



News Release

11 June 2014

CDL SETS WORLD RECORD FOR LARGEST VERTICAL GARDEN

- ***Enters Guinness World Records with 2,289 m² vertical garden at Tree House condominium***
- ***Tree House's green features are expected to achieve approximately over S\$500,000 in energy and water savings a year***

City Developments Limited (CDL) has set record for the largest vertical garden in the world. The stunning 24-storey 2,289 m² vertical garden at CDL's Tree House condominium has entered Guinness World Records. Since it was completed in 2013, the condominium nestled within the Upper Bukit Timah and Chestnut Avenue private residential estate has caught the imagination of many with its eye-catching facade.

Designed with environmental sustainability in mind, Tree House's vertical garden is more than just a unique architectural structure. A natural insulation, the vertical garden reduces the estate's carbon footprint by filtering pollutants and carbon dioxide out of the air. It reduces heat absorption and lowers the energy needed to cool indoor spaces. This is expected to achieve air-conditioning energy savings of between 15% and 30%, or a total of approximately between S\$12,000 and S\$24,000 annually for the 48 west-facing master bedrooms that are insulated by the vertical wall.

Other green features at Tree House include the use of heat-reducing laminated green tinted windows, lifts with Variable Voltage and Variable Frequency motor drive and sleep mode programming and motion sensors at staircases that will activate lights automatically.

Tree House's various green features are expected to result in energy savings of over 2,400,000 kWh per year and water savings of 30,000 m³ per year, or approximately over S\$500,000 annually.

Mr Kwek Leng Joo, CDL Deputy Chairman, said, "CDL takes great pride in building developments that leave an indelible impression on the cityscape. We have continuously pushed the boundaries with breakthrough sustainable designs and features as well as state-of-the-art technologies. With the eco-inspired Tree House, CDL has not only created a place where residents are proud to call home but more importantly, a green icon which placed Singapore in the world map."

CDL invests 2% to 5% of a new development's construction cost in eco-friendly features and sustainable construction technologies. The first and only developer to be conferred the pinnacle BCA Green Mark Platinum Champion since the award was introduced in 2011 and the first to receive the BCA Built Environment Leadership Platinum Award in 2009, CDL has continued to drive green innovations and methods that enhance construction excellence, productivity, and environmental sustainability.

In addition to having entered Guinness World Records, Tree House received top honours in the 'Best Innovative Green Building' category at the MIPIM Asia Awards 2013 which honours outstanding real estate projects in Asia Pacific. Tree House was also conferred the Green Mark Platinum award by the Building and Construction Authority in 2010 and 'Special Award - Best Design for Maintenance' at the National Parks Board's Skyrise Greenery Awards in 2013.

Besides Tree House, CDL's D'Nest development has set record for the 'Largest Solar Panels In A Condominium' in the Singapore Book of Records in 2013. Solar panels measuring 1,520 m² will be installed on roof tops to offset electricity consumption for common areas. D'Nest's solar panels

system is expected to harness 219,000 kWh of energy a year. Approximately S\$60,000 can be saved in electricity bills, potentially reducing monthly maintenance fees payable by residents.

In 2013, CDL also built Singapore's first zero energy Green Gallery located in the Singapore Botanic Gardens. The Gallery's Photovoltaic cladded roof panels are expected to generate over 31,000 kWh of energy annually, above its estimated energy consumption of about 30,000 kWh per year. It was built using the Prefabricated Prefinished Volumetric Construction (PPVC) concept introduced in Singapore for the first time. The entire structure was precast into sections offsite using the PPVC system and then brought to the Gardens for installation. This helped eliminate massive wet works usually required in building developments and resulted in faster construction time, higher productivity and minimised impact on the environment.

Please refer to Annex A for more details on Tree House, D'Nest and CDL Green Gallery.

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Annex A

TREE HOUSE



Surrounded by the lush greenery, Tree House is a nature and eco-inspired development that comprises four 24-storey towers with 429 units.

This BCA Green Mark Platinum award winning development not only offers residents the picturesque views of the Bukit Timah Nature Reserve and Upper Peirce Reservoir, but the well-thought development also incorporates numerous sustainable design features that provide dwellers with a green environment.

Approximately 2.7% of the total construction cost was invested into the development of the condominium's green innovations, which is expected to result in energy savings of over 2,400,000 kWh per year and water savings of 30,000 m³ per year, or approximately a total of over \$500,000 per year.

GREEN FEATURES	BENEFITS
<p>Designed for Energy Efficiency</p> <ul style="list-style-type: none"> ▪ Installation of energy efficient inverter air-conditioning (with 4 Green Ticks Energy Label) and gas heaters for all apartments ▪ Use of heat-reducing laminated green tinted windows ▪ Provision of lifts with Variable Voltage and Variable Frequency motor drive and sleep mode programming ▪ Provision of motion sensors at staircases that will activate lights automatically ▪ Use of T5 and LED lighting for common areas, lobbies and car parks 	<ul style="list-style-type: none"> ▪ Enjoy energy savings from the energy efficient air-conditioners ▪ Helps to reduce external heat gain
<p>Designed for Water Efficiency</p> <ul style="list-style-type: none"> ▪ Installation of water efficient sanitary fixtures and fittings (with Water Efficiency Labelling Scheme) such as tap fittings, shower mixers and water closets ▪ Use of water sub-meters to monitor water usage for key common areas ▪ Rainwater harvesting system for irrigation of landscape 	<ul style="list-style-type: none"> ▪ Achieve water savings ▪ Monitors water usage to detect to help reduce water wastage
<p>Designed for Good Indoor Environmental Quality and Environmental Protection</p> <ul style="list-style-type: none"> ▪ Construction of green walls (that are extended to the west facades) that will act as bio-shading devices ▪ Use of low formaldehyde adhesive for woodworks such as wardrobes, doors and kitchen cabinets ▪ Use of low VOC paints for all internal walls and ceilings 	<ul style="list-style-type: none"> ▪ Serves to cool the environment and reduces the estate's carbon footprints by filtering pollutants and CO₂ from the air ▪ Improves air quality

Design Innovation and Other Green Features

- Dual-chute pneumatic waste collection system (for the segregation of domestic and recyclable waste)
- Takes advantage of the natural sloped terrain of the site by introducing "bio-swales" that aids in the collection of rainwater for landscape irrigation purposes to filter and collect rain water for recycling
- Construction of green sky gardens at 7th, 13th and 19th -storeys of each block to create a fresh and healthy living space
- Encourages recycling to protect the environment
- Treats surface runoff water through cleansing and filtration of pollutants before being used for other purposes

D'NEST



Nestled within the Pasir Ris Grove residential enclave, D'Nest is a 912-unit nature-inspired luxury condominium.

Comprising 12 blocks, the design of the development is based on the concept of a "Green Habitat" to provide a seamless integration with its natural surroundings.

D'Nest has set a new record in Singapore Book of Records (SBOR) for the "Largest Solar Panels In A Condominium". Solar panels measuring a total of 1,520 m² will be installed on the development's roof tops to harness solar energy to off-set the electricity consumption for common areas within the development.

Approximately 2.6% of the total construction cost was invested in green innovation for this BCA Green Mark Gold^{Plus} development.

GREEN FEATURES	BENEFITS
<p>Designed for Energy Efficiency</p> <ul style="list-style-type: none"> ▪ Sets a record in SBOR for "Largest Solar Panels In A Condominium" with 1,520 m² of solar panels to be installed on the development's roof tops. The solar panels are designed to harness solar power up to 217 kWp and are installed to replace part of the electricity required to power the common areas. The energy harnessed by the solar panels is capable of off-setting most of the electricity consumption for common areas such as the car parks, escape staircases and lobbies. Essential services such as lifts will still be powered up conventionally by grid electricity. ▪ Provision of gas water heaters for majority of the residential units ▪ Installation of energy efficient air-conditioning certified under the Singapore energy labeling scheme (4-Ticks Energy Label) 	<ul style="list-style-type: none"> ▪ The targeted electricity generation of the solar panels system is approximately 600 kWh per day. In a year, this means potentially harnessing 219,000 kWh of energy, which translates into approximately over S\$60,000 saved in electricity bills. This can potentially reduce the monthly maintenance fees payable by residents. ▪ Estimated energy savings of up to 1,511,952 kWh per year for the development ▪ Enjoy estimated energy savings of up to 1,238,658 kWh per year from the highest 4-Ticks energy-efficient air-conditioners ▪ Minimise the use of mechanical ventilation, hence cutting down on electricity consumption ▪ Enjoy estimated energy savings up to 43,884 kWh per year

<ul style="list-style-type: none"> ▪ Design that allows for natural ventilation in common areas like lift lobbies and corridors ▪ Daylighting design for natural daylight to illuminate common areas like lift lobbies and corridors coupled with the use of photo sensors 	
<p>Designed for Water Efficiency</p> <ul style="list-style-type: none"> ▪ Installation of very good and excellent rating sanitary fixtures and fittings (certified under PUB's Water Efficiency Labelling and Standards Scheme) such as tap fittings and water closets ▪ Provision of rainwater collection system and automatic water efficient irrigation system with rain sensors 	<ul style="list-style-type: none"> ▪ Minimise water wastage and increase the overall water usage efficiency of each apartment ▪ Total annual estimated water savings of up to 41,849 m³, equivalent to 27 Olympic sized pools ▪ Minimise water usage for the estate's landscape watering
<p>Implementation of Sustainable Construction Methodology and Good Indoor Environmental Quality</p> <ul style="list-style-type: none"> ▪ Extensive use of sustainable materials for construction, including green cement in place of ordinary Portland cement in concrete production, eco concrete (Recycled Concrete Aggregates and Washed Copper Slag), eco-friendly materials (certified under the Singapore Green Label or Singapore Green Building Product schemes) ▪ Recycled content in ceiling board, road pavements and pre-cast concrete drain and road kerbs ▪ Utilisation of non-chemical termite treatment system ▪ Extensive use of pre-cast / pre-fabricated components in construction (e.g. Prefabricated Bathroom Unit) 	<ul style="list-style-type: none"> ▪ Utilisation of materials with recycled content to minimise impact on the environment ▪ Reduce toxicity levels of emissions to the environment during the treatment ▪ Improve buildability, resource efficiency and productivity ▪ Improve environmental performance during construction phase
<p>Other Green Features or Eco-Initiatives</p> <ul style="list-style-type: none"> ▪ Provision of 'Eco-Plug' to the residents ▪ Provision of electric vehicle charging points 	<ul style="list-style-type: none"> ▪ Allows residents to plug in their electrical appliances to display, check and record electricity usage and cost ▪ Encourages the usage of eco-friendly electric vehicles

CDL GREEN GALLERY @ SBG HERITAGE MUSEUM



Developed as an extension to the Singapore Botanic Gardens (SBG) Heritage Museum on Holttum Lawn by CDL, the 314 m² CDL Green Gallery is Singapore's first purposefully built zero energy Green Gallery. The Gallery, which was officially opened by Prime Minister Lee Hsien Loong in November 2013, is built with several eco-friendly technologies, including two eco-innovative features introduced in Singapore for the first time – a biomaterial known as Hempcrete (largely made from the hemp plant) and a prefabricated modular system known as the Prefabricated Prefinished Volumetric Construction (PPVC) concept.

As Singapore's first zero energy Green Gallery, a key feature of the building is the solar photovoltaic (PV) cladded roof panels that are expected to harvest all the energy required for the building's operations. The solar panels are expected to generate an annual energy yield of over 31,000 kWh, which is more than the Gallery's estimated annual energy consumption of about 30,000 kWh/year.

GREEN FEATURES	BENEFITS
<p>Designed for Energy Efficiency</p> <ul style="list-style-type: none"> ▪ A total of 105 solar photovoltaic (PV) cladded roof panels are expected to harvest all the energy required for the building's operations, making the CDL Green Gallery Singapore's first zero energy Green Gallery ▪ The CDL Green Gallery is fitted with LED lights and high energy-saving air-conditioning systems 	<ul style="list-style-type: none"> ▪ The solar panels are expected to generate an annual energy yield of over 31,000 kWh, which is more than the Gallery's estimated annual energy consumption of about 30,000 kWh/year, making the Gallery self-sufficient ▪ The high energy-efficient, dimmable LED lights use approximately 57% less energy than conventional lighting ▪ High energy-efficient air-conditioning systems reduce consumption of electricity as the inverter air-conditioning system, coupled with an integrated building control system, consumes 50% less energy compared to conventional types
<p>Eco-friendly Designs and Use of Innovative Eco-friendly Materials</p> <ul style="list-style-type: none"> ▪ Passive Architectural Design – The design, layout and orientation take into account the site's natural attributes ▪ Use of Hempcrete – An eco-friendly biomaterial used for the first time in Singapore. Made from a mixture of hemp core, lime binders and water, it is used as the external wall cladding ▪ Utilised green building materials and finishes, low Volatile Organic Compound (VOC) paints and adhesives with no formaldehyde. No concrete was used for the building structure as well 	<ul style="list-style-type: none"> ▪ The building envelop, which consists of green walls and eco-materials, helps enhance thermal insulation of the Gallery, reducing solar heat gain ▪ High thermal performance, superior acoustic properties, non-combustible, pest, mould- and mildew-resistant, and durable ▪ Enhanced environmental protection and indoor environmental quality

<ul style="list-style-type: none"> ▪ Vertical Green Walls – Purposefully cladded facades with butterfly-attracting plant species ▪ Green Roof – Installed with a selection of drought-resistant plant species 	<ul style="list-style-type: none"> ▪ Extensive green coverage of over 25% while encouraging biodiversity. Also improves thermal insulation of the Gallery ▪ Lower maintenance and mitigates Urban Heat Island effect around the building
<p>Implementation of Sustainable Construction Methodology</p> <ul style="list-style-type: none"> ▪ Prefabricated Modular System known as the Prefabricated Prefinished Volumetric Construction (PPVC) concept – Introduced for the first time in Singapore, it is a unitised form of building with steel components prefabricated and assembled in an offsite production facility. They are then hoisted by a crane into position onsite. Like building blocks, they are pieced together to form the entire structure onsite. 	<ul style="list-style-type: none"> ▪ Prefabricated Modular System is easy to build and flexible. It took less than 24 hours for the building structures to be installed into their final positions. The structure is of superior quality and there is better site protection and lower environmental impact. The modular elements are also modifiable for adaptive reuse in future
<p>Other Green Features</p> <ul style="list-style-type: none"> ▪ Environmental Management System – Active monitoring and management of energy generation and consumption. Environmental performance shared in real time with Gallery visitors. 	<ul style="list-style-type: none"> ▪ Promote environmental awareness to community-at-large