POLICIES ON SUSTAINABLE URBAN DEVELOPMENT AND GREEN BUILDINGS IN HONG KONG

PROF HON PATRICK LAU, SBS, JP
Office of the Hon Patrick Lau, Room901, Union Commercial Building, 12-16 Lyndhurst Terrace
Hong Kong Special Administrative Region, People's Republic of China

A motion without legislative effect was moved and passed by Council Members unanimously in the Legislative Council of the Hong Kong Special Administrative Region on 23 May, 2007. The motion suggested that the Hong Kong Special Administrative Region Government (HKSARG) could consider expediting its work in formulating and implementing policies on sustainable urban development and green buildings, so as to alleviate the greenhouse effect arising from imbalanced urban development and to eliminate the adverse effects of undesirable high-density building developments on weather and the environment. The HKSARG could also expedite its work on reviewing the existing legislation relating to urban planning and buildings, and introducing sustainable planning and green building principles; introducing a 'green building labelling' system to fully assess the environmental performance of buildings during the design stage and after their being put to use; and taking the lead in applying the relevant policies to both new and existing public buildings, educating the public, and offering incentives to actively promote market compliance.

1. The Challenges

The problems caused by climatic change are deteriorating: global temperature and sea level rise continuously, whilst ecological disasters are imminent. If we do not pay attention to environmental problems, our next generation will face irreversible crises.

The Intergovernmental Panel on Climate Change (IPCC) report points out that the present CO2 concentration in the atmosphere has reached its highest level in 650,000 years, and the temperature is 0.74°C higher than that in the last century. Global warming has caused polar ice cap melting, crop failures, abnormal heat waves and frequent torrential rains, which might raise water level by 18-59cm in the 21st century, threatening prominent financial centres like London, New York or Shanghai.[1] Facing such threats, the harbour city of Hong Kong cannot stand aside in the globalised environment.

The environmental impact on economies has enriched the definition of 'sustainable development' from the maintenance of a balance between the environment and development to the pursuit of a development model that is furthered by the interaction between the socio-cultural, economic and environmental perspectives, so as to make good use of natural resources fairly for generations. The American Institute of Architects defined sustainability as "the ability of a society… to continue functioning into the future without being forced into decline through exhaustion or overloading of the key resources on which that system depends."[2] In other words, we must have a continuously balanced environment to maintain good supplies of resources and provide motivation for socio-cultural, economic and environmental development.

Against this background, a motion without legislative effect titled 'Policies on sustainable urban development and green buildings' was moved in the Legislative Council of the Hong Kong Special Administrative Region on 23 May, 2007, and it was passed by Council Members unanimously.[3] The present paper attempts to examine the issues and proposals that the motion discussed.

2. Buildings and Global Warming

Greenhouse gases (GHG), the main contributors to global warming, are mainly emitted by buildings. According to the information on the Canadian 'Architecture 2030' website, buildings are a major source of energy consumption and GHG emissions, which even exceeds emissions from manufacturing and transportation.[4]

[1] IPCC (2007), *passim.*

[2] AIA (2004), p.1.

[3] LegCo (23 May, 2007). The motion was moved by LegCo Member Prof Hon Patrick Lau.

[4] Architecture 2030, 'The Building Sector: A Hidden Culprit'.

In the US, commercial and residential buildings in operation account for 38% of total GHG emissions. It is estimated that in 20 years' time, GHG emissions in the US alone will increase by 36%, energy consumption by 37%; and the global energy consumption level in the same period might increase by 54%.[5] Therefore, the Royal Architectural Institute of Canada is actively implementing a programme to cut GHG emissions drastically now and decrease our dependencies on fossil fuel.[6] According to the *Kyoto Protocol*, by 2012, all industrialised countries should reduce their overall emissions of 6 GHG[7] by at least 5.2% below 1990 levels.[8]

Although energy efficiency standards are not introduced to all buildings in Hong Kong yet, the Government of the Hong Kong Special Administrative Region (HKSARG) will be instrumental in taking the lead in introducing 'zero energy' buildings in projects like the New Central Government Complex (CGC) at Tamar or other public buildings, particularly when green buildings are being built all around the world.

In the US, the new San Francisco Federal Building has adopted an effective natural ventilation design which allows 70% of its floor area to operate without air conditioning, whilst most of its workspaces can rely on natural lighting, reducing the need for artificial illumination during the day.[9] The 288m-tall Bank of America Tower in Manhattan (scheduled to open in 2008) has employed thermal recycling technology to reduce energy consumption. Apart from higher ceilings, its also uses translucent glass panels with extra insulating properties, whilst the thermal storage system at cellar level produces ice during off-peak hours, which will be used to reduce the temperature of the building during peak daytime.[10]

Guangzhou is now constructing a 69-storey tall zero energy building. Its unique curvilinear design helps force strong winds through wind turbines inlets in the facade which contribute to powering the building's HVAC systems and reducing the wind load on the building. Moreover, rainwater can also be captured and filtered for reuse.[11]

In fact, we only need to increase construction costs by 5% to erect environment-friendly energy-efficient buildings, which will soon be compensated by the expenses saved from the energy-efficient daily operation. Newly constructed buildings, particularly public buildings, are therefore aiming at taking the lead in embracing this zero energy architectural design.

3. Building Environmental Performance Assessment Scheme

Energy-efficient buildings indeed set the architectural design models promoted under sustainable urban development. In order to encourage energy conservation and gas emissions reduction, the HKSARG could actively introduce a 'green building labelling system' which assesses the environmental performance of buildings fully in terms of their design, construction and operation. Besides energy efficiency and ventilation, attention should also be paid to the application of greening, household waste treatment, wastewater reuse, and renewable energy. It must be noted that greening does not denote sky gardens and wall greening only. What is even more important is the 'greening ratio', calculated by floor area, not vertical or suspended areas, so as to ensure sufficient spaces for greening.

Although the 'Hong Kong Building Environmental Assessment Method' (HK-BEAM) has already been launched for 10 years and graded about 100 projects, it has never been applied to all buildings because it is adopted on a voluntary basis.[12] But the HKSARG's consultancy study on a 'Comprehensive Environment Performance Assessment Scheme for Buildings' (CEPAS) has just been completed,[13] whilst the *Construction Industry Council Ordinance* has also been passed,[14] which may mark a new phase in the HKSARG's work.

There is an international trend for cities to introduce the 'Building Environmental Performance Assessment Scheme' (BEPAS) with government support. Be it new or existing buildings, they must undergo environmental performance assessment, which acts as an indicator to gauge the level of sustainable development and as encouragement to enhance buildings' energy efficiency.

---

[5] USGBC, 'Buildings and Climate Change', p.1.
[6] RAIC, 'Sustainability and the Built-Environment'.
[7] They are: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydro fluoro compounds, and perflurocarbon compounds.
[8] UNFCC (1998).
[9] Pritzker (2005).
[10] Durst, 'Bank of America Tower at One Bryant Park: Environmental Fact Sheet'.
[11] Architectural Record , 'SOM's Pearl River Tower'; Glass, Steel and Stone, 'Pearl River Tower'.
[12] HK-BEAM, 'HK-BEAM: The Hong Kong Building Environmental Assessment Method'.
[13] BD, 'Comprehensive Environmental Performance Assessment Scheme for Buildings'.
[14] LegCo (24 May, 2006).

In Japan, since 2002, the Tokyo Metropolitan Government has introduced the mandatory 'Tokyo Green Building Programme': all new or extension projects with floor area over 10,000m^2 must undergo a rating system of 1 to 3 stars.[15] Although there is no fixed level of achievement that a project with a certain floor area must attain, the developer must indicate the star rating on the sales brochure for reference.

In the US and Canada, under the 'Leadership in Energy and Environmental Design' (LEED) scheme, there are 4 levels of grading: Platinum, Gold, Silver and Certified.[16] In Vancouver, setting an example for the building sector, all public buildings with floor area over 500m^2 must at least acquire the Gold standard since 2004.[17] The City of Vancouver even changed its City Building Code to require buildings to acquire the equivalent of a 'strong LEED' rating by discretionary zoning or rezoning, so as to attain an urban development that serves public interest best. Since 2005, nearly all rezoning for major projects has to meet a level of LEED Silver or better.[18]

In Mainland China, the 'Four Conservations and One Environmental Protection' green architecture (i.e. architecture that adopts energy conservation, land conservation, water conservation, and material conservation to protect the environment, reduce pollution and create harmony with Nature) promoted by the 'Eleventh Five-Year Plan'[19] has introduced new energy and architectural design codes. The Chinese Government has also formally implemented the 'Evaluation Standard for Green Buildings' (《绿色建筑评价标准》) in mid-2006.[20] In its initial stage, it is adopted on voluntary basis, but it is progressing gradually towards mandatory adoption.

The HKSARG is following the international trend of examining how best to formulate a green building policy for the public good. There are many possible proposals. For example, all government or government-funded projects above a certain size should obtain a BEPAS rating of Gold or better; all new large private development projects should obtain a rating of Silver or better; all other new or redevelopment projects above a certain size should pass BEPAS, and the corresponding report submission should be made as part of the building approval process, whilst the assessment results should be made accessible for public viewing.

4. Sustainable Urban Planning

In order to implement genuine sustainable urban development, it is best to make a start during the urban planning and architectural design stage, and continuously monitor their day-to-day operation, whilst introduce sustainable planning and a green building policy. The HKSARG could take the lead by adopting them in projects like the new CGC or other public buildings, and it may provide incentives for market compliance, so as to promote green buildings across the board gradually.

The HKSARG may also consider introducing the sustainable planning concept of 'Green City' actively and examining how to build a 'zero pollution' low-density community when developing potential zones in the New Territories and the outlying islands, so as to help lighten the burden of the overtly high-density urban areas. Like Lok Ma Chau or Discovery Bay, we can reduce problems caused by pollution through planning measures, such as fully utilising green technology since the road planning stage, adopting smoke-free rail system, pedestrian linkage, comprehensive district greening, or building design that harmonises with the natural environment.

Hong Kong may not become a Green City in the near future, but it is most important for society to reach consensus on sustainable urban development and a green building policy, so that the Administration and the Legislature can work in harmony to expedite the implementation of the relevant policies. Relevant departments under the new Development Bureau could be combined to resolve coordination inadequacies in planning and project development, and set down a long-term and highly efficient development approval system. The Bureau, with its power of final adjudication, should take command of these departments and eliminate departmental territorialism, thus making decisions that benefit society most.

It is hoped that Hong Kong will attain a sustainable development that, according to the *Report of the World Commission on Environment and Development*, "meets the needs of the present without compromising the ability of future generations to meet their own needs"[21], as well as the goal of "ensuring adequate shelter for all and making human settlements safer, healthier and more liveable, equitable, sustainable and productive"

[15] TMG (2006), p.77.
[16] USGBC, 'Leadership in Energy and Environmental Design'; CaGBC, 'LEED Rating System'.
[17] CoVP&E (17 October, 2005), p.2.
[18] CoTCPD (2006), p.1 ff.
[19] NDRC (2006), Ch. 6, *passim*.
[20] 建设部 (7 March, 2006).
[21] UNDESA (11 December, 1987).

stipulated in the 'Habitat Agenda: Istanbul Declaration on Human Settlements'.[22]

References

1. Architecture 2030, 'The Building Sector: A Hidden Culprit'. Available from: http://www.architecture2030.org/current_situation/building_sector.html [Accessed July 2007].

2. American Institute of Architects (AIA), 'Best Practices: Ten Key Factors That Affect Any Design' (2004). Available from: http://www.aia.org/SiteObjects/files/bp_18_03_02.pdf [Accessed July 2007].

3. Architectural Record, 'SOM's Pearl River Tower'. Available from: http://archrecord.construction.com/features/digital/archives/0612casestudy-1.asp [Accessed July 2007].

4. Buildings Department of The Government of the HKSAR (BD), 'Comprehensive Environmental Performance Assessment Scheme for Buildings'. Available from: http://www.bd.gov.hk/english/documents/index_CEPAS.html [Accessed July 2007].

5. Canada Green Building Council (CaGBC), 'LEED Rating System'. Available from: http://www.cagbc.org/building_rating_systems/leed_rating_system.php [Accessed July 2007].

6. City of Toronto City Planning Division (CoTCPD), *City of Toronto Green Development Standards – Phase I*, 'Appendix I: Case Studies' (2006).

7. City of Vancouver Planning and Environment Committee (CoVP&E), 'Policy Report Environment, P&E Committee Agenda' (17 October, 2005).

8. The Durst Organization (Durst), 'Bank of America Tower at One Bryant Park: Environmental Fact Sheet'. Available from : http://www.durst.org/i_bp_env.asp [Accessed July 2007].

9. Glass, Steel and Stone: Global Architecture Encyclopedia (Glass, Steel and Stone), 'Pearl River Tower'. Available from: http://www.glasssteelandstone.com/BuildingDetail/955.php [Accessed 2007].

10. HK-BEAM Society (HK-BEAM), 'HK-BEAM: The Hong Kong Building Environmental Assessment Method'. Available from: http://www.hk-beam.org.hk/general/home.php [Accessed July 2007].

11. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: The Physical Science Basis, Summary for Policymakers* (2007).

12. Legislative Council of the Hong Kong Special Administrative Region (LegCo), *Hong Kong Hansard*, Session 2006-07 (23 May, 2007).
    ---- *Hong Kong Hansard*, Session 2005-06 (24 May, 2006).

13. National Development and Reform Commission of the People's Republic of China (NDRC), *The Outline of the Eleventh Five-Year Plan: Profile* (2006).

14. The Pritzker Architecture Prize (Pritzker), 'Federal Building San Francisco, CA' (2005). Available from: http://www.pritzkerprize.com/164/pritzker2005/sanfranciscofederalbuilding.htm [Accessed July 2007].

15. Royal Architectural Institute of Canada (RAIC), 'Sustainability and the Built-Environment'. Available from: http://www.raic.org/raic/green_architecture/sustainability_e.htm [Accessed July 2007].

16. Tokyo Metropolitan Government (TMB), *Tokyo Metropolitan Government Environmental White Paper 2006* (2006). Available from: http://www2.kankyo.metro.tokyo.jp/kouhou/env/eng/pdf/017.pdf [Accessed July 2007].

17. United Nations Department of Economic and Social Affairs (UNDESA), *Report of the World Commission on Environment and Development* (A/RES/42/187) (11 December, 1987). Available from: http://www.un.org/documents/ga/res/42/ares42-187.htm [Accessed July 2007].

[22] UN-Habitat (1996).

18. United Nations Framework Convention on Climate Change (UNFCC), *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (1998).

19. United Nations Human Settlement Programme (UN-Habitat), 'The Habitat Agenda: Istanbul Declaration on Human Settlements' (1996). Available from: http://www.unhabitat.org/downloads/docs/2072_61331_ist-dec.pdf [Accessed July 2007].

20. US Green Building Council (USGBC), 'Buildings and Climate Change'. Available from: https://www.usgbc.org/ShowFile.aspx?DocumentID=2359 [Accessed July 2007].
---- 'Leadership in Energy and Environmental Design'. Available from: http://www.usgbc.org/LEED [Accessed July 2007].

21. 中华人民共和国建设部 (建设部), '建设部关於发布国家标准《绿色建筑评价标准》的公告', 建设部公告第413号 (7 March, 2006). Available from: http://www.cin.gov.cn/gsgg/gg/jsbgg/200610/t20061031_2837.htm [Accessed July 2007].