

21st Century Buildings: Optimizing Building Performance for a Sustainable Future

Conference Report

On November 11, The Paulson Institute and China Center for International Economic Exchanges (CCIEE) – supported by the Rocky Mountain Institute and Lawrence Berkeley National Laboratory – convened leading CEOs, more than 20 experts and 90 participants to discuss the opportunities and challenges to promoting building efficiency in China. The goal of the conference was to build consensus around a set of solution areas around which PI, CCIEE, members of the newly launched CEO council and the experts could advocate and focus. Speakers included the Chairmen of CCIEE and PI, Zeng Peiyan and Hank Paulson, international CEOs, experts from leading US and Chinese think tanks, Chinese ministries and NGOs. Shenzhen Mayor, Xu Qin, and the former Mayor of Chicago, Richard M. Daley provided keynote addresses.

Overall consensus emerged on the importance of building energy efficiency in the effort to reduce greenhouse gas (GHG) emissions in China’s war on pollution. Buildings use more energy than any other sector in the world and account for nearly 40 percent of global greenhouse gas emissions, according to the Intergovernmental Panel on Climate Change. As China leads the world in building construction, the country has an excellent opportunity to make a significant positive impact on climate change by promoting energy efficiency in its buildings. Experts convened to discuss a series of recommended steps that China could take in the near and long term.

Opening Remarks

In his opening remarks, **Hank Paulson** stated that small changes in business codes and practices can have a huge impact on energy savings. Indeed, building efficiency may be the biggest lever we can pull to reduce energy consumption and greenhouse gas emissions. Four years ago, China was just launching a new program to address urbanization, which is now in full swing. This is an area where the U.S. and China must work together.

Zeng Peiyan, noted in his remarks that the focus on buildings should be a top priority. China has a goal of having 75% of all new buildings meet green building standards by the year 2020. He emphasized the need to track energy usage in these buildings as a means to better gauge overall usage to achieve energy efficiencies and lower costs. Looking ahead, technologies exist – and will be developed – that will better help China achieve its ambitious goals for green buildings. The challenge is how to find affordable and convenient ways to obtain and adopt

these technologies.

Keynotes

Shenzhen **Mayor Xu Qin** outlined his city's carbon reduction goals and sustainability plan, featuring a 45% planned reduction in CO₂ by 2020, extensive green spaces and public green buildings, green transportation, and a carbon-trading platform. He emphasized that Shenzhen has the largest amount of green buildings in China. Mayor Xu was also in Beijing to accept the PI and CCIEE Prize for Cities of the Future, which was awarded to the Shenzhen Low Carbon City this year.

Mayor Daley stressed the importance of government leading by example. While Mayor of Chicago, he built the very first municipal-owned building in the United States to achieve LEED platinum-status, the highest "green" certification. He made it open to the public and encouraged visitors. He then mandated all municipal buildings meet green standards, worked with the builders to update the codes and provided extensive training. In his estimation, green cities are successful cities.

Session 1: CEO Roundtable

The first panel was a **CEO Roundtable** moderated by **Daniel Poneman**, Distinguished Fellow at The Paulson Institute and former Deputy US Secretary of Energy. **David Cote**, Chairman and CEO, Honeywell; **Mark S. Hoplamazian**, President and CEO, Hyatt Hotels Corporation, and **Wang Jianqiang**, Vice President, Tonghsu Group participated in the panel. Mr. Poneman noted that more than 70% of the infrastructure for the millions of people moving to China's cities has yet to be built, presenting a great opportunity for energy efficient construction. Mr. Cote noted that the greatest challenges to implementing the technologies – which already exist – are code enforcement and changing consumer behavior. For example, a programmable thermostat is a better investment than any stock you could buy, but people do not buy them due to a lack of consumer awareness. Mr. Hoplamazian reinforced Mr. Cote's view that changing behavior is critical. Hyatt Hotels are dedicated to raising awareness among their staff through training, and also aim to change guest behavior to help reduce energy and water consumption in their hotels. Mr. Hoplamazian noted the strong business case for doing so: they have found that only end users are evaluating their hotel based on sustainability practices. Mr. Wang echoed the sentiments of both CEOs by noting that despite producing products related to sustainable practices and urban design, Tonghsu has faced greater challenges in getting people to buy their energy efficient products than they ever anticipated. Mr. Cote concluded by noting the necessity of utility companies and end users to work together to reduce peak load, which is when companies generally use their dirtiest fuels. He cited Honeywell's automated demand-response technology as an effective way to reduce and regulate peak load.

Anchoring the Discussion

Jon Creyts, Managing Director of the Rocky Mountain Institute, and **Zhou Nan**, Staff Scientist and Deputy Group Leader of the China Energy Group of the Lawrence Berkeley National Laboratory, set the scene for discussion by presenting the key drivers of energy use in the Chinese building sector and setting forth a vision for building energy performance. They

provided the four key themes that guided discussion towards potential solutions and framed the day's discussion. Citing population growth, urbanization rates and GDP as the three main drivers of energy consumption in China, Mr. Creyts noted that these factors have led to an increase in demand for building space and higher-quality buildings, as well as a proliferation of appliances, which translates into growing energy use. Ms. Zhou outlined four areas that will maximize energy savings in the next stage of China's building development: comprehensive design of buildings that use natural lighting and ventilation amongst other features to reduce energy, increased availability and awareness of energy efficient equipment, use of smart systems and automated demand response, and lastly, on-site renewables and fuel switching. Incorporating these four measures can cut energy use by a half, as evidenced by economically viable case studies.

Session 2: Challenges and Approaches

The second panel was a discussion on **Challenges and Approaches**, moderated by **Jiang Yi**, from the Chinese Academy of Engineering. **Ellen Franconi**, Principal at the Rocky Mountain Institute; **Kevin Mo**, Buildings Program Director at the Energy Foundation China; **Qiu Baoxing**, former Vice Minister of the Ministry of Housing and Urban Rural Development of China; **Wang Hong**, Executive Director at AECOM Building Sustainability; **Ye Qing**, Chairman of the Shenzhen Institute for Building Research, and **Zhou Nan** served as panelists. Mr. Jiang started off the discussion by emphasizing China's comparatively positive energy conservation efforts. Chinese residents use one-seventh of the energy that Americans use and one-fourth of the energy that Europeans use in buildings. This disparity is attributed to the usage of buildings in China and occupant behavior, rather than energy-efficient technology. Chinese keep their apartments cooler in the winter and warmer in the summers, for example, than Americans. For that reason, Mr. Jiang advocates reducing building energy emissions from a lifecycle perspective, by focusing on building materials, construction and longevity. Speaking about the kind of environment to be provided for citizens, Mr. Ye emphasized the role of design – each space and section of a building has to be constructed based on the purpose of maximizing energy efficiency. Mr. Qiu added the importance of finding a balance between distributed energy sources and central energy sources, both in residential and industrial buildings. Not only do we have to build upon our foundation of traditional energy-saving designs, Ms. Zhou proposed the implementation of stricter energy-efficiency standards and data collection of energy use and savings, highlighting the United States as an example. All panelists emphasized the importance of pricing reform through new pricing models, and the active promotion of a change in producer and consumer behavior.

Session 3: Codes and Enforcement

The third panel was a discussion on **Codes and Enforcement**, moderated by **Deborah Lehr**, Senior Fellow at the Paulson Institute. Panelists included **Feng Wei**, Senior Scientific Engineering Associate at the Lawrence Berkeley National Laboratory; **Robert J. James**, Global Building and Security Inspection Leader of Underwriters Laboratory LLC; **Piper L. Stover**, Managing Director, United Technologies Management Co.; **Xu Wei**, Director of the Institute of Building Environment and Energy Efficiency at the China Academy of Building Research, and **Yu Bing**, Executive President of Shanghai Yanhua Smartech. All of the panelists agreed that getting codes right is key but that then enforcing them and providing the right training and

education – for the whole value chain – on the codes is equally critical. Both Mr. Fen and Mr. Xu agreed that China’s path on building codes, begun in the 1980s, has paralleled that of other countries and will continue to draw heavily on Western experience adapted to China’s realities. Mr. Xu laid out China’s three main goals for building codes: 30% of new buildings achieve near zero energy consumption by 2030; standards be revised every 5 years; and, developed regions to achieve this goal 5-10 years ahead of time.

At the company-level, Ms. Stover and Mr. Yu emphasized that private sector firms developing renewable and efficient products and services have to work with regulators to promote quality certification. Ms. Stover highlighted the need for a performance-based building regulation framework, as many modern technologies are installed but not run properly. Mr. Yu also noted the importance of demonstration projects in promoting building codes.

But it is not enough to have better building codes. Mr. James emphasized consistency in regulations nationwide and appropriate training for the whole value chain. From the design team to the installation team, there should be a clear understanding of the codes and the significance of abiding to them. And, codes have to be regularly updated. To overcome the challenges facing building codes, solutions include improved enforcement through third-party agencies and a higher cost for non-compliance, education on energy efficiency standards, regularly updating building codes and influencing consumer behavior. There are cost-efficient strategies to meet these targets in the near term, such as self-inspection of buildings by community.

Session 4: The Path Forward

The fourth panel was a discussion on **The Path Forward**, moderated by **Jon Creyts**. Participants included: **Ted Gryo**, Vice President at ENN Energy Research Institute, **Neil C. Hawkins**, Corporate Vice President and Chief Sustainability Officer at the Dow Chemical Company, **David Nieh**, Head of China at Lend Lease, **Wang Youwei**, Chairman at China Green Building Council, **Xu Jingjing**, Executive Director at Green & Smart Urbanization Task Force of the China Development Bank Capital, and **Zhou Wenlian**, Executive General Manager & Director at China Construction Engineering Design Group Corporation Limited. Mr. Nieh began the discussion by emphasizing system integration and creating combined solutions for energy, waste and water. He also singled out some barriers: multiple parties own buildings, which makes it harder to get overall consensus, and the lack of awareness of energy service companies (ESCO).

Mr. Wang noted that 30%-40% of energy consumption in China comes from buildings. He indicated two solutions: cut energy consumption in buildings and change people’s behavior, a theme explored extensively in the CEO panel as well. In order to identify how energy in a building is consumed, he established customized building codes to categorize different building types into industrial, residential and public buildings. Mr. Hawkins emphasized the need for stakeholder collaboration and systematic implementation. Metrics, goals and accountability are key in accelerating the process for building energy efficiency. Ms. Xu indicated that the issue is that developers pull back from low-carbon design because of the competitive tendering process. They are under pressure to offer cost-competitive designs, which is not often the case with green designs. She suggests establishing a specialized fund, such as those offered in New Zealand, to support green building standards and encourage the government to lead by example. Mr. Gryo

offered a different perspective, using data of consumption patterns and automated technologies to manage distributed energy and achieve energy efficiency. Mr. Zhou noted that green technologies and green planning are essential to promote green buildings. Almost all panelists noted that they are pushing for more stringent efficiency standards from the government. If standards are stricter, it makes everyone more competitive and pushes the prices down further. All agreed on the need for additional training as well.

Conclusion and Next Steps

In summarizing the outcomes of the Conference, Hal Harvey, CEO of Energy Innovation, concluded by saying that we all know that energy consumption in buildings will go up and that the potential for green buildings will only increase. He noted that codes will be key. California's buildings now use 80% less energy than before their code was introduced. And it is an evolving code. Strong regulations create strong companies – a sentiment echoed by all of the corporate participants.

Based on the discussions during the conference, the Paulson Institute and CCIEE have developed a set of recommendations focused on the need for practical and readily implementable solutions that will make a significant difference:

- *Strengthen the underlying legal infrastructure:* Building-code standards that reflect the latest technological innovations, are updated on a consistent and regular schedule, and vigorously enforced could potentially promote efficiencies of up to 30 percent.
- *Increase the role of market forces:* Reform of resource pricing and the energy sector will ensure more efficient supply and demand of energy.
- *Use data more effectively:* Tracking energy use allows governments, building owners, utility companies and users to regulate their behavior in a more cost-effective manner.
- *Promote incentives to change behaviors:* Incentive programs and awareness campaigns can encourage more widespread use of energy efficient appliances and Three Star building designates.
- *Raise awareness of—and access to—energy efficient building materials and methods.*
- *Actively enforce building codes:* Vigorous enforcement through inspections, combined with raising awareness, will help ensure greater compliance with China's ambitious energy efficiency agenda.