CB(1)516/12-13(03)

Legislative Council Panel on Housing

Energy Saving Initiatives
in New Public Housing Developments

PURPOSE

This Paper is to brief Members on the energy saving initiatives already implemented by the Hong Kong Housing Authority (HA) and to set out further measures for new public housing developments (PHD) .

BACKGROUND

2. The HA is committed to implement energy saving measures to reduce electricity consumption in new PHD. Through continuous efforts, the HA has achieved a substantial reduction in annual electricity consumption in communal areas within new PHD, by 42% (or 436 kWh[1] per flat) over the past 11 years from 2000/01 to 2011/12. Notwithstanding our past effort, we will continue to implement more energy saving initiatives with a view to further reduce annual electricity consumption in communal areas by another 10%[2] in 2014/15 (see **Annex A**).

ENERGY SAVING INITIATIVES BEING IMPLEMENTED

3. Lighting, lift and water pump systems consume around 55%, 21% and 16% respectively of the energy used in communal areas of a public housing domestic block[3]. We have implemented a number of initiatives on energy saving systems and effective energy management tools to achieve better energy saving performance in new PHD. We have also put great emphasis on raising residents' awareness of energy saving. An account of these initiatives is summarized in (a) to (c) below.

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[1] Reducing from 1,032 kWh per flat in 2000/01 to 596 kWh per flat in 2011/12, for a typical 41-storey domestic block with 799 flats.

[2] Reducing from current 596 kWh per flat to 536 kWh per flat in 2014/15, for a typical 41-storey domestic block with 799 flats.

[3] For a typical 41-storey domestic block with 799 flats.

(a) Energy Saving Systems

(i) Reducing Consumption by means of Renewable Resources

In May 2011, the HA decided to implement grid-connected photovoltaic system in all new PHD under planning and design, which provide domestic blocks with communal electricity consumption of at least 1.5% . The system can exploit inexhaustible solar energy and generate electricity without carbon emissions.

(ii) Reducing Consumption of Lighting Systems

Lighting systems are the most electricity consuming system in domestic blocks. We have optimized the illumination levels in public areas and also adopted energy efficient electronic ballasts and T-5 fluorescent tubes since 2000. Details were set out in our paper CB(1) 2099/09-10(06).

We adopt passive design in buildings to optimize the use of daylight and reduce lighting energy consumption. We design lighting circuits to fully utilize daylight at open corridors or corridors with openings to maximize energy saving. We have widely employed photo sensors and time switches to fully utilize daylight and control the operation of artificial lights to suit the sunrise and sunset periods throughout the year.

Since December 2008, we have implemented a two-level lighting control system in new PHD. The new “Design Manual: Barrier Free Access (BFA) 2008” promulgated by the Buildings Department in 2008 mandates a higher illumination standard to cater for the needs of the visually impaired persons. In order to save energy and at the same time comply with the BFA requirement, we have, under the lighting-on-demand principle, developed a two-level lighting control system for lift lobbies, corridors and staircases in domestic blocks, whereby light levels are controlled by means of motion sensors and on-demand switches with timer controls. Details were set out in our paper CB(1) 1909/09-10(01).

(iii) Reducing Consumption of Lift Installations

Since 1996, we have used variable voltage variable frequency (VVVF) type lift power system. This energy-efficient system ensures that our lift installations meet the Building Energy Code (Lift) under the Voluntary Energy Efficiency Registration Scheme for Buildings. In addition, we have adopted a light weight lift car decoration design to further save energy.

(iv) **Reducing Consumption of Water Pump Installations**

Since 2010, we have adopted electronic variable speed drive control systems in the fresh water booster pump system to provide adequate water pressure to the topmost domestic floors. High efficiency motors are also used to further reduce the energy consumption of water pump installations.

(b) Energy Management Tools

(i) **Energy Efficiency Registration Scheme for Buildings**

Since 2000, the HA has been one of the forerunners in adopting the non-statutory Building Energy Codes (BEC) under the voluntary Energy Efficiency Registration Scheme for Buildings (EERSB)[4] in the design of new PHD. Up to December 2012, more than 400 Building Energy Certificates have been awarded by the Electrical & Mechanical Services Department (EMSD) for new PHD in recognition of their building energy performance.

(ii) **Carbon Emission Estimation**

Since February 2011, we have conducted carbon emission estimations for all domestic blocks of the new PHD. We have developed a user-friendly carbon emission estimation (CEE) methodology to holistically evaluate the carbon emission of our new PHD throughout the building life cycle. The CEE model embraces the carbon emission from major construction materials and building operations as well as the carbon reduction from renewable energy systems and absorption from trees planting. It consists of six aspects, namely (i) materials consumed during construction, (ii) materials for building structure, (iii) communal building services installations, (iv) renewable energy, (v) trees planting, and (vi) demolition. This provides an effective design verification tool for us to gauge the overall performance of a PHD in terms of carbon emission throughout the life cycle of the buildings. In most cases, aspects (ii) and (iii) contribute to more than 30% and 60% of total carbon emission.

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[4] In October 1998, the EMSD has launched the voluntary EERSB to promote the application of BEC. To further promote building energy efficiency, the Government enacted the Buildings Energy Efficiency Ordinance which has come into full operation from 21 September 2012 onward.

(iii) **Energy Management System to ISO 50001**

With the launching of ISO 50001 in June 2011, we developed and rolled out HA's Energy Management System (EnMS) for new PHD in December 2011 by modeling on the ISO 50001 best practice framework. HA was awarded the first ISO 50001 certificate on residential building design in Hong Kong in June 2012. The ISO 50001 EnMS provides a systematic framework to verify the energy performance of communal building services installations design of residential buildings against the energy baseline. It also set a clear indicator for improving the energy performance of our design. The energy performance will be verified by actual energy measurements taken after the mass intake of the domestic blocks.

(c) Awareness of Energy Saving

To raise tenants' awareness of energy saving, we have installed one or more solar-powered lamp poles at prominent locations in each new PHD since 2008 for educational purpose. We also installed pilot smart meters and display panels in ground floor lobbies in Yan On Estate at Ma On Shan Area 86B to make tenants aware of the comparative electricity, gas and water consumptions in each flat, so as to encourage the reduction of energy consumption of sitting tenants.

WAY FORWARD

4. Although the electricity consumption has already been substantially reduced through the implementation of energy saving initiatives, we will continue our efforts in exploring every practicable means to further enhance the energy performance of our buildings. We target to save a further 10% of electricity consumption in communal areas by adopting light emitting diode (LED) bulkheads. LED lighting is a promising technology that can be utilized to further reduce the energy consumption in new PHD with its potential merits of better luminous efficacy (better lighting output per watt than conventional compact fluorescent lamp by about 30%). To reap the benefits of the new technology, we are testing eight LED prototypes in Tsz Ching Estate and implementing a trial installation of LED bulkheads in Kai Tak Site 1A to evaluate the performance and product reliability. The prototypes in Tsz Ching Estate are under continuous monitoring; we will also start monitoring the trial installation in Kai Tak Site 1A upon the completion of construction in 2013. When the LED bulkheads are proven to be reliable and the price becomes more cost-effective, we will consider wider applications of LED bulkheads in new PHD.

5. As lift systems are recognized as the second-most electricity consuming system for communal areas, we will also explore the potential of new lift technologies to save energy from lift systems, such as the Permanent Magnet Synchronous (PMS) lift motor, as well as the lift regenerative power systems. The PMS lift motor is a new technology that can drive lift machine with energy saving potential. In addition, regenerative power collected from lift system can be utilized for communal consumption. We are currently carrying out trial installations of PMS lift motors in Kai Tak Site 1A and lift regenerative power systems in Kai Tak Site 1B, both are due for completion in 2013. We will monitor the availability of suppliers with a view to considering wider use of the two new lift technologies mentioned above.

6. Members are invited to note the content of this paper.

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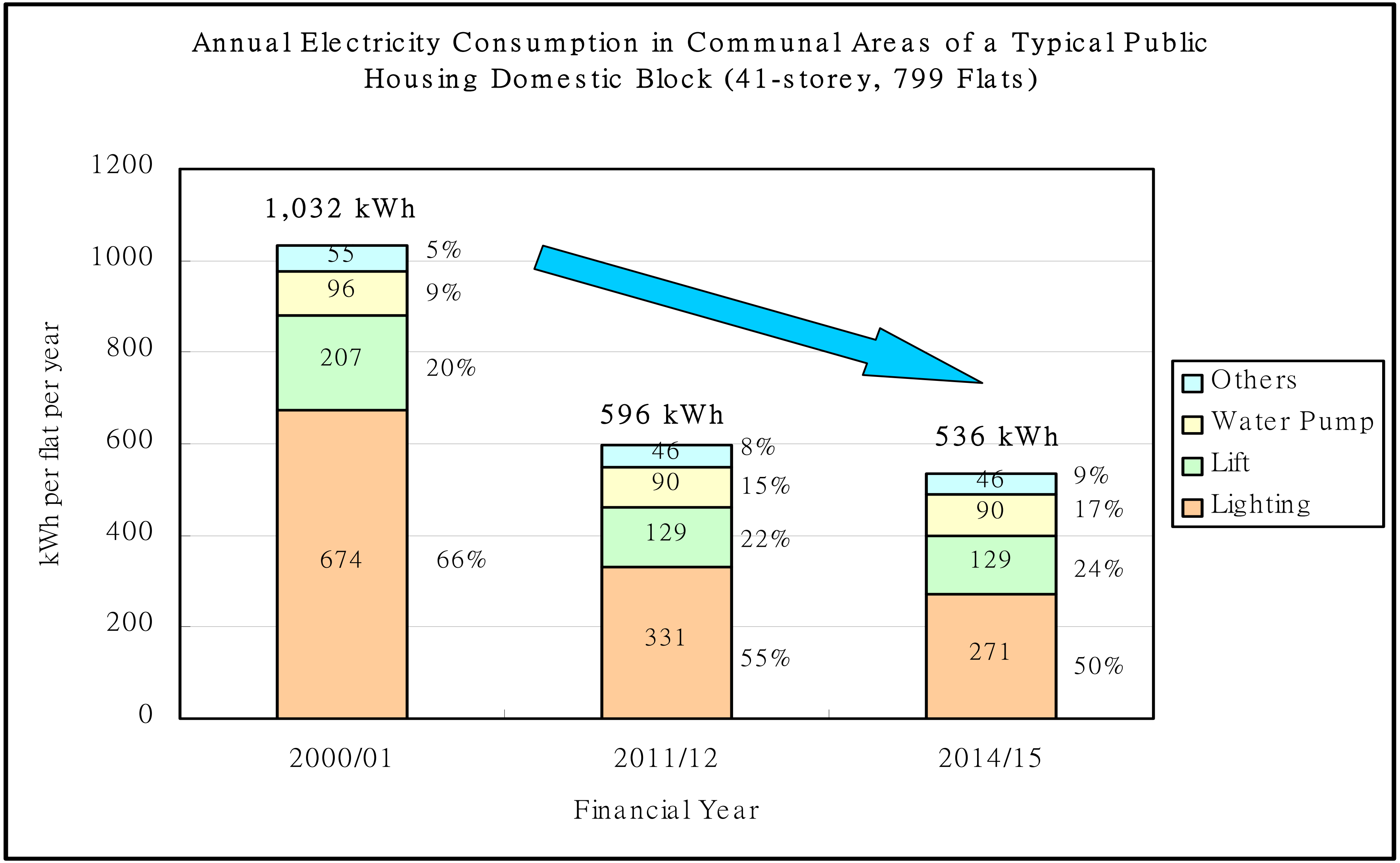
Annex A



Annual Electricity Consumption in Communal Areas of a Typical Public Housing Domestic Block (41-storey, 799 Flats)
1200
1000
800
600
400
200
0
kWh per flat per year
1,032 kWh
55
5%
96
9%
207
20%
674
66%
596 kWh
46
8%
90
15%
129
22%
331
55%
536 kWh
46
9%
90
17%
129
24%
271
50%
2000/01
2011/12
2014/15
Financial Year
Others
Water Pump
Lift
Lighting