about 350,000RMB/month. The annual operation cost on cooling and heating for this neighborhood was approximately 6,000,000RMB.

Table 2. Comparison on initial investment of different energy systems

Initial Investment		**Operation Cost**	
Gas turbine	8,300 RMB/KW	Gas	0.18 RMB/KW
Chiller/Heat pump	3,600 RMB/KW	Electricity	0.40 RMB/KW + 50 RMB/KW(peak)
Compression chiller	3,200 RMB/KW	Water cooling towers	14 RMB/m^3
DE-Absorption chiller	4,250 RMB/KW	CO_2-emission	4,250 RMB/KW
Cooling towers	500 RMB/KW	Gas	0.2 tCO_2/KWh
Boiler	450 RMB/KW	Electricity	0.9 tCO_2/KWh
Energy piles	2,000 RMB/KW		
Ground water wells	700 RMB/KW		

When the building was put into operation, the Vanke people were happy to see that the thermal storage system, the under floor air distribution system brought thermal comfort to the building and had a better energy performance with lot money saved on electric bills. The solar PV panels offer 15% of the power for the building and reduce the CO2 emission. Water saving strategy saves 30% of the total consumption. The innovation of the construction of the project saved 80,000,000 CNY budget.

To allow the user to be in control of comfort and operating the system is essential for saving energy and operation cost, and more importantly, to achieve occupant satisfaction. People can stand some degree of discomfort when they are in control of the conditions in their workplace (Cohen et al., 1999). Yet to what extend should the occupants be granted the control worth discussion. When user involvement is not appropriately designed, it can also result in wrong operation of the building and wasting energy. Leaman's study (1999) revealed that user reaction and response could be reckless sometimes, such as over-compensating for relatively minor annoyances, not choosing the most proper system to operate but instead the ones that are convenient to hand, and lacking responsiveness in adjusting the systems with the change of the environment.

In the Linked Hybrid case, occupants can regulate the temperature and fresh air supply by a controller inside the apartment, which has a limit though, considering the comfort range and energy consumption of the ceiling radiation system. The integrated system set the temperature range to be 21-22℃ for winter and 24-26℃ for summer, occupants can adjust the indoor temperature within 2 degree. When the apartment is unoccupied for couple days, the system can be switched off while small amount of fresh air will enter and circulate the space due to the pressure in the duct. So the apartment is still ventilated without extra energy consumption, and there won't be unpleasant smell when occupants come back days after.

The energy system of Vanke Center showed a slightly different picture. Data from EMO recorded the total energy output of the PV panels was 1358,460KWh since the building was put into operation, and the annual output of the system was 272000 kWh, reached about 97% of the expected value. According to a recent interview, the EMO stated that after 5 yearss' operation, the PV panel system has been malfunctioned and under repair. On the other hand, test result from 2013 revealed that the ice store air conditioning system had a low efficiency in ice making (less than 50%). The data above demonstrates the performance of the energy systems in Vanke Center are not functioning as designed.

Nevertheless, the design of Vanke Center values the comfort and satisfaction of the occupants. Great efforts were made on different aspects to meet the comfort range, including temperature, humidity, lighting and views. Occupants can flexibly control the working environment according to their personal needs. In the working space sparated lighting switch and a control panel for air conditioning are provided to each staff. "People working together in a big office usually have different needs for air-conditioning. a centralized cooling system hard to satisfy everyone and sometimes makes people sick. Now this is no more a problem to us." A staff claimed in the interview. Furthermore, everyone working in the building is more or less noticed the building's green features. It shows that understanding how the building operates and its quality of being environmental friendly brings additional satisfaction to the occupants.

DISCUSSION ON GREEN PRACTICE AND EVALUATION SYSTEM ESTABLISHMENT

These two case studies demonstrated that LEED and LEED-initial practice benefits a the green building development in mainland China, and the positive effects can be summed up as below:

1. The LEED system offers clear environmental structure for green practice and in developing countries;
2. Training process and technical support introduce knowledge input and increase the amount of local professionals;
3. Large and demonstration projects can promote international cooperation and communication between different expertise.

However, the high cost and large investment of these LEED-oriented projects make it difficult to widely adopt this mode in developing countries. Energy performance of some of the LEED projects are relied on high-tech systems, and these projects to some extend, neglect the passive design and environmental planning methodology. This, as revealed in the case study, has its shortcoming. Based on the above, suggestions on enhancing green practice in developing countries are summarized:

- climate-based passive design

A great portion of developing countries and regions locate in severe and harse climate zones. To identify the climatic issues and formula strategies of climatic design with passive approach is vital in these regions. It is regional-applicable and much less cost-demanded; and a larger cost-and-return ratio can be obtained from climate-based practice in these regions than it was in the moderate climate zones.

- energy efficiency of heating and cooling systems

As Chmutina (2010) has pointed out, improve the cooling and heating system can save up to 70% of energy in China; energy efficient heating and cooling system is essential for the green development in China. Since air carries relatively less energy per unit volume, it is not recommended as energy medium. Furthermore, the heating and cooling system should be separated from fresh air supply.

- standard setting and occupant behavior study

User involvement is essential for both energy saving and occupant satisfaction. The "comfort" standard should be set as an acceptable range instead of a neutral condition; at the same time allow the occupants to adjust the systems within this boundary. It can firstly let the user have the control, and secondly avoid energy waste caused by overreaction of the users. At the same time, branching and operation systems are preferred to centralized control.

REFERENCES

Council, U. G. B. 2007. LEED for new construction. US Green Building Council.

Cole, R. J. 2005. Building environmental assessment methods: redefining intentions and roles. Building Research & Information, 33(5), 455-467.

Cole, R. J., & Z., Brown. 2009. Reconciling human and automated intelligence in the provision of occupant comfort. Intelligent buildings international, 1(1), 39-55.

Cole, R. J. 2012. Transitioning from green to regenerative design. Building Research & Information, 40(1), 39-53.

Lam, T. 2012. Linked Hybrid in Beijing: placing an American building and its architectural concept in its Chinese context (Doctoral dissertation, UCL (University College London)).

Wan, L., & E., Ng. 2012. Passive Design and Low Energy Consumption Building Assessment in Sustainable Building Evaluation System. Architecture Journal, 10 (2012): 13-16.

Wan, L., Ng, E., and J., Mu, 2011. Indoor thermal Environment Assessment and Optimized Design in Rural China. Journal of Civil, Architectural & Environmental Engineering, (2011) 117-120

Yun, C., Xie, A., and Y., Mingjie. 2010. Green Headquarters: Explanation of the Vanke Center Design. Architectural Journal, 1, 005.