# Environmental Performance

- Initiatives in Planning and Construction of New Housing Estates
- Initiatives in Existing Housing Estates
- Initiatives in Office at Work

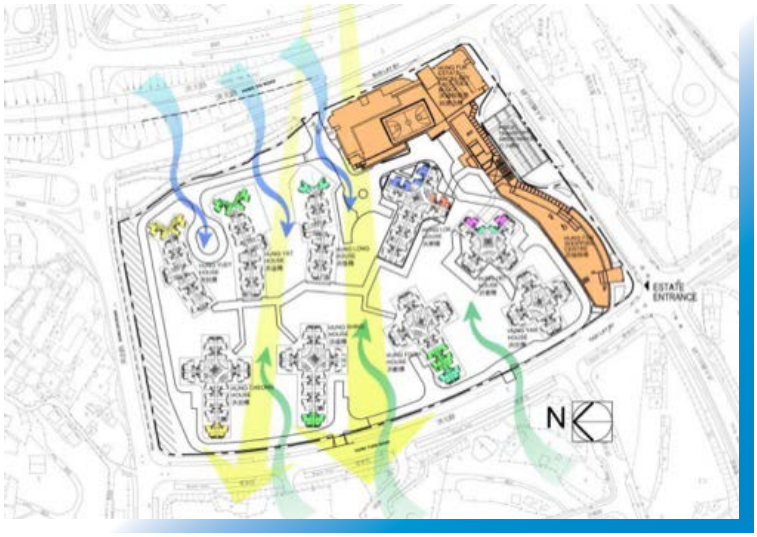
The Hong Kong Housing Authority (HA) endeavours to provide quality and environment-friendly housing estates for the public. We actively manage different environmental aspects in our estates and offices to achieve energy efficiency, resource conservation, better air quality and more greening.

## Initiatives in Planning and Construction of New Housing Estates

### Green Design and Construction

#### Conducting Micro-climate Studies

We apply micro-climate study to our site planning and design stages for public housing. The study makes use of computer simulations with prior calibration of software based on the local climatic conditions to have better understanding on how new projects will affect the environment nearby. It takes into account a wide range of environmental factors including wind speed and direction, natural ventilation, pollutant dispersion, natural daylight and solar heat gain, etc. During the year, we conducted micro-climate studies in 40 public housing projects and Air Ventilation Assessment in 30 projects to enhance wind environment, natural ventilation, mitigate solar heat gain, and use of daylight in housing blocks and external areas.




New Developments with Detailed Design to Optimise Natural Ventilation

Taking advantages of the unique characteristics of individual site, we have adopted passive design in our public housing projects to enhance environmental performance and continued to explore other green design initiatives in our development projects.

### Adopting Low Carbon Building Design

In support of the Government's target of reducing 50%-60% greenhouse gas (GHG) emissions by 2020 relative to the emission level in 2005, we have put substantial efforts to apply various green building strategies during the design and construction stages to cut down carbon emissions of our public housing projects.

We have applied Carbon Emission Estimation (CEE) at the planning and design stage for all new development projects since 2011 to benchmark the carbon emission level among our projects. CEE provides the GHG emissions of a public housing block throughout the entire expected life in terms of carbon dioxide equivalent. During the year, we have carried out CEE for 12 projects during the design stage. Carbon emissions of these domestic blocks were compared with that of the New Harmony 1 Option 6 block and Kai Ching Estate, which are benchmarks for comparison. Since implementation, it is estimated that we have achieved an average of about 13% reduction in carbon emission as compared with the baseline figure of New Harmony 1 Option 6 block in terms of construction floor areas.

### Utilising Green Materials and Products

We have specified to use Ground Granular Blast Furnace Slag (GGBS) for precast facades and precast staircase in all new projects starting from the first quarter of 2016 to reduce concrete usage and enhance utilisation of recycled materials. We are also studying the use of GGBS in the production of precast beams, precast refuse chutes and precast plank of semi-precast slab. We have investigated the possibility of using GGBS to replace 60% of the cement in massive concrete, such as pile caps. However, due to limited supply of GGBS, GGBS could not be used for in-situ concrete.

Apart from concrete, we continued to apply installations and specifications to conserve resources, including the use of timber from certified sustainable sources for manufacturing of doors, Water Efficiency Labelling Scheme (WELS) registered plumbing fixtures, two-level lighting, grid-connected photovoltaic systems, etc. We also closely monitored the performance of mixer tap products to comply with the specified flow rate restrictions and keep updating the specification by consulting the Water Supplies Department on the results of the latest flow rate tests. The latest specification are documented in our Specification Library in December 2015.

▲ Precast Façades with GGBS

▲ Ground Granulated Blastfurnace Slag (GGBS)

In addition to the above green materials and components, we apply BEAM Plus specification clauses in all new works projects. We defined and updated the specification for the use of the following items in our contract requirements to enhance environmental footprint of our housing estates:

- pulverized fuel ash (PFA) as cement replacement material in structural concrete with mass concrete pouring;
- recycled rock-fill in earthworks and recycled sub-base materials in roadworks;
- recycled rock cores retrieved at ground investigation works for landscape and associated external works;
- GGBS as cement replacement material in concrete for the manufacture of precast facades in domestic blocks;
- concrete paving blocks with recycled glass cum aggregates replace concrete paving blocks for new building and civil engineering contracts;
- marine mud excavated at site stabilized by cement treatment to useful backfilling material;
- timber from sustainable sources for temporary works; and
- modular hoarding using bolt-and-nut connections for re-use in projects.

To implement effective upstream control of the quality of building materials and components in manufacturing factories, we had previously implemented product certification for ten selected types of building materials. Such certification was carried out with reference to the Product Conformity Certification Schemes, developed and published by respective professional bodies. During the year, we are preparing to implement certification for the eleventh type of material – paint products. Consultation sessions with paint suppliers were in progress to discuss the time of implementation.

### Environmentally Friendly Construction Practices

During the construction phase, we require our contractors to adopt green construction methods that go beyond the compliance with statutory requirements. We laid down various requirements in different construction stages and projects covering site formation, demolition, foundation, building of superstructure and civil engineering works in order to enhance contractors' environmental performance. These requirements include:

- Submitting and implementing environmental management plans;
- Implementing ISO 9001 Quality Management Systems (QMS) and ISO 14001 Environmental Management Systems (EMS);
- Requiring Building (New Works Category) and Piling Contractors to be certified ISO 50001 Energy Management Systems (EnMS);
- Banning the use of incandescent light bulbs for temporary lighting on site;
- Using generators with Quality Powered Mechanical Equipment (QPME) labels;
- Installing water recycling facilities;
- Restricting vehicle speed on site;
- Adopting hard paved construction;
- Using precast concrete components;
- Implementing single board hoarding;

- Providing solar hot water heaters in workers' shower areas;
- Using food waste composting facilities in remote sites with canteens or catering services;
- Providing greening on site;
- Using electric vehicles (EVs) as contract cars within specified round trip distance; and
- Recovering undamaged timber pallets for locally manufactured pavers for reuse or recycling.

◀ Precast Facade

▲ Precast Staircase

▲ Hard Paved Construction

We have also developed suitable standards for the application of various innovative green practices. For example, we conducted a pilot run of using precast segmental roof water tank for reviewing its effectiveness, the result was satisfactory. We therefore have standardised its construction details for application in future projects.

Meanwhile, we are exploring the application of other innovative measures including 5D Building Information Modeling (BIM) and structural soil in Anderson Road Sites A and B Phases 1 and 2 (On Tai Estate). The 5D BIM adds two more dimensions: time and cost in traditional BIM to strengthen project management. We have completed 53% of the 5D BIM modeling for the Anderson Road project during the year and target to complete the model by the end of 2016. Structural soil composition facilitates compliance with load-bearing requirements and allows root growth for vegetation. We have tested various mixes of soil in laboratory and will carry out field tests in 2016/17 for the Anderson Road project.

We formally launched a database to indicate the availability of non-inert construction and demolition recyclable materials excavated from construction sites for collection by recyclers to facilitate waste recycling two years ago. The database is now available on the HA website and updated on a monthly basis.

### Green Building Recognition

We strive to incorporate green features into our public housing. We have laid down requirements in the contract specifications to ensure that all our new projects should be ready to achieve "Gold" rating under the Building Environmental Assessment Method Plus (BEAM Plus) scheme run by the Hong Kong Green Building Council. During the year, we registered and completed provisional assessment for seven new works projects in the BEAM Plus Scheme. In 2015/16, public rental housing (PRH) development at Ex-Kwai Chung Police Married Quarters achieved "Provisional Platinum" rating under BEAM Plus version 1.2.

## Resource Conservation

### Holistic Energy Management

We understand the importance of implementing an effective EnMS to improve energy efficiency. We have started to implement EnMS in accordance with the ISO 50001 EnMS standard for our housing development projects since 2011. With the EnMS in place, we estimated the communal energy consumption associated with their operation phase for each of our new domestic blocks at the design stage and managed to figure out possible control measures to improve their energy performance. During the year, we have applied the energy estimation approach to 12 new public housing developments.

Since 2013, we implemented EnMS in existing PRH estates and attained ISO 50001 certification in 2 phases. The extended certification for all PRH estates was awarded in April 2015. We would continue to maintain this EnMS in existing PRH estates to enhance their energy efficiency.

To extend our circle of influence, we mandated the contractors to apply for admission to the HA Lists of Building (New Works Category) and Piling Contractors on or after 1 January 2014 to be certified to ISO 50001. For contractors who were already admitted to the HA Lists prior to 1 January 2014, they had to obtain certification on or before 31 December 2015.

We continued to closely monitor the energy consumption of our contractors. Data on their energy use were collected and analysed to gauge their energy performance.

| Energy Consumption of Construction Contractors (April 2015 – March 2016) | Gigajoule (GJ) | % |
|---|---|---|
| Diesel consumption for construction activities | 781 846 | 92.6 |
| Diesel consumption for transportation of construction waste | 40 595 | 4.8 |
| Electricity consumption for construction activities | 17 244 | 2.0 |
| Gasoline consumption for contract cars | 5 298 | 0.6 |
| Total | 844 982 | 100 |

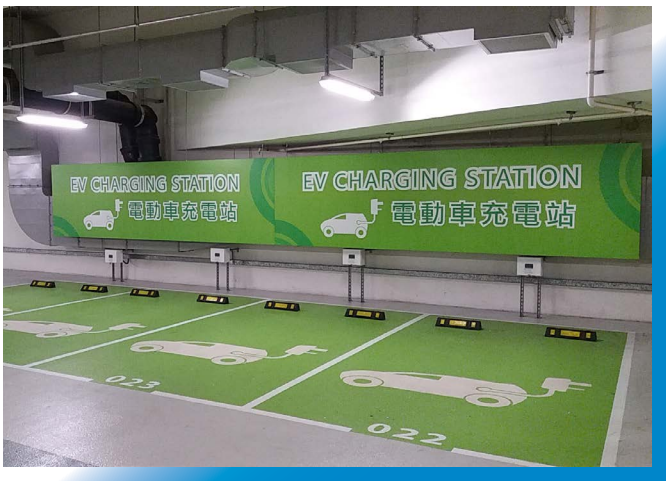
## Renewable Energy

As a pioneer to incorporate green features in housing development projects, we have adopted renewable energy as far as possible. For new rental domestic building blocks, we have installed grid-connected photovoltaic (PV) system where appropriate to provide at least 1.5% of the communal electricity consumption. In addition, we further promote the use of renewable energy by installing one to two solar-powered lights in all new housing developments.

▲ Photovoltaic Panels

## Promoting Electric Vehicles

To support Government's policy in promoting the wider use of electric vehicles (EVs), we have provided EV charging facilities in the covered car parks of all new estates under design. As of the end of the year, we have already been equipped with standard EV charging facilities in about 200 parking spaces. As an incentive to promote the use of EVs, we have offered free parking for EVs for a maximum of two hours. In our development projects, we have also adopted specification on provision of EVs as contract cars.




▲ EV Charging Station

## Energy Efficiency in Buildings

Following the promulgation of the new "Guidelines on the Design and Construction Requirements for Energy Efficiency of Residential Buildings" (the Guidelines) by the Buildings Department in 2014, we have aligned our design of new works projects with the prescribed requirements. We continued to improve design of our domestic blocks to achieve energy efficiency and to adopt natural ventilation according to the Guidelines.

During 2015/16, we have obtained 24 energy certificates under Energy Efficiency Registration Scheme for Buildings from the Electrical and Mechanical Services Department. This demonstrated our effort to meet energy efficiency requirements in different building installations.

For air-conditioning system, based on the evaluation of three pilot systems in Yau Lai Shopping Centre, Choi Tak Shopping Centre and Domain, we prepared a set of application criteria and guidelines to facilitate implementation of hybrid ventilation systems in suitable projects. Such system can save energy from air conditioning and mechanical ventilation systems. We also explored the use of foamed concrete panel at gable end wall for thermal insulation during the year. Initial findings indicated that such application was feasible in structural design. A mock-up test is being prepared to further study its effectiveness of thermal insulation in 2016/17.

▲ Lift Drives Installation at Kai Ching Estate

For lift systems, we have stipulated the use of regenerative power for lift motors of 18kW or above and energy efficient gearless lift drives in the latest specifications for new lift installations. During the year, we have completed the data collection and analysis for the lift system at Kai Ching Estate and Tak Long Estate, and the review of performance was finalised and the result was satisfactory. Further, we have adopted permanent magnet synchronous lift motor in some projects to further cut down energy consumption.

▲ LED Bulkhead Lights

For lighting system, we have been adopting LED bulkhead lights since early 2016 as the standard luminaires in public areas of domestic blocks of all new works projects under design. We have also implemented two-level lighting control system for barrier free access in domestic and non-domestic blocks of new works projects. Lightings can be operated by environmental lighting controls using motion sensors and on-demand switches with timer-controls.

▲ Two-level Lighting Control System Before (Left) and After (Right)

## Smart Meter

We continued to provide “smart meter” monitoring system with displays at the main entrance lobbies of all new domestic blocks. The system shows information and peer comparison of communal and tenants’ consumption of electricity, gas and fresh water with the aim of arousing environmental awareness of tenants. During the year, we had prepared a new standard specification for implementation.


▲ Display of the Smart Meter Monitoring System at Ground Floor Lobby of Tak Long Estate

## Water Conservation

To preserve our precious water resource, we have implemented a number of conservation initiatives in our developments.

For gardening, we have installed Zero Irrigation System (ZIS) in suitable new works projects and reviewed the effectiveness of the completed installations. ZIS consists of a Sustainable Urban Drainage System and Sub-irrigation Planting System to reduce water consumption in irrigation. For instance, we initiated the trial use of Zero Irrigation System (ZIS), along with Rainwater Harvesting System and Root Zone Irrigation, in Hung Fuk Estate to conserve the water resources and better manage irrigation water use.

▲ Zero Irrigation System

In Shui Chuen O Estate, we introduced an integrated water sensitive urban design which collected rainwater at high elevations and planted slope. Collected rainwater would be treated via bio-retention and held in storage tanks for plant irrigation.

For housing flats fixtures, we have promulgated specification to use water efficient installations, such as 6-litre single or dual flush water-closet suites, and plumbing fixtures registered under WELS of the Water Supplies Department.

## Mitigating Environmental Impacts

### Estate Ecology

We protect the ecology nearby our housing estate carefully by applying balanced ecological planning and design principles in all suitable projects. For instance, we conducted a plantation improvement study jointly with the University of Hong Kong for revitalising the existing low-eco plantation on the slopes at Long Shin Estate. We planted native tree seedlings on the slopes and are currently monitoring the results. We also co-ordinate with the Development Bureau on tree preservation and management works. New guidelines and contractual requirements are under development and we will engage our contractors through regular liaison channels.

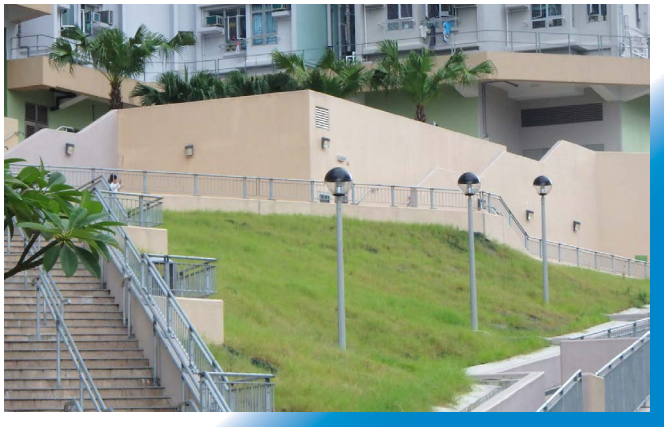
We set out green design guidelines for public housing developments. The overall greening coverage target is to have at least 20% greening ratio in new estates and 30% for sites over two hectares. As a rule of thumb, the tree planting ratio is not less than one tree per 15 flats. In addition, we continued to closely monitor the cost effectiveness of the greening design and provisions in our new estates.

To facilitate sustainable gardening, we have experimented recycling of felled trees to produce gardening compost in Hung Fuk Estate. The results have been used to develop the criteria for selecting composting machine and the optimum application rate of wood waste and garden waste for the production of compost.

▲ Turning Felled Tree into Compost


▲ "Action Seedling" Programme

We have involved local residents in greening all new housing estates through the "Action Seedling" programme during the year. We have also introduced planting areas for community participation in three development projects to encourage residents to participate in gardening and planting works within their own estates for recreation and education purposes.

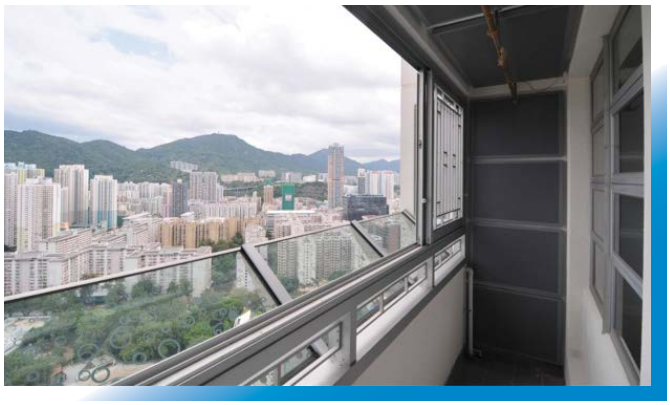


▲ Newly Formed Slopes after Green Treatment

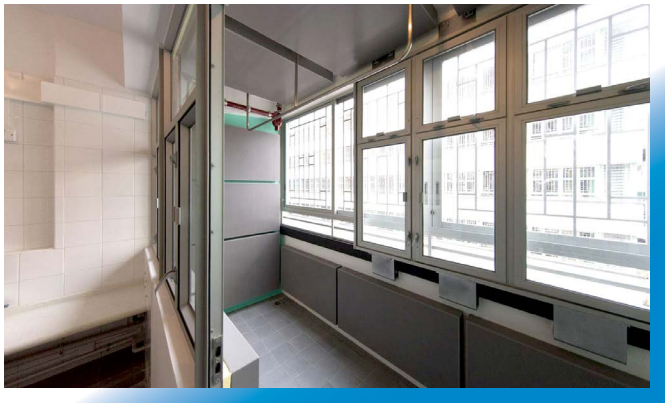
To create aesthetic values for residents, we proactively provide green treatment to newly formed slopes by hydroseeding, planting or other appropriate methods. During the year, green treatment was carried out in five projects with formed slopes, including Choi Yuen Road, Shui Chuen O Estate Phases 1 and 2, On Tat Estate and Long Shin Estate.

### Noise Control

To minimise noise impact, we have been adopting different types of noise mitigation measures, including acoustic windows, acoustic balconies, acoustic fins and noise barriers, etc., in different projects to suit the site-specific characteristics and lessen the noise nuisance to the residents.



▲ 1st Generation Acoustic Balcony



▲ Project Adopting the Principle of the 2nd Generation Acoustic Balcony

We have completed the design of the second generation acoustic balconies in which a sliding screen is installed in front of the balcony door. Other auxiliary feature such as noise adsorptive material at the wall and ceiling of the balcony and inclined panel along the parapet would be provided for further noise mitigation enhancement. The second generation acoustic balconies will be implemented in new projects where necessary.

▲ Sliding Window

### Air Quality Management

To reduce air pollutants in car parks and roads, we have been studying the use of bio-filtration system in different estates. We have completed the study on the use of bio-filtration system to reduce air pollutants in the car park at Cheung Sha Wan Estate with satisfactory result.

Bio-filtration Units ▶

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## Initiatives in Existing Housing Estates

## Environmentally Responsible Management and Maintenance

### ISO 14001 Environmental Management System

Since 2010, we have started establishing an effective EMS for estate management in accordance with the internationally recognised ISO 14001 standard to better control, measure and improve our environmental performance. All our PRH estates obtained the ISO 14001 certifications for maintenance and property management in 2011 and 2013 respectively.

▲ Awareness Training Course for Management Frontline Staff Held in November 2015

During the year, we continued to implement the EMS in the planning, design, project management, contract administration of planned Maintenance and Improvement (M&I) Works, and property management services in existing estates to maintain continual improvement in our environmental performance.

▲ Kwai Shing West Estate

### Green Recognition

To showcase our environmental management, we have been working on a pilot project to obtain certification for a selected existing PRH estate under the BEAM Plus for Existing Buildings. In the year under review, we have successfully obtained “Final Platinum” rating under the abovementioned scheme for Kwai Shing West Estate in the third quarter of 2015.

## Energy Conservation and Carbon Management

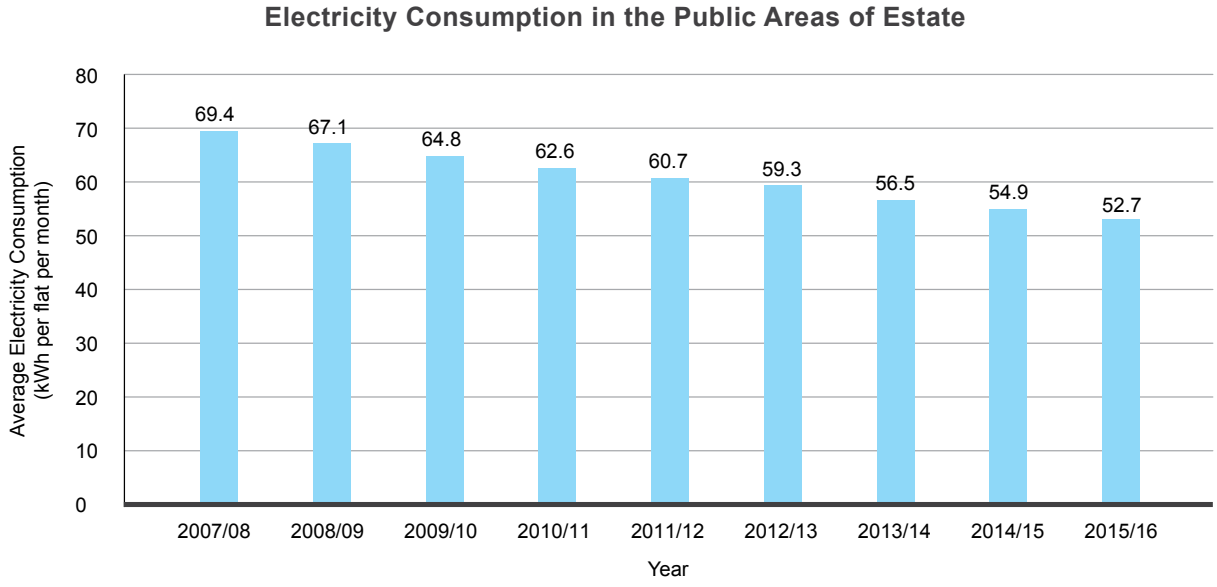
### ISO 50001 Energy Management System

Taking Kwai Shing West Estate as a pilot, we are the first organisation in Hong Kong obtained EnMS to ISO 50001 certification for existing residential buildings to enhance overall energy efficiency and energy performance. We have progressively extended the EnMS to cover all PRH estates in two Phases with the successful completion of the extended certification for Phases One and Two in August 2014 and April 2015 respectively.


▲ ISO 50001 EnMS Certificate Presentation in May 2015

### Overall Energy Consumption

With the EnMS in place, our electricity consumption in the public areas of PRH blocks was 52.7kWh per flat per month in 2015/16, which was 4.0% lower than the level recorded in 2014/15.



▲ Light Fittings at Tin Heng Estate Replaced with Sensor-controlled LED Light Fittings

### Adoption of Energy and Carbon Reduction Measures

Since April 2012, we have launched a Light Fitting Replacement Programme to replace electromagnetic ballast with electronic ballast in existing light fittings of public area in PRH blocks with the aim to enhance efficiency and effectiveness of energy use. We have planned to replace electromagnetic ballast at approximately one million light fitting in 960 PRH blocks within a period of 42 months. The replacement work for all PRH blocks was completed in September 2015.

During the year, we initiated a trial replacement of conventional light fittings with sensor-controlled LED light fittings in the common areas of domestic block in existing estate. We completed the trial installation in Tin Heng Estate in the third quarter of 2015 and other two trial installations in Tsz Ching and Kai Ching Estates by March 2016.

Under our Lift Modernisation Programme (LMP), we replaced 101 old lifts during 2015/16. In general, the new lifts can save over 30% energy consumption as compared with the old models.

We continued to conduct carbon audit for 14 typical PRH block types to monitor and benchmark our carbon emission. The overall carbon emissions of the 14 blocks in 2014/15, when comparing with their baseline figures in 2011/12, ranged from -23.91% to -0.72%. The carbon audit results facilitated us to identify appropriate measures to reduce carbon emissions.

In line with the Government's energy saving initiatives, the HA continued to join the Energy Saving Charter and pledged to reduce electricity consumption. During summer, we have maintained an average indoor temperature at 24 - 26 degrees Celsius in public areas of all our shopping centres with central air-conditioning to save energy. In addition, we have implemented other energy saving measures in various shopping centres, such as partial closure of lighting during non-peak hours, setting timers of advertising panels and decorative lightings and installation of oil-free chillers, to minimise energy use.

## Noise Control

We care about the noise impact may have on our PRH residents. We therefore strictly follow relevant legislation and take appropriate measures to minimise our operational noise without causing any nuisance to our residents and the nearby areas. With our concerted effort, we have not received any noise abatement notices from the Government since 2005/06.

## Waste Management

With a view to promoting waste reduction and green living at the community level, we have been in full support of waste separation at source by implementing the Source Separation of Domestic Waste Programme across all our estates. To actively raise the awareness of our PRH tenants, various publicity channels, such as video broadcasting and promotional activities, have been rolled out to call for participation. During the year, we have collected, in our estates, around 26 690 tonnes of waste paper, 2 223 tonnes of plastic bottles, 1 353 tonnes of aluminium cans and 867 tonnes of used clothes for recycling. In addition, all our estates have established collection counters to receive domestic recyclables from tenants with incentive, such as cash or household sundries for exchange.

| Waste Type | Quantity of Waste Collected for Recycling (tonnes) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 |
| Paper | 14 748 | 14 194 | 17 935 | 21 376 | 23 849 | 27 589 | 29 394 | 27 127 | 26 690 |
| Plastic Bottles | 765 | 939 | 1 218 | 1 427 | 1 584 | 1 929 | 1 812 | 1 983 | 2 223 |
| Aluminium Cans | 310 | 496 | 520 | 865 | 1 054 | 1 133 | 1 359 | 1 362 | 1 353 |
| Used Clothes | 633 | 618 | 775 | 844 | 945 | 998 | 1 053 | 896 | 867 |

Tenants of restaurants, supermarkets and market stalls were encouraged to adopt the food waste management practices, such as food donation to non-governmental organisations (NGOs).


▲ Poster of Lai See Pocket Reuse and Recycling Programme 2016

Apart from implementing various waste reduction initiatives in our PRH, we have provided free venues in HA's shopping centre where appropriate to support waste reduction and other environmental activities initiated by NGOs or other government departments. For instance, we sponsored venues for displaying polling boxes and promotional materials of the Zero Food Waste Cooking Competition to promote food waste reduction. A total of eleven of our shopping centres participated in Lai See Pocket Reuse and Recycling Programme 2016 to distribute reusable Lai See packets and collect used ones.

Having all these waste reduction initiates in place, we were delighted to achieve the average domestic waste production of 0.55 kg/person/day from our residents during the year, accounting for over 6.8% decrease when compared to that of 2014/15.

## Greening and Tree Management

### Greening and Landscaping

During the year, we have completed green treatment works such as replacing chunam surface with hydroseeding for 10 slopes at nine estates to enhance the slope appearance in our PRH estates. In addition, we have installed roof greening in Kwai Shing West Estate which is well received by the residents.

▲ Roof Greening at Kwai Shing West Estate

▲ Hydroseeding to Bare Slope Surface in Chuk Yuen South Estate Before (Left) and After Green Treatment Works (Right)

▲ Planter at Toe of Slope in Chuk Yuen South Estate Before (Left) and After Green Treatment Works (Right)

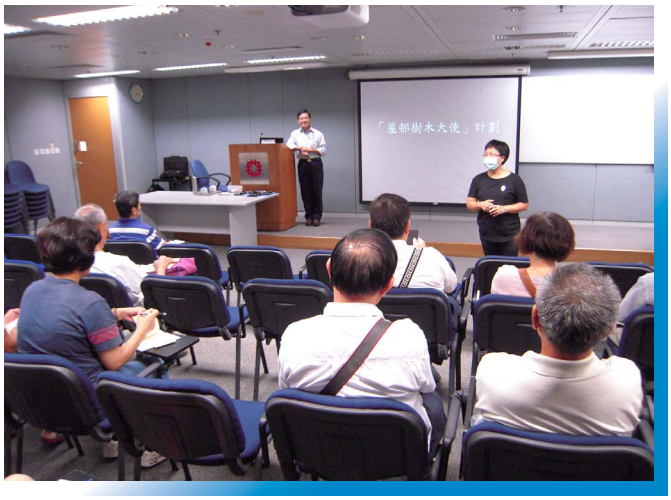

▲ Community Garden Programme at Lok Wah South Estate in November 2015

In 2015/16, we completed landscape improvement works to enhance greening at 20 PRH estates by introducing new varieties of plants to match the local landscape and conditions. In addition, we organised community garden programmes in 10 estates to promote community participation in greening activities.

### Strengthening Tree Management

The approximately 100 000 trees growing in and around PRH estates across Hong Kong require effective tree risk assessment and management, and to this end we have developed and implemented a new Enterprise Tree Management System (ETrMS) to assist in monitoring our tree management work and conducting annual tree risk assessment exercise in a systematic way. With the aid of the database, we are able to identify trees that need prompt remedial actions through assessment and inspection. Data would be updated and uploaded to a comprehensive Geographic Information System (GIS) tree database after each assessment. We have also carried out ad hoc tree risk assessment and maintenance work when needed.

To support our work in preserving trees, we have recruited Estate Tree Ambassador (ETA) to assist in tree management in our housing estates. As at March 2016, there were 690 ETAs recruited. To enhance and refresh their knowledge, we have organised two refresher and training courses during the year to foster their knowledge in tree preservation.




▲ ETA Refresher Course in June 2015

▲ ETA Training Course in September 2015

To ensure we are following update and effective practices, we have arranged regular meetings with the Development Bureau to review our guidelines and contractual requirements for tree preservation and management. In addition, a mini-website has been developed for public access to obtain general information and characteristics of common tree species that can be found in our PRH estates.

## Asbestos Abatement

The presence of asbestos in some of our old housing blocks and buildings pose minimal or no health risk as long as it remains intact and undisturbed. To minimise the occurrence of potential health risk, we have carried out two surveys annually to monitor the condition of asbestos-containing materials in existing PRH estates to ensure that they are in good condition. A registered asbestos contractor has been engaged for emergency repair to underground asbestos cement water-mains when necessary.

During the year, we have conducted the asbestos removal works for the Public Housing Development at Queen's Hill which was completed in June 2016.

## Organising Green Activities

Since its inception in 2005, we have been partnering with green groups to launch a long-term estate-wide community environmental education programme, the “Green Delight in Estates” (GDE) with the aim to foster environmental awareness of our tenants.

In 2015/16, we completed GDE Phase 8 and had started the GDE Phase 9 with the theme of “Rehome & Reuse Resources” to encourage residents to share their excessive but useful resources to other people. Environmental educational programmes including rehome box graphics design competition, green living carnivals, second-hand barter markets, upcycling and eco-detergent workshop, eco-tours and talks have been organised for PRH residents. Around 4 400 volunteers were recruited as Green Estate Ambassadors to help launch these activities to promote waste reduction.


▲ GDE Phase 9 Kick-off Ceremony

▲ Green Estate Ambassadors Training


▲ Second-hand Goods Barter Market

Our Estate Management Advisory Committee (EMAC) put substantial efforts to promote green living environment to our PRH tenants. During the year, we collaborated with EMAC to organise a considerable number of activities, aiming to increase tenants' awareness and to promote participation in the greening of PRH estates, including tree planting days in 10 estates and greening activities for residents in 20 estates.

▲ Tree Planting Days at Sun Chui Estate (Left) and Yiu Tung Estate (Right) in Mid-2015

▲ EMAC-Funded Greening Activity at Wo Che Estate in October 2015 (Left) and Tin Yiu Estate in March 2016 (Right)

We have also implemented the pilot "Environmental Protection Window" Scheme to disseminate environmental protection messages to PRH tenants and conducted other environmental programmes, such as Promotion of Green Living, Green Carnival and Epidemic Prevention to enhance environmental awareness of PRH tenants.

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# Initiatives in Office at Work

## Implementation of Environmental Management System

In December 2013, our Corporate Services Division was awarded the ISO 14001 EMS certification for the provision of property management functions at the HA Headquarters (HAHQ). In May 2014, Independent Checking Unit (ICU) was certified to ISO 14001 EMS and ISO 9001 QMS standards. We are the first regulatory body in Hong Kong which obtained such certifications in relation to building control. This has marked a significant milestone in our relentless pursuit of excellence in discharging our duties of regulatory control. Following the publication of the new version of these standards in September 2015, we have planned to upgrade our systems within three years.

## Energy Saving and Carbon Management

Over the years, we have implemented various initiatives to enhance our energy performance, reduce electricity consumption and cut down carbon footprint by controlling refrigerant consumption, optimising chiller system control, adopting motion sensors for lighting, and optimising operating hours of lifts, escalators and air-conditioning equipment, etc.

In 2015/16, the electricity consumption of our office premises was 35 511 000kWh, representing 7.9% reduction when compared to our baseline consumption figure in 2007/08.

Since 2008/09, we have conducted carbon audit to gauge our carbon emissions. The yearly audit results from 2008/09 to 2014/15 of carbon emission are tabulated below. The carbon emission in our properties has been stable over the past few years, which indicates the success of our carbon management programme in place.

| Properties | Carbon emissions (Tonnes of CO2 equivalent/$m^2$) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
| Block 3 of HAHQ | 0.170 | 0.146 | 0.122 | 0.110 | 0.110 | 0.126 | 0.120 |
| Lok Fu Customer Service Centre | 0.171 | 0.168 | 0.224 | 0.167 | 0.161 | 0.162 | 0.157 |

## Waste Management

To minimise solid waste generated in our offices, we have initiated various waste management initiatives at all Housing Department (HD) offices. During the year, we consumed 147 267 reams of papers, representing an increase of 9.2% when compared with the consumption baseline in 2007/08. There had been a general increase in paper consumption in nearly all offices in 2015/16 as a result of the upsurge in manpower of about 300 staff members to achieve the production target of 200 000 PRH units and 80 000 subsidised sale flats by 2025/26 according to the Long Term Housing Strategy, as well as the expanded business activities.

The volume of waste paper collection per staff in 2015/16 was 55.0 kg per staff. The volume well exceeded the collection target of 21.6 kg per staff.

Apart from collecting waste paper for recycling, we have been using environment-friendly paper as a prerequisite requirement in printing of all publicity materials.

We have also arranged to collect all defective mercury-containing lamps in HAHQ for special waste treatment to minimise the impact of disposal of hazardous materials.

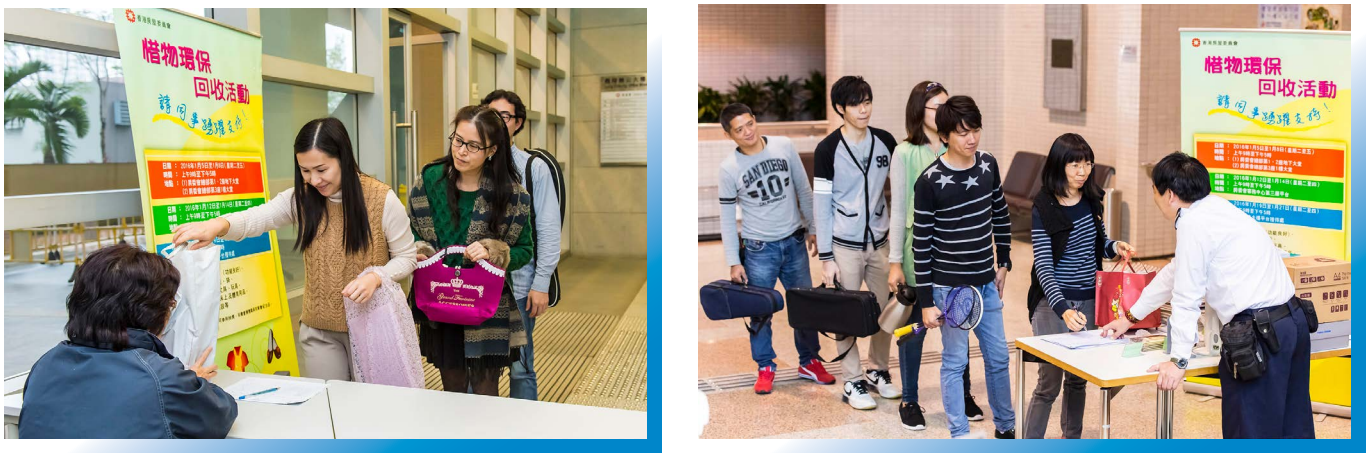
## Water Conservation

We monitor our water consumption continuously at HAHQ. In 2015/16, the HAHQ consumed 12 068 cubic metres of water. It was decreased by 21.0% as compared with the consumption of 2007/08.

## Green Culture and Activities

The HA Environmental Corporate Video highlighting our environmental initiatives has been uploaded to the HA/HD website, social media platforms and e-Learning Portal that are accessible by staff members and the public. It has been broadcasted during the induction course for all new recruits. Apart from the corporate video and induction course, we organised 28 seminars for our staff during the year to enhance their environmental awareness and knowledge. To tie in with the World Environment Day, green display panels were set up in the HAHQ from May to August 2015 to showcase our latest environmental initiatives.

To promote green messages among our staff and encourage them to help the needy of the society, we have joint hands with a non-profit making charity organisation to host two “Environmental Collection and Recycling Campaigns” in June 2015 and January 2016 respectively. We received overwhelming support from our staff and collected about 4.8 tonnes reusable items in total. Those items include electrical appliances, shoes, handbags, books, stationeries, household items, beddings and decorations, etc. The Campaign not only helps those in need, but also boosts staff awareness of environmental protection by promoting waste reduction and re-use of resources.




▲ HA staff at the HAHQ, the Customer Service Centre in Lok Fu and Lung Cheung Office in Wong Tai Sin are Enthusiastic about Donating Reusable Household Items to those in Need.

In addition to our own initiatives, we encourage our staff to join various external green activities to arouse their environmental awareness, such as the Hong Kong Tree Planting Day, the Community Chest’s Green Day and the Hong Kong Flower Show. About 100 staff and their family members joined the Hong Kong Tree Planting Day in the year under review. We also participated in Eco Expo Asia 2015 and the Community Chest’s Green Day to showcase our green performance and disseminate green messages to the community.

As an active participant in the annual Hong Kong Flower Show, we had designed an “Art of Living @Home” garden for this year’s event, echoing the Show’s theme “Blossoms in Vivid Art 2016”. The landscape design won the Gold Award for Unique Feature (Landscape Display) in the Flower Show.

▲ Hong Kong Flower Show 2016

▲ Hong Kong Tree Planting Day


▲ Eco Expo Asia 2015

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