Transitioning to a Low-carbon Economy
過渡至低碳經濟

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Abstract

In recent years different phrases and buzzwords have been used to promote green building, but the term 'low-carbon' has taken on a sense of urgency due to the increasingly apparent effects of climate change. Although measures have already been adopted to enhance the energy efficiency of our buildings, much more needs to be done if we are to make a realistic contribution to the fight to keeping global warming within the safe limit of a 2°C rise in temperature. To do so, we must introduce new thinking as well as new technologies to complement the use of existing technologies. This requires a holistic approach to the issue and a readiness to consider changes not only to the engineering systems involved, but also traditional practices and user behaviour. Creating a low-carbon environment needs more than just a change in terminology; it will take a more fundamental shift in the way we think about and tackle the problem of climate change.

摘要

近年，有不同的詞彙被應用於推廣綠色建築。當中，因氣候急劇轉變，令「低碳」一詞變得最為人所熟識。即使我們已提升建築物的能源效益，但若要確切的對抗溫室效應，把上升的溫度保持在攝氏2度的安全線之內，我們必須更加努力。為此，我們必須引入新思維、新技術來補足現有科技。這需要全面的對策，並嘗試就工程系統、甚至既有的傳統做法和用者行為等範疇著手提出轉變。創造低碳環境，不單要改變用詞，更要徹底改變大眾對氣候轉變的想法及相關的對策，一起克服難題。

Biography

Ir Prof Reuben CHU Pui Kwan, President of the Hong Kong Institution of Engineers (HKIE), has over 30 years' experience in consulting engineering and has delivered civil, geotechnical and structural services in Hong Kong and overseas. He is currently the Managing Director - Structural, Infrastructure and Environmental, of Meinhardt Consulting Engineers.

A HKIE Fellow, Ir Prof CHU has made significant contributions to the development of the Institution as a key member of various boards, panels and committees. He also has strong connections with the community, having served on numerous academic, professional, institutional and government bodies.

Transitioning to a Low-carbon Economy

Good morning, ladies and gentlemen. Thank you for inviting me to speak at a symposium on a subject that's close to my heart.

When I joined the Hong Kong Professional Green Building Council (HKPGBC) seven years ago, the concept of "green building" was as new to Hong Kong as the newly-established organisation. People were talking more about "sustainable development" than "green building" or "energy efficiency", and the idea of "low-carbon living" or "zero-carbon building" was unheard of.

However, everything's changed: the threat of climate change has become more urgent and cutting greenhouse gas emissions has taken priority. The change in terminology is a reflection of this.

Because buildings account for 89% of Hong Kong's energy use, efforts to reduce our carbon emissions have focused on measures to improve the energy performance of our buildings. Our host today, the EMSD, has spearheaded research into energy efficiency in buildings, developed the performance-based building energy codes and introduce energy labelling for an increasing number of appliances. The Environmental Protection Department's introduction of carbon auditing and government incentives for energy conservation are also useful tools for cutting our carbon emissions.

However, we need to do even more. According to research by the Stockholm Environment Institute, we are on course for global warming of up to 3.5°C by 2100, because the cuts in carbon emissions pledged by the international community at the Copenhagen Summit will not be enough to keep global warming within the safe limit of a 2°C rise in temperature.

So apart from replacing tungsten lamps with LED lighting, switching to energy-saving appliances and ensuring new and retrofitted buildings comply with the new building energy codes, what else can we do?

Energy conservation measures have been described as the "low hanging fruits", because they are the easiest to implement so the resulting reduction in energy use is easy to achieve. The building services industry estimates that, if all commercial buildings in Hong Kong that perform poorly on the energy front are upgraded to comply with

the energy codes, we will cut our annual total energy consumption by almost 8%.

Now imagine what we can do if we climb further up the tree, to go for more ambitious carbon reduction measures.

According to a study commissioned by the Climate Change Business Forum (CCBF), retrofitting existing buildings with current and emerging low-carbon technologies to deliver power, heating and cooling on site can deliver a 50% reduction in our carbon emissions. That means introducing micro-hydro, smart grid and other technologies to Hong Kong. The study suggests that further improvements are possible through the implementation of building energy management systems, which means deploying advance information and communication technologies, or ICT, to help us maximise energy savings.

We can be justifiably proud of the fact that, in Hong Kong, everything works so well. We expect the lights to come on when we flick the switch and water to flow when we turn on the tap. We don't have to worry about blackouts or water shortages. The regulatory system is robust and our engineers are well qualified to deliver reliable building services based on a simple rule: the system or technology adopted has to be "tried and tested".

This is all well and good, but in the face of the most serious threat to humanity's long-term survival, it's time for us to embrace new thinking and new technologies. That is not to say we should adopt ideas that don't work: there are many ideas that do work; it's just that they have not been given a chance to prove their worth in Hong Kong, and we are accustomed to thinking of different building services as discrete systems, which limit their potential for reducing carbon emissions for us.

For example, we can retrofit a building with a water-cooled air-conditioning system and variable speed booster pumps to save energy, but can we not do more by integrating the different services so that the hot water system can be leveraged to produce chilled water for air-conditioning as well? Instead of thinking in terms of energy savings within the existing design and operational framework, can we think outside the box a little and embrace more ambitious ideas?

Right now we are trying to make incremental improvements to the energy performance of our building stock, but we are nowhere near the "zero carbon" that green building advocates around the world are already designing and putting to use. Why do we need to aim for "zero carbon"? Because scientists are telling us that reduction in our carbon emissions has to be much more drastic than we have been willing to make in order to keep global warming within the 2°C limit.

What we must undertake, therefore, is not just an 'upgrade', but a transition – a transition from energy-hungry systems and an energy-hungry way of life to a low-carbon alternative that is unfamiliar but inevitable. To do that, we have to start thinking of these two elements together and not separately; building professionals will have to work hand-in-hand with users, NGOs and the government in order to deliver a low-carbon environment.

We need to start thinking holistically. You know, among engineers we have been talking about how engineering contributes to every aspect of life and yet people are not aware of it. We may develop more energy-efficient building services, but people just take it for granted or, worse, use them more, which cancels out the carbon savings. How can we contribute to user education so that the energy-efficient systems we design and install will serve their purpose? And how can we help our fellow citizens save more energy by acquiring a better understanding of their usage patterns and preferences?

Perhaps we should turn to the younger generation for inspiration. Some schools have installed mini-wind turbines, solar panels and green roofs and started growing their own plants. The students love being part of all that, and when they go home, they tell their parents to switch off the lights and save water. This is a generation that does not know life before the Internet and the mobile phone; you can say they are wired differently from us, the "Pre-80s". I bet, if we pose the low-carbon question as a challenge for the young, they will come up with some ideas that surprise us. Involving them will also enhance our efforts to interact with and serve the community, something we are all eager to do.

"Problems cannot be solved by the same level of thinking that created them," Einstein once said.

It's time for us to apply new thinking to the design and operation of our buildings. We can't just change the terminology – talking about "green building" one day and "low-carbon building" the next – we must have the courage and creativity to take the necessary steps towards making our buildings fit for a very different world.