symbolic features of the high-tech identity of power building. The shining material and shape reflects the harmony of the main building.

As with Fujian Power, the architectural design intent was to create a unique and contemporary building with a sculptural form that expresses the energy of electricity in the building’s design. Unique to this building’s design is a pair of internal illuminated translucent glass boxes stylizing electrical current as light discharging at an extremely fast speed from the building below.

A north and south curtain wall envelopes the crystal-like tower, and acts like a shield to the building. The lightning motif is integrated into the glass panels by using silkscreen glass or ceramic frit low-E glass, a highly energy efficient glazing material. The pattern of the ceramic frit is carefully designed in a triangular pattern. When viewed from a distance, hundreds of
transparent triangles glisten on the building’s north and south curtain walls, creating a sense of networking connections. It also helps express features of a power conduction grid and digital network.

Dynamism is a concept which runs through the power industry and is apparent not only in the product itself, but also in the rapid development of technology associated with power generation in China. Thus, in Shidong Power, the turbine is the main thematic motif. This is expressed throughout the design and produces the feeling of dynamism with strong compositional centrality by integrating the internal and external space. The dynamic features of electric current and transmission are displayed through the transparent observation elevator and the exposed external pipelines and switching equipment. At the same time, to represent features in power conduits, the exterior wall of the annexes and the ladders below the microwave communications tower are covered with a copper alloy veneer.

The dynamic process is also seen in the design of Fuzhou Power. The building’s design concept expresses the constantly changing dynamic process of electric transmission which is featured though the use of exposed elevators and a transparent chamber of space every three levels along the outer wall.

The microwave communications tower is an important element in the structuring of all four power company buildings. In Fuzhou and Shidong, directly below the microwave tower is the elevator, which creates a unified column from the building’s highest point to the ground. With Shidong, the exposed steel structure applies an additional crispness to the design. Both of these design elements, in combination with the building’s height not only demonstrate key characteristics of the modern power industry, but also express the structural integrity and beauty.

In Jiangsu Power, all floors are elevated to allow electric and communication wires to run underneath the floors. This provides much more flexibility than traditional floor design.

Probably the most powerful metaphor seen in power company design is the effect of lighting and night scenes. As one views Shidong or Fuzhou Power at night, one can see a clearly illuminated and exposed elevator chamber. Also, the external walls of the transparent chamber, roof platform, and the top of the microwave tower are illuminated by outdoor radiation lighting. For Fujian Power, the tips of the curtain shields are made of translucent white glass which glows at night.

Figure 5. Shanghai Shidong Power Company Electric Dispatch Center.
Solar panels above the observation deck (MulvannyG2)

Figure 6. Fuzhou Electric Dispatch Center (MulvannyG2)

This effect clearly celebrates the power industry nature of these buildings and establishes a branded building design.

3. Provide a highly flexible, efficient, healthy, comfortable interior office environment and inviting exterior public space

A high rise building contains many people inside. It is very critical to provide a healthy and comfortable indoor environment. As a high-tech industry, power companies are spending more effort to attract an increasingly sophisticated and better educated work force. Not only does the modern power industry professional desire a higher salary, but a collaborative and comfortable work environment must be created to retain high-level talent. This allows them to be able to freely exchange ideas and work productively and contentedly at demanding and stressful jobs.

As seen in figure 3, 5 and 6, the design in these buildings helps promote social and teaming opportunities, by designing multi-level lounge areas for employees...
every two to three floors, together with the green courtyard, roof gardens, and an employee activity center. This creates a caring corporate culture and in return, inspires a higher productivity rate for workers who typically work long hours in this industry.

An example of the direct link between design and productivity can be seen in Fuzhou Power. In this project, the Dispatch Center Hall, a two story high column free space, which is considered the soul of the Power building, runs 24 hours a day and requires the highest standard in operation. Rather than putting it in the basement, like some US power companies do, in this project all of them were placed on the top of the building to take advantage of the surrounding views. This design solution helps employees to release stress from a high-intensity working environment.

Likewise, transparent and translucent materials are used to create open and spacious interiors that are full of natural day lighting. In the lobby of Fujian Power for example, combinations of clear glass and metal screenings are applied around the podium area and the lobby atrium with an outdoor observation deck. A large water wall in the lobby further magnifies the feeling of transparency and an open flow with nature. The pre-function space of the main auditorium is formed like a “crystal box.” The space is washed with daylight during the day and by night it transforms into a shimmering, bright space.

Elements of the garden city of Fuzhou are incorporated into the indoor green space of Fujian and Fuzhou Power. This is reflected in the way that green space from the roof of the podium is extended to the top of the building. These small garden spaces not only help regulate the building’s temperature and climate, but also provide workers with convenient spaces for informal exchange and meeting. These humanistic spaces function for the office in the same way the living room functions in the home. Many studies prove that creating these informal spaces help to create cohesive bonds among co-workers, which are translated into higher productivity and lower employee turnover.

4. Respect and improve the urban context and character of the locale

As these buildings are designed to be innovative landmark icons, through client request, it is, at the same time, important to find ways in which these buildings can blend in with their urban context so they will be rooted to the place they are set. Architecture should augment the local surroundings by reflecting local design considerations, cultural themes and materials, and should not in anyway detract from the existing environment. Great effort was taken to design buildings that in some way help to enhance the local environment. These efforts are best reflected in the design of the Fujian and Jiangsu Power buildings.

Fujian Power is not only a symbol of power generation and conservation, but it also calls upon Fujian’s sea-faring history, recalling the signature compartmentalized Chinese junk-style sail motif. Also inspired by Fuzhou’s fame as a garden city, incorporated in the design were green spaces, both horizontally and vertically: from the major public plaza, to the southern Chinese-style courtyard, from the roof gardens to the many indoor green sky lounges.

Similarly, Jiangsu Power Company Headquarters, located in the former imperial and national capital of Nanjing, takes on the influence of its surroundings. The building’s solid form and use of stone in the outer wall are cues taken from the nearby Purple Mountain and still-standing Ming dynasty city wall, both symbols of Nanjing’s natural and imperial history.

Though these buildings stand tall and unique, they do not stand apart. These buildings’ landscaped gardens and open plazas are a welcome addition by the local community as they provide a place for morning and afternoon exercises and recreation. These activities play an important role in the social life of the average Chinese person.

5. Provide a landmark icon for the client and the community.

As mentioned, the power industry is a pillar of development in China and has fueled thirty years of economic advancement. As such, power company clients have expressed their wishes to have this reality manifested in the physical stature of the building and its environment.

How to make an Electric Power Company’s building into an iconic landmark? Height is a huge advantage here, but it is not everything. The architect must capture the uniqueness of the Electric Power Company and express it as an abstract and memorable form. As an example, the Fujian Provincial Electric and Power Company is a high-tech and a high point of the city. One hundred and ninety five meters in height, this office complex is the tallest to date in the Fujian Provincial capital of six million. Similarly, the 38-story, 260 meters tall (to the top of communication tower) Jiangsu Power Company establishes physical dominance among neighboring buildings.
The uniqueness in design can be found in the design language and details that are specially related to electric power companies, such as: the soaring microwave /communication towers; the transparent electric control center hall floating in the sky; the high-tech expression of "electric grid" pattern on the Fujian Power curtain walls; the dynamic "turbine engine" concept in the Shanghai Shidong Power design; the electrical conductivity expression through fine metal material and sustainable design ideas. It is the aesthetic expression and integration of all these elements that creates a unique skyline and becomes a proud trademark for clients and their cities.

Conclusion

Energy is a pivotal factor in China’s development, and the country has made great strides at reducing its dependence on coal as its sole energy resource. Renewable energy sources and more efficient usage of coal are revolutionizing the power industry. As the main actors in this process, power generation companies wish to represent a brand in their buildings that reflect the many sides of power in China: to be an organic integration of advanced technology, environmental stewardship, and high-rise building art. Design considerations in creating these iconic buildings were crafted with a view toward the power company’s high tech and modern characteristics in order to provide the client with a highly functional and healthy environment suitable for top-tier power companies. But also, given the pressure for these energy companies to constantly innovate and find new sources of renewable energy, the design cannot only stand for power industry dynamics of today. The design for these buildings has to take tomorrow into consideration with a design solution that will remain relevant for years to come.

References

*China Daily*, (Nov. 2007). Hi-Tech Meets Human Need for Power
*China Daily*, (Nov. 2007). Wind Power as a Win-Win Strategy

Project Facts

Fujian Provincial Electric and Power Company
Project location: Fujian Province, Fuzhou, China
Building area: 43,358 m² (above ground)
Height: 195m to the top of the communication tower
Floors: 31 floors + 2-story basement
Design Architect: MulvannyG2 Architecture
Local Project Architect: China Northeastern Architectural Design Institute
Completion Date: 2007

Jiangsu Power Company Headquarters
Project location: Jiangsu Province, Nanjing, China
Building area 50,500m² (above ground)
Height: 260m to the top of the communication tower
Floors: 38 + 2-story basement
Design Architect: MulvannyG2 Architecture
Local Project Architect: ECADI
Completion Date: 2004

Fuzhou Power
Project facts:
Project location: Fuzhou, Fujian Province
Building area: 37,800 m² (above ground)
Height: 150m to the top of the communication tower
Floors: 25 floors + 1-story basement
Design Architect: MulvannyG2 Architecture
Local Project Architect: China Northeastern Architectural Design Institute
Completion Date: 2008

Shanghai Shidong Power Company Electric Dispatch Center
Project location: Shanghai Municipality, China
Building area: 21,970m² (above ground)
Height: 138m to the top of the communications tower
Floors: 19 floors + 1-story basement
Design Architect: MulvannyG2 Architecture
Local Project Architect: ECADI
Completion Date: to be announced