Hong Kong Housing Authority

Legislative Council Panel on Housing

Energy Saving Initiatives in New Public Housing Developments

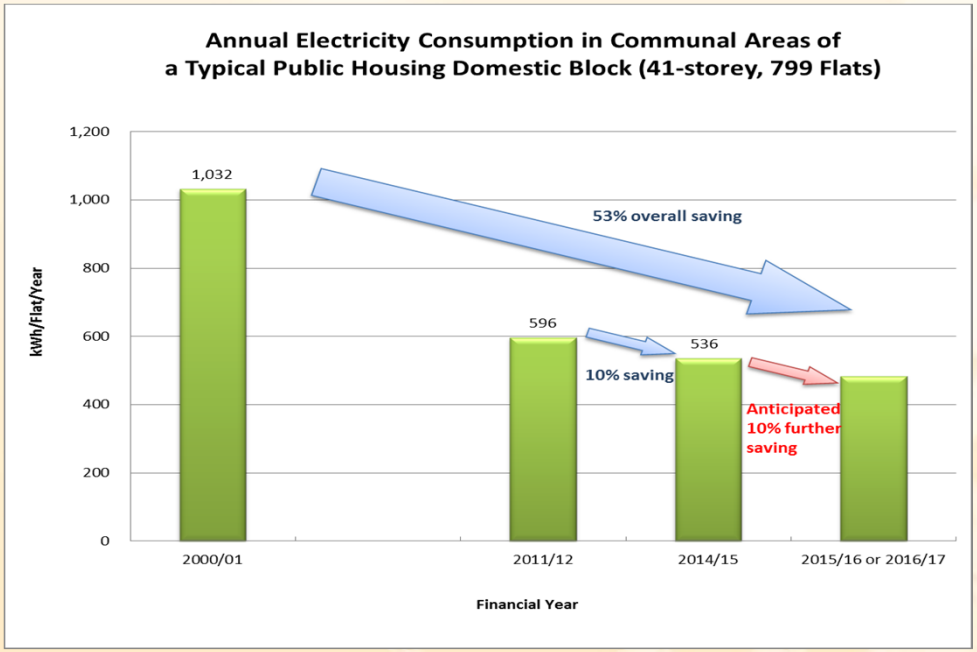
14 April 2015

Purpose

This presentation is to brief and update Members on the energy saving initiatives implemented in new public housing developments (PHD) by the Hong Kong Housing Authority (HA).

Background

- The HA is committed to implementing energy saving measures in new PHD to reduce electricity consumption and carbon footprint.
- In February 2013, we briefed Members on the energy saving initiatives implemented in new PHD and the way forward for enhancing energy performance of the HA's buildings (vide Legislative Council (LegCo) Paper No. CB(1)516/12-13(03)).
- In the past two years, the HA has been strengthening various energy saving initiatives and achieved remarkable results. As compared with 2011/12, the annual electricity consumption in communal areas of a typical public housing domestic block has been successfully reduced by 10% in 2014/15.



Energy Saving Initiatives

- The HA's primary principle is to adopt passive design for all new PHD and make the best use of natural lighting and ventilation, thereby reducing the use of energy for artificial lighting, mechanical ventilation and air conditioning as far as possible.

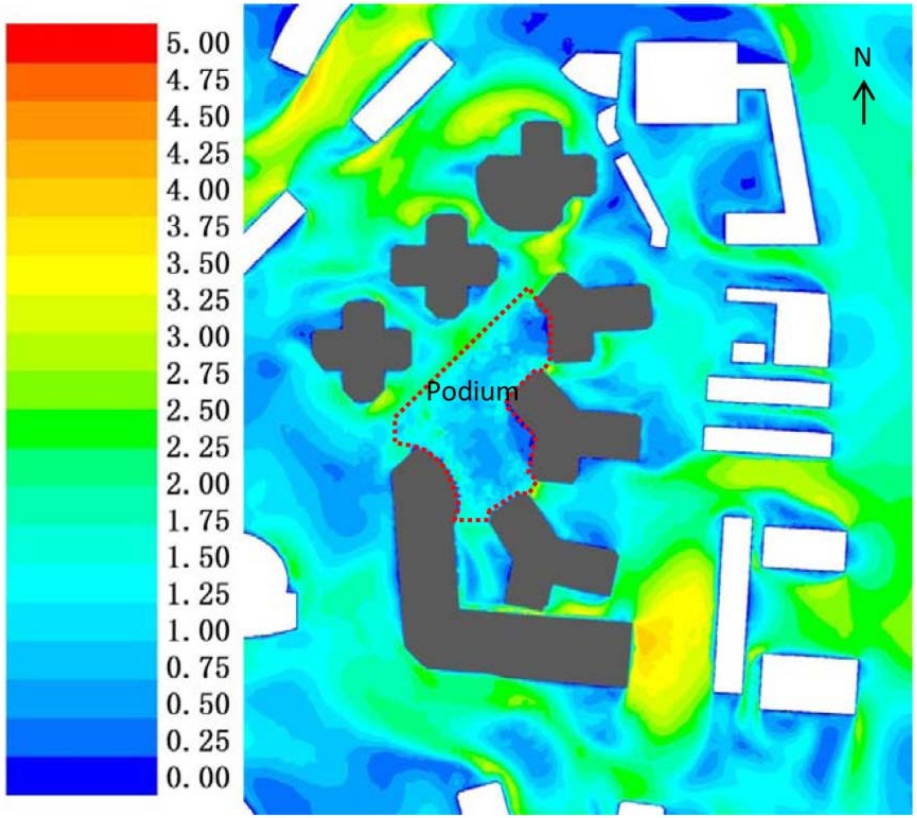


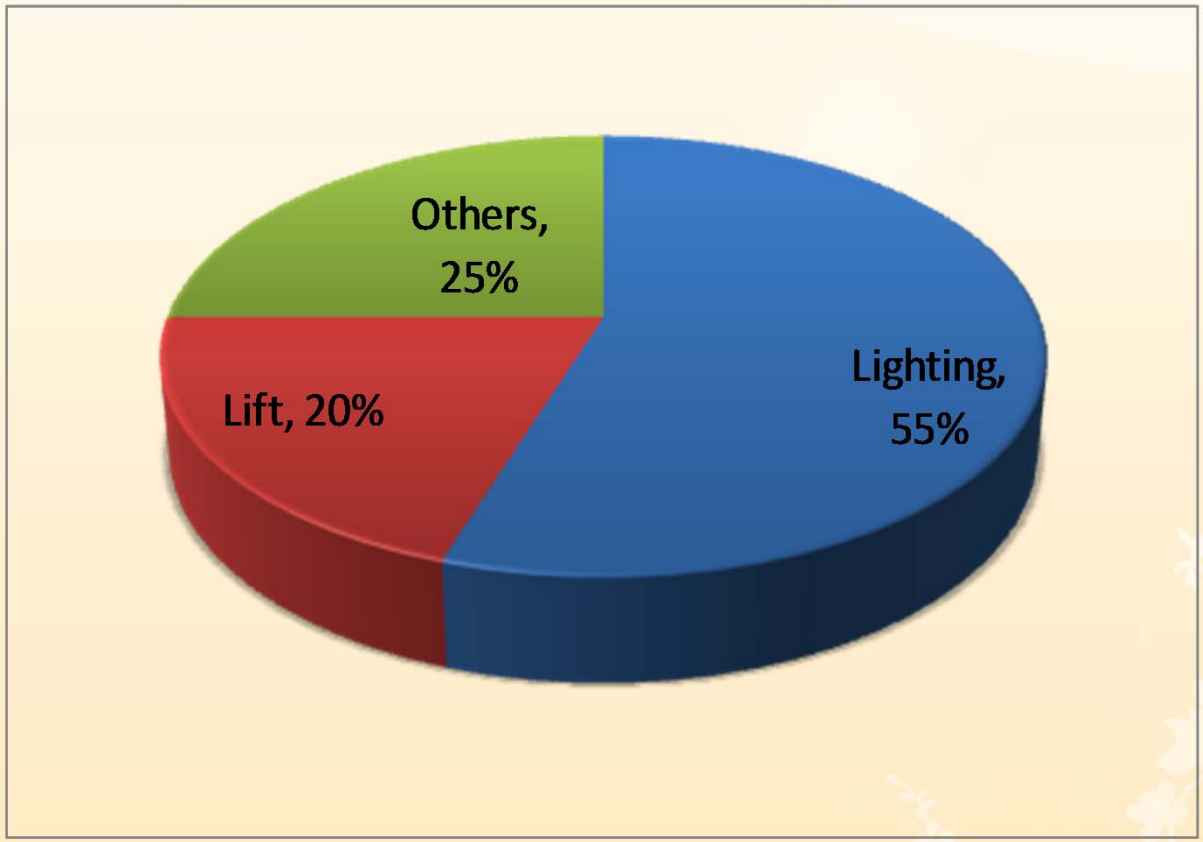
Figure 11 wind velocity distribution at 1.5m above podium with east incoming wind in mid-season

Energy Saving Initiatives

- Coupled with more greening in new PHD, we have reduced urban heat island effect and air temperature, leading to less cooling load for air conditioning in the neighbourhood.
- These measures all help reduce energy consumption both for PHD tenants as well as the HA.

Energy Saving Initiatives

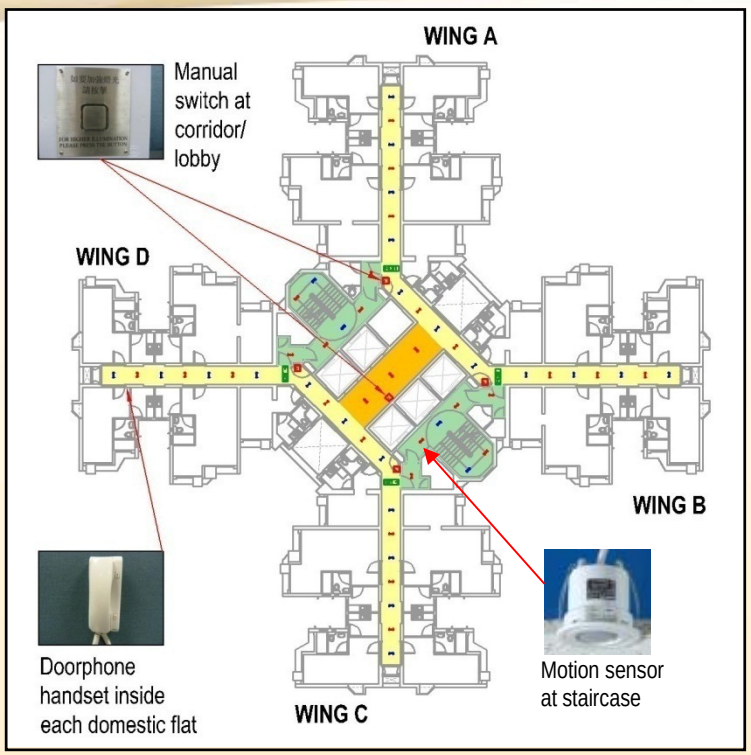
- In terms of energy use for communal facilities in PHD, about 55% is for lighting, 20% for lifts, and 25% for other services including water pumps, fire services, ventilation and security system installations.



Lighting

- Lighting is the most electricity consuming system in domestic block and hence it has all along been the HA's main focus in terms of energy saving.
- In addition to the optimisation of illumination levels in communal areas, utilisation of daylight and adoption of energy-efficient electronic ballasts and T-5 fluorescent tubes, the HA has implemented two-level lighting control system and completed a large-scale installation of LED bulkheads for trial in recent years.

Lighting



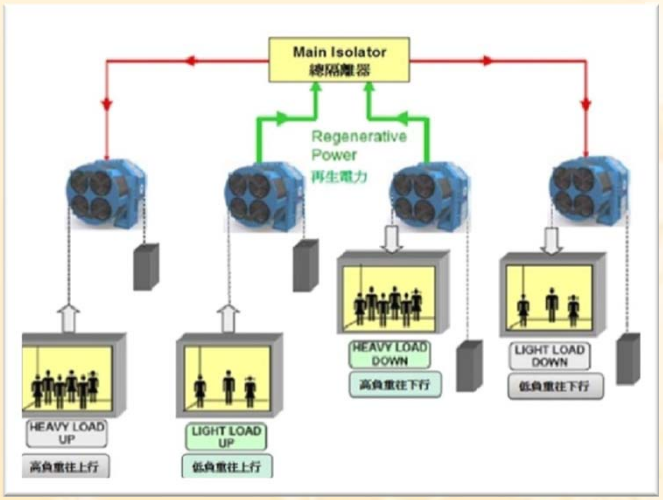
- Since December 2008, the HA has implemented the two-level lighting control system for lift lobbies, corridors and staircases in the design of new PHD to fulfill the requirement of increased illumination level for the visually impaired under the Building Department's Design Manual: Barrier Free Access (2008), and at the same time, to minimise electricity consumption through adopting the lighting-on-demand principle.
- We have assessed the energy saving performance of the first batch of projects installed with two-level lighting control systems. The result shows that the above control systems can save energy by more than 30% on average.

Lighting

- In 2013, we have completed a large-scale installation of LED bulkheads for trial in one of the domestic blocks of Kai Ching Estate to evaluate the product performance.
- The performance of the installed LED bulkheads is found to be satisfactory, and as compared with conventional bulkheads using compact fluorescent lamps, the energy saving is more than 40%.

Lift

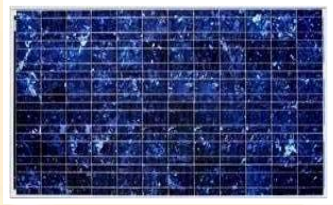
- Lift is the second-most electricity consuming system in domestic block.
- Since 2013, the HA has taken a further step to adopt state-of-the-art lift technologies, viz. lift regenerative power for large lift motors and gearless lift drive, to save more energy.
- Gearless lift drives coupled with VVVF power systems can reduce energy consumption by more than 10% as compared with conventional geared lift drive systems.
- Lifts equipped with regenerative power feature can capture and condition the regenerated electricity for feeding directly into the power grid for immediate consumption by communal facilities. The amount of energy saving arising from lift regenerative power varies with the lift traffic pattern.
- We have assessed the lift systems in Kai Ching Estate and found that the amount of energy regenerated is generally up to 20% to 30% of the energy consumed by the lifts.



Renewable Energy

- Since May 2011, the HA has been implementing grid-connected photovoltaic (PV) system in the domestic blocks of new public rental housing estates to provide at least 1.5% of the communal electricity.
- Mono-crystalline silicon PV panels have generally been adopted due to their higher solar conversion efficiency.
- In Kai Ching Estate, we have recorded an average annual electricity generation of about 1,090 kWh per kWp capacity, surpassing the estimated amount by more than 5%.
- We have also tried out other types of commercially available PV panels in Yau Lai Estate and Tak Long Estate to evaluate their performance. These include poly-crystalline silicon, amorphous silicon and CIGS thin film PV panels.

Mono-crystalline silicon

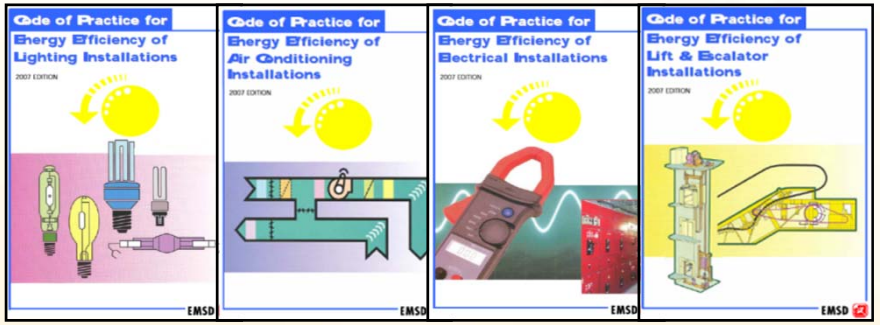


Poly-crystalline silicon

Amorphous silicon thin film

CIGS thin film

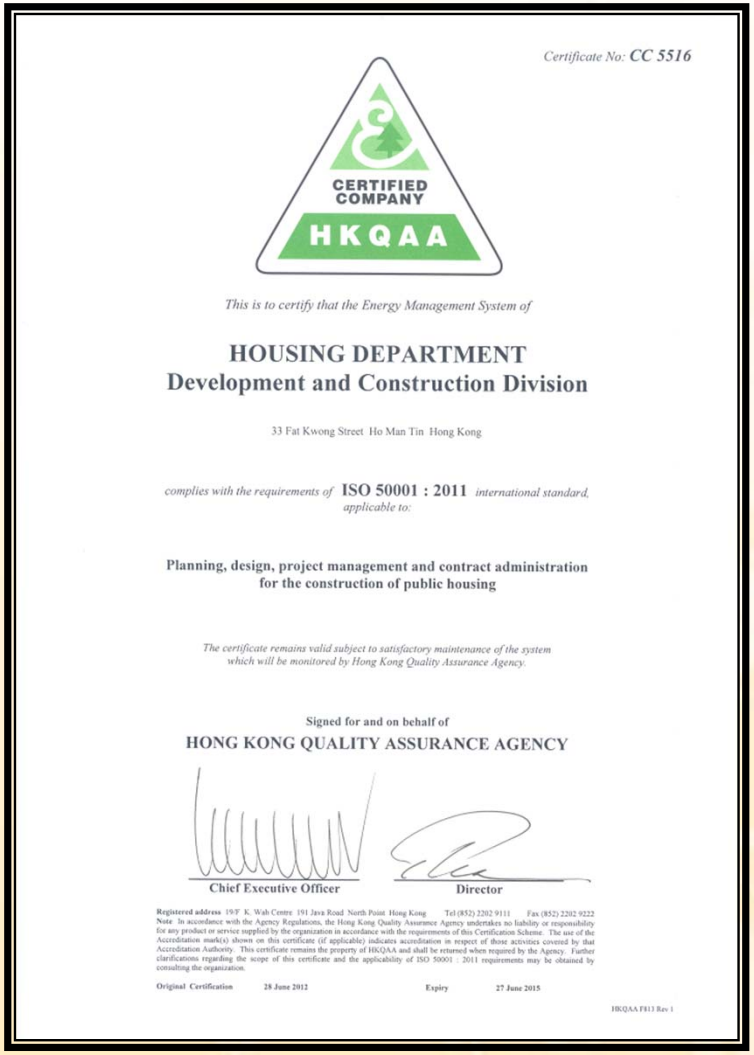
Energy Efficiency Registration Scheme for Buildings (EERSB)



- The HA has been a pioneer in achieving building energy efficiency.
- The Building Energy Efficiency Ordinance came into force in September 2012. Date back to early 2000, the HA adopted the non-statutory Building Energy Codes under the voluntary EERSB in the design of new PHD.
- From early 2000 to December 2014, more than 500 Building Energy Certificates have been awarded by the Electrical & Mechanical Services Department in recognition of good energy performance of lighting, lift, electrical and air-conditioning systems in the HA's buildings.

Energy Management System (EnMS) to ISO 50001

- The HA has implemented EnMS for the design of all domestic blocks in new PHD since December 2011.
- Up to December 2014, there have been 109 domestic blocks with Energy Estimations endorsed by the HA.
- As compared with the Energy Baseline in the EnMS, it is estimated that a reduction in communal energy consumption by 14% can be achieved and will bring about a total annual electricity saving of around 6,227,000 kWh for these domestic blocks, amounting to a reduction in carbon emission of around 4,360 tonnes.



Certificate No: CC 5516

CERTIFIED COMPANY
HKQAA

This is to certify that the Energy Management System of

HOUSING DEPARTMENT
Development and Construction Division

33 Fat Kwong Street Ho Man Tin Hong Kong

complies with the requirements of **ISO 50001 : 2011** *international standard, applicable to:*

Planning, design, project management and contract administration for the construction of public housing

The certificate remains valid subject to satisfactory maintenance of the system which will be monitored by Hong Kong Quality Assurance Agency.

Signed for and on behalf of
HONG KONG QUALITY ASSURANCE AGENCY

Chief Executive Officer Director

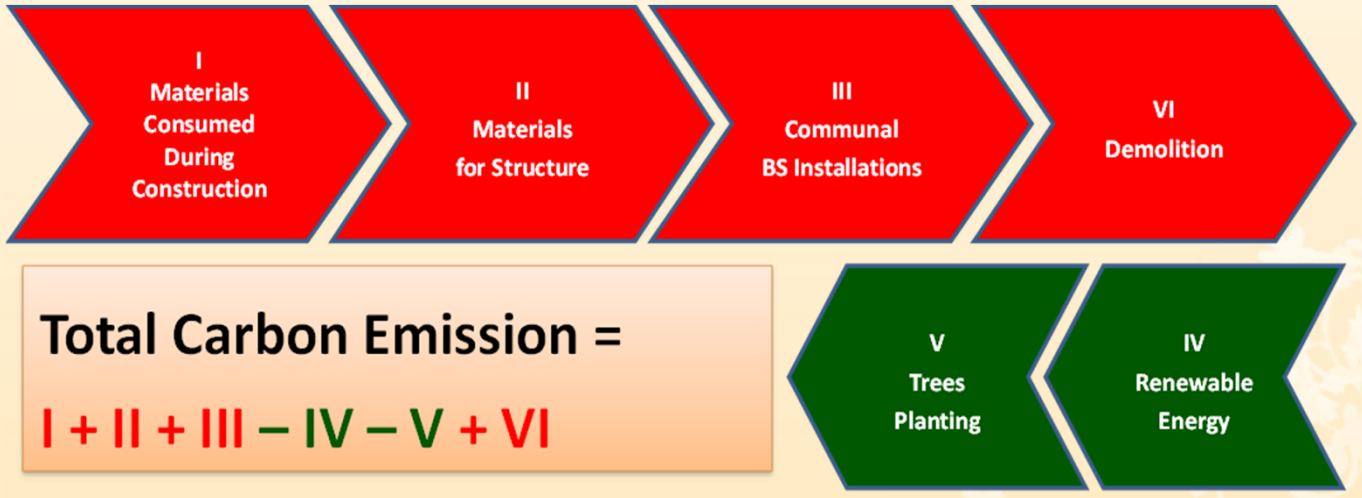
Registered address 19/F K. Wah Centre 191 Java Road North Point Hong Kong Tel (852) 2202 9111 Fax (852) 2202 9222
Note: In accordance with the Agency Regulations, the Hong Kong Quality Assurance Agency undertakes no liability or responsibility for any product or service supplied by the organization in accordance with the requirements of this Certification Scheme. The use of the Accreditation mark(s) shown on this certificate (if applicable) indicates accreditation in respect of those activities covered by that Accreditation Authority. This certificate remains the property of HKQAA and shall be returned when required by the Agency. Further clarifications regarding the scope of this certificate and the applicability of ISO 50001 : 2011 requirements may be obtained by consulting the organization.

Original Certification 28 June 2012 Expiry 27 June 2015

HKQAA F813 Rev 1

Carbon Emission Estimation

- Since February 2011, the HA has implemented CEE at design stages for all domestic blocks in new PHD.
- Up to December 2014, there are 117 domestic blocks with CEE endorsed by the HA.
- We have achieved an estimated reduction in carbon emission of around 632,000 tonnes for the whole life cycle of these domestic blocks with design building life span of 100 years, representing an average of 12% reduction as compared with the baseline figure.



Awareness of Energy Saving

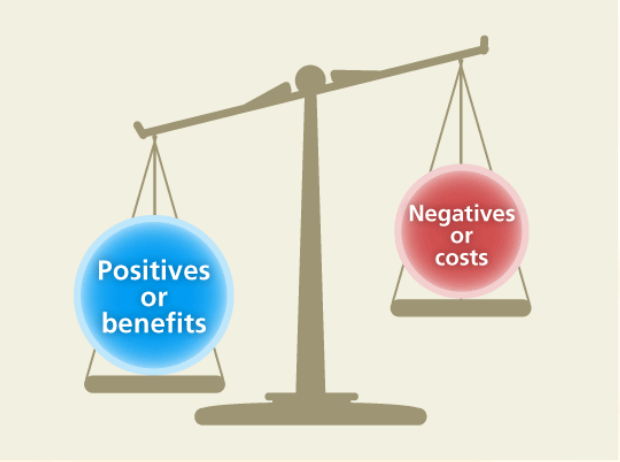
- With a view to arousing tenants' awareness of environmental conservation, we have developed a Smart Meter Monitoring and Energy Information Display System (SMM&EIDS) for implementation in new PHD.
- According to the resident survey for Kai Ching Estate, more than 60% of the residents are aware of the new system, out of which more than 75% consider the system helpful in raising tenants' awareness of the importance of environmental conservation.

Overall Performance

- Implementation of the latest initiatives mentioned above can bring about substantial energy saving and hence carbon reduction.
- Taking Kai Ching Estate as an example, the total annual electricity saving achieved through two-level lighting control, LED bulkheads, gearless lift drive, lift regenerative power system and grid-connected PV system is about 240,000 kWh for the domestic block concerned, which equals to a reduction of 168 tonnes carbon emission and 25% of communal electricity consumption at 2000/01 level.
- Together with the other energy saving initiatives implemented earlier, the overall communal electricity saving for a typical domestic block is around 53%.

Cost Effectiveness

- The HA, being a major public sector developer of residential buildings in Hong Kong, plays a key role in reducing energy use and carbon intensity to echo with the carbon reduction target set by the Government on one hand, and must be prudent in evaluating and implementing the various energy saving initiatives to strike a balance between reaping environmental benefits and rational use of the HA's funds on the other hand, in order to achieve value for money.



- According to the electricity saving achieved in Kai Ching Estate as a result of the implementation of various energy saving initiatives detailed above, the corresponding saving in annual electricity cost can well cover the amortised additional capital and maintenance costs of the initiatives over the service life of the systems or equipment.

Way Forward

- Reliability and durability of energy saving equipment would have direct bearing on whether their service life can last as anticipated, so that forecast for electricity cost saving could be realised to offset the additional capital and maintenance costs involved.
- As the qualities of LED lighting products available in the market vary considerably, the HA has collaborated with the local industry to spearhead a product certification scheme to ensure their reliability and durability for mass application.
- We are planning to adopt LED bulkheads as a standard lighting provision for the lift lobbies, corridors and staircases of domestic blocks in new PHD when there is adequate supply of quality certified products in the market.

Way Forward

- Considering the current status of accreditation application by certifying bodies and product certificate application by LED lighting manufacturers, we anticipate that mass application of LED lighting can be rolled out for building contracts due for tender in late 2015.
- With the mass application of LED bulkheads, we anticipate to further reduce 10% of electricity consumption in communal areas of the domestic blocks in new PHD from 2014/15 to 2016/17.
- In future, the HA will continue to explore every practicable means to further enhance the energy performance of buildings in new PHD.

Thank You