持續發展 啟拓新猷
LEADING THE WAY IN SUSTAINABLE DEVELOPMENT

我們除了須達成公屋興建目標外，還須確保規劃、設計和建造工作符合可持續發展原則和成本效益，以及在品質和安全方面達到嚴格標準。

Not only are we responsible for meeting public housing production targets, we also must ensure all our planning, design and construction work satisfies principles of sustainable development and cost-effectiveness, and meets stringent quality and safety standards.

The year 2011/12 was another challenging one for us in terms of planning, designing and managing the construction of a steady supply of quality public housing for those requiring affordable accommodation in Hong Kong. We met our production targets for the year by completing construction of 11 200 new flats on seven public rental housing (PRH) projects, namely Hung Hom Estate Phase 2, Yau Lai Estate Phase 5, Tung Tau Phase 9 (i.e. Tung Wui Estate), Shek Kip Mei Estate Phase 2 and Phase 5, Lower Ngau Tau Kok Estate Phase 1 and Un Chau Estate Phase 5. At the same time, we embarked on three new PRH projects: Anderson Road Sites A and B, Tung Chung Area 56, and the Ex-Au Tau Departmental Quarter site. These projects are due for completion from 2015 to 2017.

Such are the bare statistics of our achievements and planning in public housing development and construction. All our work, however, has to satisfy core principles of environmental care and sustainability, people-centred planning, cost-effective quality, and stringent safety measures. The rest of this chapter presents a summary of the key developments and initiatives under these topics over the past year.

1 The newly completed Tung Wui Estate.

2 Energy efficient lighting is used in communal areas to reduce our carbon footprint.

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Reducing our carbon footprint

In line with the government's goal of reducing greenhouse gas emissions and carbon intensity in Hong Kong by 50% to 60% in the period from 2005 to 2020, we have been introducing a series of green designs and initiatives for estimating and reducing the carbon footprints of our PRH blocks. This represents quite a design challenge, as most international models for measuring carbon emissions are not suitable for applying to the Hong Kong environment. We have risen to this challenge by designing a new carbon emission estimation methodology using a "cradle-to-grave" approach, based on the assumption that construction materials and building operations will have an approximately 100-year lifespan. The methodology needs to be refined further, as currently we lack data about tenants' energy consumption and certain information about carbon levels in some construction materials. Nevertheless, it provides a good start for more sophisticated planning towards achieving low-carbon public housing development in the future, taking into account carbon emissions from six major sources: construction materials, structural materials, communal building services installations, renewable energy, tree planting, and demolition. We have been applying carbon emission estimation to all new development projects incorporating domestic buildings since February 2011; up to the end of March 2012, 12 such projects have undergone estimation.

Energy saving

Energy saving, both in the design of new estates and in work undertaken in the renovation and revamp of older estates, is an important way of reducing our carbon footprint. In fact, energy represents one of the single greatest operational expenses of our PRH estates. Most of this energy is consumed by the major communal building services, such as lighting, lifts, and water pump operations.

To reduce energy consumption in new projects, in December 2011 we rolled out an energy management system closely modelled on ISO 50001. The system sets a baseline for energy consumption of 30kWh/m^2 for the building services installed in the communal areas of PRH blocks, and will apply a series of energy performance indicators over the next three years. At the design stage, an estimate will be made of the likely communal energy consumption of each new block, and this estimate will be compared against the baseline. If there is any discrepancy, further design adjustments will be made. Once the completed block is occupied, actual energy consumption will then be measured and checked against the previous estimates. The systematic approach adopted by this exercise, and the reliable data derived from it, will help us manage energy use in future PRH blocks more effectively.

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Sustainable building

We have already incorporated in the Client Brief and Specifications of our construction contracts most of the latest requirements of the Hong Kong Building Environmental Assessment Method, better known as BEAM Plus. In 2011/12 we drew up further plans for implementing a series of environmental initiatives in our future developments. These include plans for enhancements in areas such as site layout, use of energy and water, and indoor environmental quality. The process of implementation is complex and will involve many technical studies and tests, but we are ready to take on the challenge in the belief that the end result will be a greener, more sustainable environment for PRH.

People-centred planning

Our PRH flat design is being continuously reassessed and improved. To do this we rely greatly on input from the residents who are actually living in the flats we design and build. At the most general level, we assess our success by gauging the satisfaction levels of our tenants. Since 2003, we have been carrying out surveys at recently completed estates around 14 months after residents have moved in. In 2011/12, we conducted surveys at five estates covering 13 290 flats, and carried out a total of 3 436 interviews. The overall satisfaction rating was 91.3%, rising from 84.8% last year. This figure is well above our Key Performance Indicator of 80%, which has been in place since April 2011.

1 A range of environmental initiatives is adopted in the latest phases of Shek Kip Mei Estate.

2 Intake Ambassadors ensure our contractors are quick to rectify defects inside flats.

These surveys and interviews generated valuable feedback on a number of areas such as flat layout, design of cooking benches, provision of laundry racks, and water supply features. Residents also expressed their views and preferences on topics such as the level of lighting in public areas, rooftop planting, and refuse collection arrangements. All these views are incorporated into the regular review process of our Model Client Brief. The latest version of the Brief, issued in September 2011, includes requirements for more robust aluminium windows, better natural lighting and ventilation, and extra laundry rack facilities – all as a result of previous client feedback. Meanwhile, our Intake Ambassadors provide assistance to tenants as they move into their new homes, and ensure our contractors are quick to rectify any construction defects inside their flats.

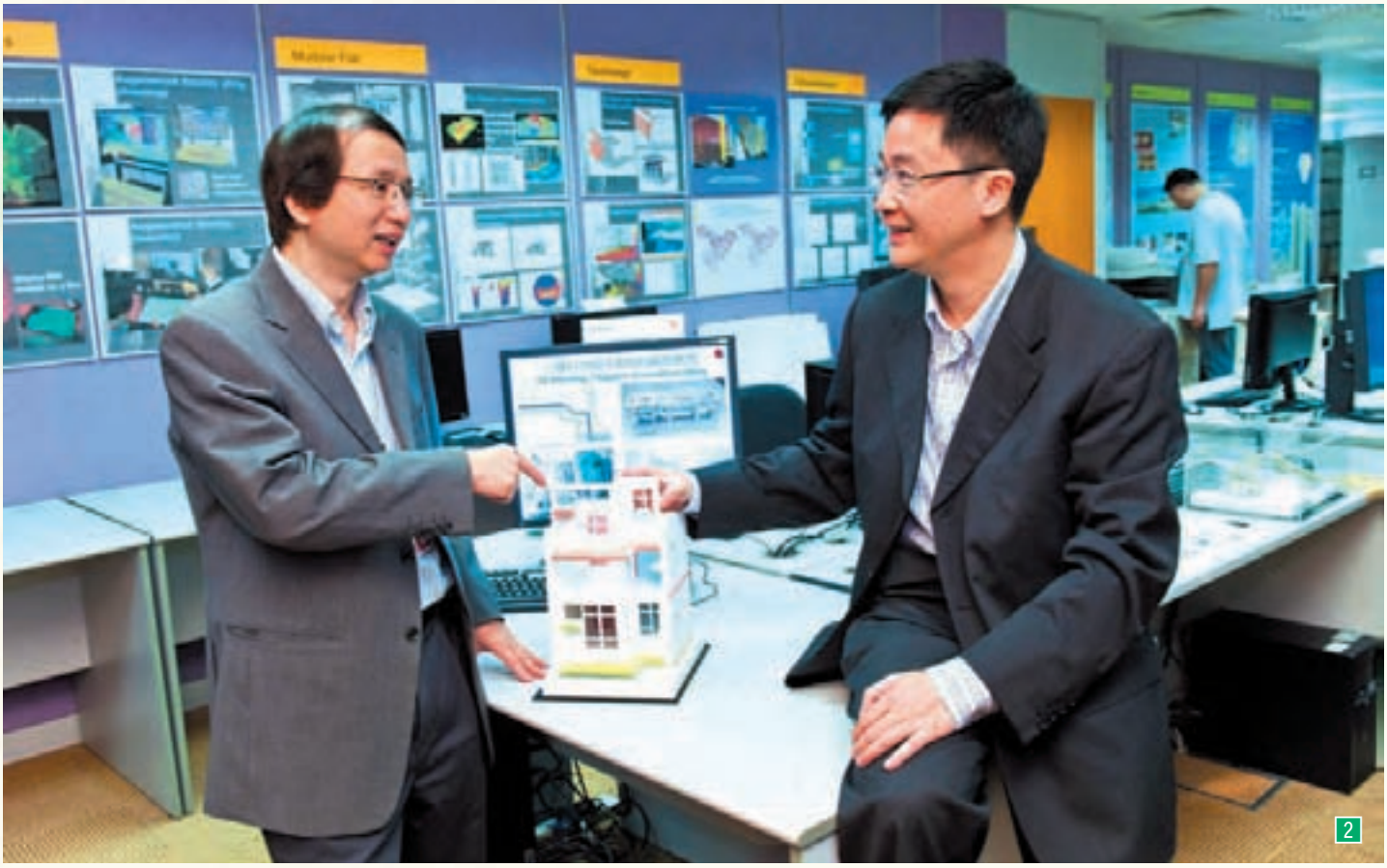
Enhancing building quality

All our building design and construction process work is linked to various quality management systems, based around the standards of the International Organisation for Standardisation (ISO). We first gained our ISO 9001 certification back in 1993, and since then we have continuously enhanced and expanded our quality management systems. This led to the acquisition of ISO 14001 environmental management certification in 2009, and the rolling out of ISO 31000 risk management and ISO 26000 corporate social responsibility in 2010. Over the past year, we have been further working towards attaining ISO 50001 for energy management, and adopting the European Foundation for Quality Management Excellence Model.

We have been active in tailoring new information technology developments to improve the process of designing and developing public housing in Hong Kong. For instance, we have set up an online platform for knowledge management and collaboration concerning construction projects – the "Housing cOnstruction Management Enterprise" or HOMES. It is the first platform of its kind to provide a common information backbone for the construction industry in Hong Kong, storing data on over 700 construction projects which is accessible to more than 2 000 users. In practical terms, HOMES gives the project teams and construction operators working on our projects convenient one-stop access to much essential information.

1 We strive to enhance our building quality. Picture shows Hung Hom Estate Phase 2.

2 The BIM technology helps generate three-dimensional data that facilitates visualisation and co-ordination.



Other IT initiatives that we have continued to apply include Building Information Modelling (BIM), and the Geographic Information System (GIS). BIM allows us to generate three-dimensional data in a way that enhances visualisation and co-ordination to unprecedented levels of accuracy. We began using BIM in 2006, and have built up much experience in using it across all phases of our projects. The GIS we use, meanwhile, has been custom-designed for use in developing and managing housing estates. Its sophisticated features and its link with the Lands Department's base plans allow us to identify and pinpoint a full range of facilities in an area when we are planning a new development, vastly improving our process of layout design. In 2011 we began an exercise to enhance our current GIS system, adding new features to make it even more useful. Such features included, for example, the addition of a 3-D Spatial Data Viewer, the use of Light Detection and Ranging (LiDAR) Survey data, and the testing of laser scanning technology and a Mobile Mapping System – all of which have significant potential advantages for PRH planning and design.

Construction materials and components form major parts of our capital expenditure. Assuring their quality is not only essential for safety, it also avoids costly and time-consuming refurbishment and repair work on substandard materials. Most of the products and materials used by our contractors are sourced from the Pearl River Delta region, within a radius of around 800 km from Hong Kong. We have increasingly required a large number of materials and components used in our developments to be certified, a requirement that helps ensure long-term construction quality. Other initiatives that maintain standards include routine surveillance checks against approved samples, on-site verification, and the use of the Performance Assessment Scoring System and Radio Frequency Identification for tracking selected products.

We met our production targets by completing construction of 11 200 flats on seven PRH projects.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As at the end of March 2012, we required product certification for seven building products, namely fire resistance timber doors, fire resistance panel walls for partitions, cement products (for architectural uses), tile adhesives, ceramic tiles, repair mortars and aluminium windows. Three more are in the pipeline and will be implemented later in 2012. We will also be applying Radio Frequency Identification to four building products – timber doors, metal gate sets, aluminium windows and precast concrete façades – to ensure their authenticity and add traceability along the supply chain.

With a view to enhancing our built quality, we have over the years joined hands in carrying out research and development (R&D) work with numerous partners, including academia, industry experts, business partners and other stakeholders. Many of our R&D results have been developed into useful and practical applications.

Examples include our green treatment of marine mud which, following cement stabilisation, is used for backfilling, and our use of ground granulated blast furnace slag in precast concrete façades. Such creative re-use of "waste" materials conserves our natural resources, reduces landfill, and lowers our carbon footprint.

Promoting site safety

The Housing Authority Site Safety Strategy 2011, implemented at all our new works sites, maintenance works sites, and by our property service agents and cleansing services contractors, sets a goal of no more than 12 accidents per 1 000 workers. We achieved this goal in 2011, with accident rates of 9.0 per 1 000 for new works contracts and 7.3 per 1 000 for maintenance contracts. These figures can be set aside the average industry accident rate of 49.7 per 1 000 workers, clear evidence of the effectiveness of our stringent safety systems.

Specific enhancements and initiatives to improve safety over the year included use of Surprise Safety Inspections focusing on high-risk activities at construction sites, and the incorporation of new guidelines on lift shaft works and tower crane safety into contract specifications. Other initiatives that helped keep our safety practices among the best in Hong Kong included organising regular training activities, a Site Safety Forum for Works Contracts and Property Services, and other workshops and seminars on safety topics, for a total audience of around 1 300. We also published the booklet *A Practical Guide to Working at Height – Ensuring Safe Work Practices*.

We are proud to announce that this year the Lighthouse Club and the Construction Industry Council awarded its prestigious Golden Helmet Award to the Deputy Director of Housing (Development and Construction) Ms Ada Fung, for her significant work in spearheading and promoting safety practices in Hong Kong.

1 The newly completed Lower Ngau Tau Kok Estate Phase 1.

2 Certification is required for various building products including cement products for architectural uses.

Green Construction: Pioneering Work at Kai Tak Site 1A

Once Hong Kong's busy airport, the old Kai Tak site alongside Victoria Harbour is now being transformed for a myriad of other uses. Next to the future Avenue Park and located at the north apron area of the Kai Tak development site, two new PRH estates are being constructed under the theme "Homes in the Park". One of the estates, Kai Ching Estate (Kai Tak Site 1A), contains six domestic blocks that will provide around 5 200 flats for 13 300 residents. The initial intake of residents is scheduled for mid-2013. This project has provided us with an ideal opportunity to incorporate environmentally friendly features at both the design and construction stages.

Green design features

At the design level, we have introduced "green" innovations which aim to substantially reduce the estate's carbon footprint and energy consumption, and gear it up for other sustainability initiatives that are new in Hong Kong.

Renewable energy is a recurring theme in the design. Photovoltaic panels on the roofs of the domestic blocks will harness sunlight to generate electricity to run the communal facilities. Energy will also be generated from the lift operations on the estate. Lift motors can act as power generators under certain conditions, such as in cases of "heavy load down, light load up" and during braking. Using the latest technology, the power generated by the lifts can be fed back into the power supply system, saving electricity.

Renewable energy will go even further due to the estate's utilisation of energy-efficient lighting options in public areas, through the use of electronic ballast, T5 fluorescent tubes and LED lighting. A two-level lighting control in the lift lobbies and corridors will allow the visually impaired to switch on extra lighting as and when required, removing the need to maintain a constantly high level of illumination. To make residents an active part of the energy conservation culture and raise their environmental awareness, the new estate will have "smart metres" and electronic display panels installed in the ground floor lobbies of individual blocks to keep residents informed about average electricity and water consumption.

Non-domestic facilities such as shops, kindergartens and the estate management office will be air-conditioned using a District Cooling System, which has been implemented by the Electrical and Mechanical Services Department for use throughout the Kai Tak district. This centralised supply of chilled water will be a green solution for building air-conditioning systems throughout the district.

Water is another vital natural resource that is being better preserved through the design of the new estate. Rainwater will be harvested for root zone irrigation in one part of the planting area, thus reducing the use of fresh water for irrigation. The new estate will also provide Electric Vehicle Charging Facilities, enabling electric vehicles to be charged while parked.

Environmentally friendly construction techniques

The green construction techniques being used, and in some cases pioneered, at Kai Ching Estate are not only important for achieving sustainability; they are also leading to improvements in efficiency and productivity, as well as helping minimise the environmental impact of the construction site on the entire neighbourhood. Many of these construction techniques are being carried out in collaboration with contractors and other industry stakeholders.

Mud may seem an unlikely substance for use in "green" development, but we use a Marine Mud Cement-Stabilisation method that helps reduce pollution and takes pressure off Hong Kong's landfills. Marine mud from dredging activities is often dumped in landfills or marine dumping sites. At the site of the new estate, we treat the marine mud by adding cement and sand, and then reuse it for backfilling in situ and for making paving blocks.

When erecting the domestic blocks, our use of Modular Design and Component Prefabrication techniques goes a long way towards improving built quality while reducing wastage. Not only are we using many prefabricated elements such as fabric reinforcements, semi-precast slabs, and precast façades and staircases; we are also using volumetric precast kitchens and bathrooms.

To reduce the environmental impact of vehicles, our contractor at Kai Ching Estate has arranged with China Light and Power to lease electric vehicles as contract cars. In another environmentally friendly move, we have begun a trial use of bio-diesel fuel in some of the construction equipment. If this trial proves effective in reducing greenhouse gas emissions, it will be implemented more widely.

1 Kai Tak Site 1A at twilight.
2 Electric vehicles are used as contract cars to reduce carbon emission.
3 The project team is committed to turning the site into "Homes in the Park".

Green Living: a Better Life at Yau Lai Estate Phase 5

Built on the Eastern Harbour Crossing site and completed in July 2011, Yau Lai Estate Phase 5 is one of our newest PRH developments and incorporates a number of "green living" features. The development contains two domestic blocks with 2 002 flats in total, along with a four-storey block that combines carpark spaces and welfare facilities. If proven successful, some of the pilot green initiatives incorporated in this development will be adopted as standard measures in future projects.

Reducing waste

Waste reduction is a major step towards creating a more sustainable society. At Yau Lai, the corridors of the new domestic blocks have been fitted with a mailbox type collection system that makes it easy for residents to separate and dispose of waste for recycling. The "mailboxes" are connected directly with the Refuse Storage and Material Recovery Rooms. For safety and hygiene reasons, the doors on the mailbox hatches are self-closing, fitted with sensors that alert building security personnel if they do not close properly.

Yau Lai Phase 5 incorporates the latest technology for generating electricity from the rays of the sun. We have installed efficient Building Integrated Photovoltaic Panels on the entrance porticos to the estate. These are optimally situated to catch sunlight and convert the energy into electricity for use in the public areas of the Carpark and Ancillary Facilities Block. In addition, Photovoltaic Panels have been installed on the roofs of the domestic blocks. We are testing two different types of panel, poly-crystalline panels and thin film amorphous solar panels, to see which is more effective.

Water is an increasingly precious resource. At Yau Lai we have introduced new systems and technologies to harvest and collect water that would otherwise have gone to waste. The Rain Water and Air Conditioning Condensate Water Harvesting System is designed to collect rainwater runoff from the carpark block and condensate water from domestic air-conditioning units. After filtering, the water is used for irrigating green areas on the estate and for washing floors in the Refuse Storage and Materials Recovery Rooms. The Twin Roof Water Tanks at Yau Lai also help conserve water. The simple expedient of adding a partition wall to the freshwater and flush water tanks along with some extra piping means that one part of each tank can be closed off for cleaning or repair as required without disrupting the water supply. The system, which has received approval from the Water Services Department, makes for greater convenience for residents while also reducing water wastage.

Greening

Recognising the importance of greening not only in providing a pleasant, relaxing natural environment for tenants but also in reducing heat and counteracting pollution; we have been exploring new ways of expanding our greening practices in PRH estates. At Yau Lai, we have introduced a series of stylish and attractive vertical green panels. These have been installed on the noise barrier along the boundary of the estate, and also on the 35th floor of the domestic blocks. Our vertical green panel initiative was one that got locals involved, as the planting design is based on the winning piece in a competition held among local schools. The competition was one of the outcomes of the community engagement programme we ran in the area in 2009.

Besides finding vertical locations for greening, we have also expanded the scope of our more traditional horizontal planting through our green roof initiative. Greening has been added to the roofs of covered walkways and also the plant room of the Carpark and Ancillary Facilities Block. These roofs are equipped with an automatic irrigation system utilising harvested rainwater, and are planted with a range of hardy and attractive plant species.

1 A host of "green living" features is incorporated into Yau Lai Estate Phase 5.

2 A noise barrier is built along the boundary of the estate.

3 A pleasantly designed green roof.