

Enhancing Building Energy Efficiency - A Concerted Effort of the Trade and the Government

C.H. Yip and W.Y. Ho

Electrical and Mechanical Services Department, The Hong Kong SAR Government

Abstract

In Hong Kong, electricity constitutes about 55% of total energy use while around 90% of the electricity is consumed in buildings. To pave the way towards a quality and sustainable environment, it is imperative to enhance energy efficiency of buildings. While the Buildings Energy Efficiency Ordinance (Cap 610) serves a major regulatory instrument in upholding energy efficiency of buildings, other initiatives are also adopted both within Government and collaboration with the trade to achieve the purpose. This paper provides a general review of Government's experience on improving energy efficiency of government buildings and the collaboration with the trade / owner of existing private buildings through a financial instrument.

在香港，電力約佔總能源使用量的百份之五十五，而其中約百份之九十的電力是使用於樓宇當中。要達至一個有質素和可持續的環境，提高樓宇的能源效益是重要的一環。建築物能源效益條例(第六百一十章)是維持樓宇能源效益的主要監管工具；此外，政府也於內部和與業界合作的兩個層面推行其他計劃，以達至上述目標。本論文概略地檢討了政府在提高政府樓宇能源效益以及透過財務工具與業界及現有私人樓宇業主合作的經驗。

Keywords: Building Energy Efficiency Funding Schemes; Buildings Energy Efficiency Ordinance; community-wide participation; energy efficiency of buildings; Energy Efficiency (Labelling of Products) Ordinance

1. Introduction

Hong Kong, as a member of the Asia-Pacific Economic Cooperation (hereafter referred as APEC), has committed to strive for the aspirational target of reducing energy intensity by at least 45% by 2035 with 2005 as a base year. In respect of our energy consumption pattern, electricity constitutes about 55% of total energy use while around 90% of the electricity is consumed in buildings. To achieve our committed reduction target, various measures have been planned / implemented to promoting demand side management and enhancing energy efficiency. However, Government's effort alone is not sufficient. Concerted effort from all fronts including the trade and industry (i.e. consultants and contractors, town planners, developers, building professionals and facility managers) and the collaboration of the general public are equally important to pave the way towards a quality and energy efficiency built environment for sustainable development.

2. Regulatory Instrument

Energy efficiency and conservation in Hong Kong has been promulgated through various means and channels including policies, regulatory instruments, financial instruments and public participation. The regulatory instruments provide the ruling and the minimum standards to enable the general public, trade and industry to nurture energy efficiency practices and distinguish energy efficient products in the market. While around 90% of the electricity is consumed in buildings, all round actions have been taken to improve energy efficiency in the built environment as well as consumer's electrical appliances.

The Government introduced regulatory instruments namely, the Buildings Energy Efficiency Ordinance (Cap. 610) (hereafter referred as BEEO) on 21 September 2012 and the Energy Efficiency (Labelling of Products) Ordinance (Cap. 598) on 9 May 2008. Empowered by the mentioned Ordinances, the Building Energy Code (hereafter referred as BEC) and the Mandatory Energy Efficiency Labelling Scheme (hereafter referred as MEELS) were implemented with a view to reduce energy consumption of two different sectors of energy consumers.

2.1 Buildings Energy Efficiency Ordinance

In Hong Kong, the four key types of building services installations (i.e. lightings, electrical installation, air conditioning systems and lifts & escalators) account for around 80% of the total electricity consumption in a modern office building. To effectively reduce the energy consumption, the BEEO has been fully implemented to mandate newly constructed buildings and major retrofitting works in existing buildings, in particular the building services installations mentioned above, to comply with the BEC which is the minimum energy efficiency design standards governing the prescribed building services installations.

The establishment of the BEC has taken into account the development of energy efficiency technology, design practices, local needs and good engineering practices world-wide and in Hong Kong. The prescribed building services installations designed in accordance with the BEC will be deemed to have satisfied the relevant statutory requirements in the technical aspects.

Under the BEEO, the developer of a newly constructed building is required to submit a "stage one declaration" and a "stage two declaration" which are certified by a Registered Energy Assessors (hereafter referred as REA) registered in the Electrical and Mechanical Services Department (hereafter referred as EMSD) to apply for a Certificate of Compliance Registration (hereafter referred as COCR). For major retrofitting works in a unit or common area in a prescribed building, the responsible person (i.e. owner, tenant or occupier etc.) is required to obtain a Form of Compliance (hereafter referred as FOC) from a REA within two months after completion of the retrofitting works.

Besides, the BEEO also requires owners of commercial buildings (including the commercial portions of composite buildings) to carry out energy audit every 10 years for the four key types of central building services installations in accordance with the guidelines provided in the Energy Audit Code (hereafter referred as EAC). The EAC is another tool under the BEEO to assess the energy performance of buildings and recommend appropriate energy management opportunities (EMO) for the building owners' consideration. The energy audits should be carried out by a REA and the audit results should be exhibited in a conspicuous

position at the main entrance of the buildings. Building owners may consider to implement the EMOs recommended in the energy audit with due consideration of the proposed scope of work, building operation, cost and effectiveness etc.

It is estimated that, through the implementation of BEEO, around 2.8 billion kWh saving could be obtained in the covered new buildings in the first decade after the implementation.

2.2 Energy Efficiency (Labelling of Products) Ordinance

In Hong Kong, about 60% of electricity was consumed on space conditioning, refrigeration and lighting in the residential sector. To promote efficient use and conservation of energy in this sector, MEELS was implemented through the Energy Efficiency (Labelling of Products) Ordinance with a view to raise energy saving awareness of the general public and to facilitate them to select energy efficient appliances. The philosophy behind is to cultivate consumers culture to differentiate and purchase more energy efficient appliances to create a market force. This market force would eventually drive electrical appliances suppliers / manufacturers to introducing more energy-efficient appliances to the community to phase out those less energy-efficient appliances.

Under the MEELS, energy labels are required to be shown on the prescribed products for supply in Hong Kong. The energy labels provide information to consumers on the energy efficiency performance of the appliances which form part of the consumers' decision matrix. MEELS currently covers five types of prescribed products, namely room air conditioners, refrigerating appliances, compact fluorescent lamps, washing machines and dehumidifiers. Importers or local manufacturers of products covered by the MEELS have to submit information of the product models to EMSD prior to supplying them to the local market. In order to facilitate importers or local manufacturers' submissions under the Ordinance, EMSD has issued a Code of Practice on Energy Labelling of Products which sets out practical guidance and technical details on the energy labelling requirements for the five types of appliances.

The MEELS has been implemented in phases. The initial phase of the MEELS covering room air conditioners, refrigerating appliances and compact fluorescent lamps was implemented on 9th November 2009 while the second phase for washing machines and dehumidifiers was commenced on 19th September 2011. It is estimated that with the implementation of the initial phase of the MEELS for the three prescribed products, an annual energy saving of 150 GWh can be achieved. With the implementation of the second phase of the MEELS, an additional annual energy saving of 25 GWh can be achieved.

3. Government Lead-By Example

The Government, which as one of the major electricity consumers in Hong Kong, is committed to lead by example in promoting energy efficiency and conservation. In November 2005, a government internal technical circular has been issued requiring all new Government buildings as well as major retrofitting and renovation projects to comply with BEC and to incorporate energy efficient features and renewable energy technologies into their design where appropriate. Since then, EMSD has planned more than 600 energy efficiency improvement projects in government facilities utilizing various energy efficient technology, including water cooled air conditioning systems, variable speed drive for condensing water

pumps and air handling units, LED lightings and etc. Upon completion of these projects, an annual electricity saving of more than 70 million kWh is anticipated.

In April 2009, the Government further promulgated a comprehensive target-based environmental performance framework for new and existing government buildings. The framework set targets in respect of energy efficiency, renewable energy application, indoor air quality, reduction in greenhouse gas emissions, waste reduction and water management. It demonstrates the Government's commitment to lead by example for the community in striving for a greener Hong Kong.

Besides, the Government is also promulgating green procurement policy for which departments are required to incorporate the energy labels in their procurement specifications.

In supporting green infrastructure, the Government is implementing a first-of-its-kind district cooling system (hereafter referred as DCS) in Hong Kong to provide more energy efficient centralized water-cooled air-conditioning system to the public and private non-domestic developments at the Kai Tak Development. Upon the full operation of the system, the DCS is anticipated to bring about annual electricity saving of 85 million kWh.

4. Financial Instrument

To encourage the community to take concerted actions, the Government has established a 3-year Building Energy Efficiency Funding Schemes (hereafter referred as BEEFS). Under the BEEFS, an amount of HK\$450 million was allocated to subsidize owners of residential, industrial and commercial buildings to carry out energy-cum-carbon audits (hereafter referred as ECA) and energy efficiency projects (hereafter referred as EEP) with a view to encourage building owners to review their use of energy and quantifying the greenhouse gas emissions associated with their buildings. This can facilitate building owners to identify opportunities on reducing energy consumption and greenhouse gas emissions. The BEEFS have been well received by the community since its launch in April 2009. The application has been closed in April 2012. More than 1,700 EEP and 233 ECA applications were received. Over 6,400 buildings, or more than one seventh of the total building stock in Hong Kong, have received subsidies under the BEEFS. The types of installations involved in the projects have evolved from the replacement of lighting installations, which is relatively easy to implement, to large-scale projects involving replacement of central air-conditioning and lifts. There were 1,115 applications approved under the BEEFS which constituted about 56% of the total applications. Among the approved applications, the highest amount of subsidies per building reached the cap of HK\$0.5 million per building, and the lowest amount per building is about HK\$3,000. An estimated annual energy saving of 180 million kWh can be achieved upon completion of these projects.

5. Effort of the Trade and the General Public

Besides Government's effort, success in energy saving and conservation also rely heavily on the trade and industry with the collaboration of the general public. Each member of the community such as professional streams, developers, retail industry and the general public have their key role to play.

With the support of the trade and industry, REAs under the BEEO are appointed by developers, building owners or responsible persons. These REAs are tasked with the

important role to certify compliance with the BEC in COCR application, issuing and copying the FOC to responsible persons of unit/common area and EMSD respectively, and conducting energy audits for building owners.

Similarly, the BEEFS have also successfully encouraged cross-sectoral co-operation between the engineering and property management sectors to grasp the opportunities brought by low-carbon economy.

For the retail sector and general public in the community as a whole, the Government have been promoting community-wide participation in energy saving through various campaigns. For instance, the Government has recently launched the Energy Saving Charter on Indoor Temperature and the Energy Saving Charter on "No Incandescent Light Bulbs" as a public-private cooperation in promoting energy efficiency.

6. Conclusion

Enhancing building energy efficiency has to be achieved through concerted effort of trades and professionals, relevant stakeholders, the general public and the Government. The success in both the regulatory instrument and the financial instrument is an indication signifying good expertise and opportunities, in terms of technology know-how and the energy saving potential, exist in Hong Kong. The Government is also committed to reduce energy consumption of public venues through implementation of policies and energy saving projects. For the community as a whole, the campaigns for community-wide participation in energy saving raise the awareness of energy saving among different sectors with a view to drive the behavioural change of local energy end users. It is only by this concerted effort, the energy efficiency of the buildings in Hong Kong can be pushed up to the next level and the reduction of the energy intensity as committed in the APEC can be achieved.