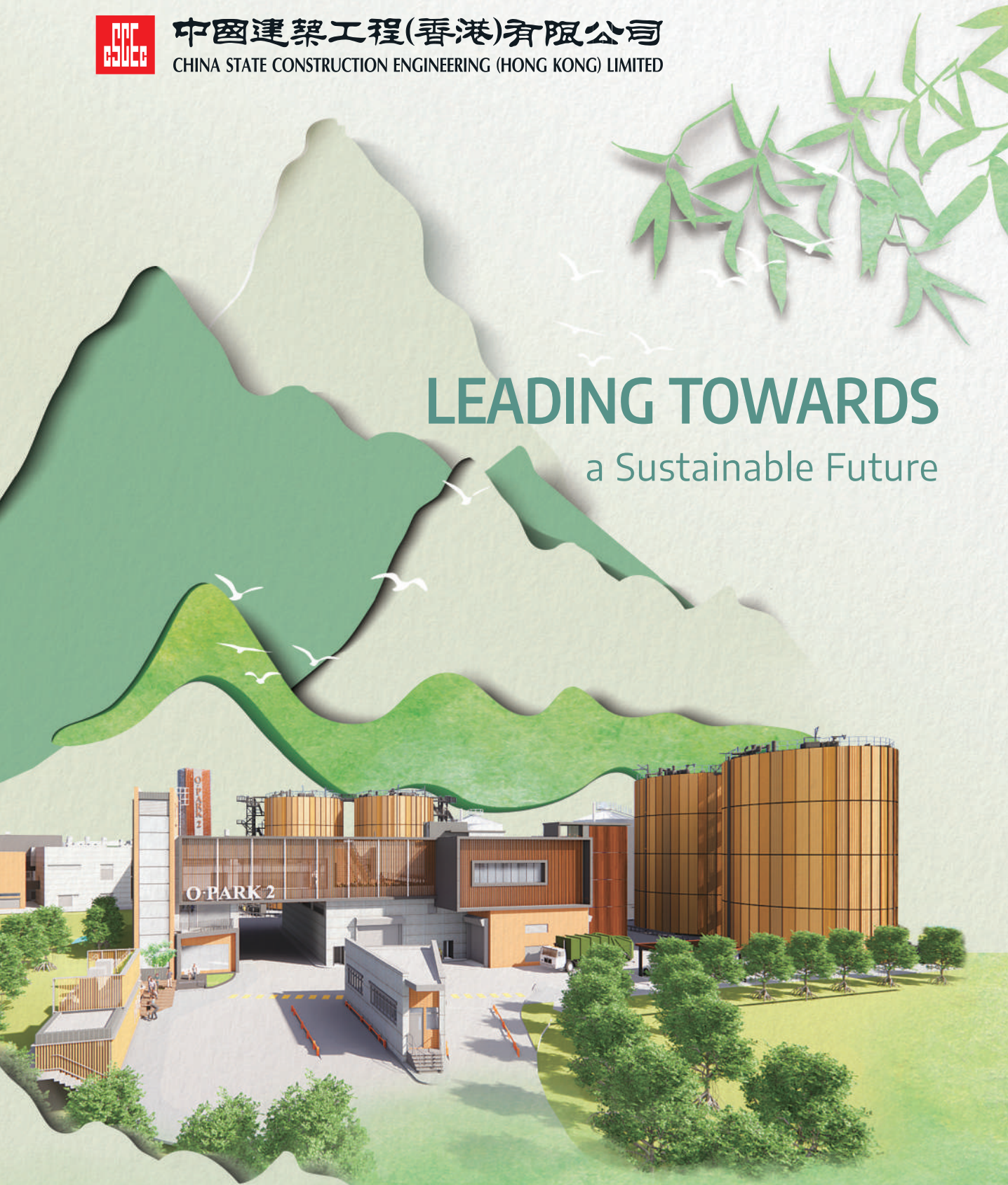
中國建築工程(香港)有限公司
CHINA STATE CONSTRUCTION ENGINEERING (HONG KONG) LIMITED

LEADING TOWARDS
a Sustainable Future



O·PARK 2
Organic Resources Recovery Centre Phase 2
2021 Sustainability Report

Organic Resources Recovery Centre

Sustainability Report *Phase 2*

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FOREWORDS

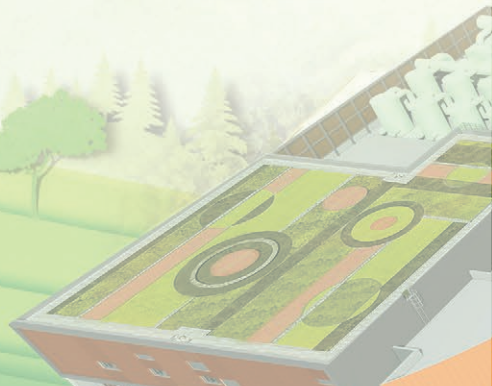
FROM THE MANAGEMENT

As a representative green project of CSHK under the Design, Build, Operate (DBO) model, the O·PARK2 project has started in 2019 and will be completed and put into operation in 2024.

Climate change is a great challenge for mankind that draws global attention in recent years. Confronting the increasing frequency of extreme weather events, the United Nations has set global carbon emission reduction and carbon neutrality targets and action plans through the Paris Agreement, which many countries have responded to. China has taken the initiative to put forward the strategic goal of "striving to achieve carbon emission peak by 2030 and carbon neutrality by 2060", and has formulated corresponding industrial policies and carbon reduction plans to promote the low-carbon transformation of various industries, and Hong Kong has advanced its timeline for achieving carbon neutrality to 2050.

Scan the QR code for more information about O·PARK2.

Taking root in Hong Kong for more than 40 years, CSHK has always upheld the business philosophy of "exercise caution in details and implementation, build a strong foundation to seek greater success". We are committed to maintaining consensus, bringing together innovation and wisdom to create shared value and formulate sustainable development strategies. In response to Hong Kong's 2050 carbon neutrality target, we, as a leading company in the construction industry, have taken the initiative to meet the challenge and promote carbon reduction by using O·PARK2 as the first pilot project that aims to achieve carbon neutrality during the construction period, reducing the carbon emissions of construction from various stages including design, material selection, project construction, operation and maintenance, etc., so as to lead the construction industry towards low-carbon transformation.



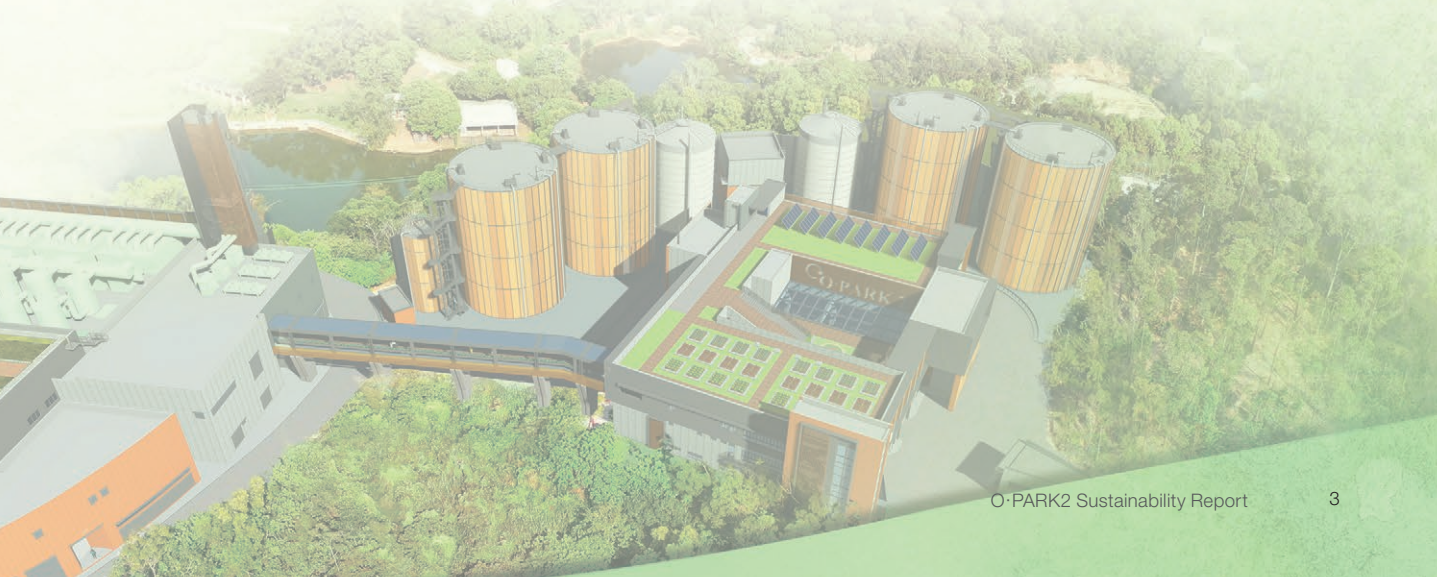
As a representative green project of CSHK under the Design, Build, Operate (DBO) model, the O·PARK2 project has started in 2019 and will be completed and put into operation in 2024. Currently, O·PARK2 is in the construction phase and has adopted a number of carbon reduction measures, including the use of low-carbon construction materials, application of renewable energy and site electrification. To demonstrate our commitment to achieving carbon neutrality during construction, we have issued the Organic Resources Recovery Centre Phase 2 (O·PARK2) Commitment to Carbon Neutrality during Construction Period in 2021, committing to achieve the carbon neutrality during the construction period through sustainable management, technological innovation and supporting voluntary emission reduction. Upon completion, O·PARK2 will be the first project in China to achieve carbon neutrality during the construction period.

We accurately monitor the project's carbon emissions during its construction period from material procurement to construction to ensure it progresses towards carbon neutrality. In November 2021, the project's carbon emissions were verified by CCA and became the sole receiver of the highest caliber *Carbon Neutral Level* CarbonCare® Construction (Process) Label, indicating the achievement of carbon neutrality in the construction process.

Looking ahead, we will continue to promote decarbonization in the industry by studying and summarizing our experience in O·PARK2 and applying it to other applicable projects. In the future, we will also explore the development of carbon assets during the operation period of O·PARK2, hoping to become the first certified Voluntary Emission Reduction project in Hong Kong that meets international standards and help to drive the development of Hong Kong's carbon market and the transformation to a low-carbon economy.

Along the way of the construction industry to achieve carbon neutrality, CSHK will continue to be the industry leader and steer the way toward a sustainable, better and more liveable Hong Kong together with all stakeholders.

Mr. Hung Cheung Shew, Danny
Chairman and President



MESSAGE FROM THE ENVIRONMENT AND ECOLOGY BUREAU

The entire world, including Hong Kong, is impacted by the catastrophic consequences of climate change. As climate change exacerbates, the number of blistering days in Hong Kong has increased in recent years. The overall temperature has risen, extreme rainfall and typhoon events have become more frequent, and the sea level is rising.

To mitigate climate change, implementing a carbon-neutral city will continue to be one of Hong Kong's priorities. In 2017, we published the first Hong Kong Climate Action Blueprint 2030+, which set our carbon emission targets. In recent years, we have adopted a wide range of measures to effectively reduce carbon emissions, including a significant reduction in coal-fuel power generation, the introduction of the Feed-in Tariff (FiT) scheme and the development of renewable energy. With the implementation of various measures, Hong Kong's annual per capita carbon emissions have dropped from the peak level of 6.2 tonnes in 2014 to about 4.5 tonnes in 2020. Since 2005, Hong Kong has already reduced its carbon emissions by about a quarter. Given the satisfactory progress of carbon reduction, we recently updated and published the Hong Kong Climate Action Blueprint 2050 in 2021 with a more ambitious medium-term target to halve Hong Kong's total carbon emissions from 2005 levels by 2035.

Along with the publication of new policies, we are cooperating with government bureaux and departments to implement carbon reduction measures in various aspects. EPD has taken the lead in promoting carbon reduction in green projects. Our upcoming green project, O·PARK2, which is our second organic resources recovery centre, as well as one of the most advanced low carbon construction projects in Hong Kong. O·PARK2 has two main focuses in carbon reduction: achieving carbon neutrality during the construction phase and waste-to-energy during the operation phase. The use of biogas to generate electricity during operation, which will provide renewable energy for Hong Kong and reduce the use of fossil fuels for electricity generation, together with the reduced amount of organic waste landfilled will inject new impetus to reduce carbon emissions.

Looking ahead, we will continue to work hand-in-hand with the whole community to drive Hong Kong towards carbon neutrality and create a sustainable and liveable environment for our next generation.

Mr. TSE Chin-wan, BBS, JP

Secretary for Environment and Ecology

MESSAGE FROM ENVIRONMENTAL PROTECTION DEPARTMENT

In 2020, 3,255 tonnes of food waste were disposed of at landfills in Hong Kong every day, accounting for approximately 30% of the local municipal solid waste, and took up valuable landfill space. The Government announced the Waste Blueprint for Hong Kong 2035 in 2021 to set out the vision of "Zero Landfill" with the long-term goal to develop waste-to-energy facilities and progressively to move away from over-reliance on landfills.

O·PARK1 commenced operation in July 2018 and is the first facility in Hong Kong that converts food waste into energy. Upon completion, O·PARK2 will become the largest organic resources recovery centre in Hong Kong with a food waste treatment capacity of 300 tonnes per day, which will effectively relieve the pressure on landfills.

At the same time, O·PARK2 will convert waste into energy during its operation phase and contribute to renewable energy generation in Hong Kong. In addition to meeting the needs of its facilities for electricity and thermal energy, it is expected that O·PARK2 can export about 24 million kilowatt-hours of electricity to the power grid annually, which is equivalent to the electricity consumption of 5,000 households or so. With reduced reliance on fossil fuels for electricity generation and less food waste to be disposed of at landfills, it is anticipated that our greenhouse gas emissions can drop by some 67,000 tonnes annually, thereby helping us move towards the goal of achieving carbon neutrality before 2050 as stated in Hong Kong's Climate Action Plan 2050. It is also encouraging to see how dedicated China State Construction Engineering (Hong Kong) Limited is in promoting low-carbon construction practices and committing themselves to carbon neutrality during the construction phase of O·PARK2. Their low-carbon transformation is exemplary for the construction industry.

We hope the successful experience from O·PARK2 can be applied to the future waste-to-energy projects to foster the sustainable development of Hong Kong in reaching a new milestone.

Miss TSE Siu-wa, Janice, JP

Permanent Secretary for Environment and Ecology (Environment)/Director of Environmental Protection

CONSTRUCTION INDUSTRY COUNCIL REMARKS

As an important pillar of Hong Kong's economy, the construction industry is also key to achieving the carbon neutrality target by 2050. Over the years, CIC has been actively promoting the adoption of innovative technologies for the low-carbon transformation of Hong Kong's construction industry and is committed to helping the construction industry to seize the opportunities of carbon reduction. To achieve the carbon reduction target, the construction industry can improve its practices, business models and supply chain management.

O·PARK2 is a successful sustainable construction project. The project has adopted various measures to reduce the environmental, social and economic impacts during the construction period, including the use of low-carbon materials and equipment, source separation of construction waste, and the application of innovative technologies such as MiC and BIM.

As a major contractor, CSHK has actively promoted low-carbon transformation and demonstrated how construction projects can achieve carbon neutrality during the construction period, setting an example for the industry and promoting the development of sustainable construction in Hong Kong. We hope that O·PARK2 can share the valuable experience in achieving carbon neutrality to the industry, so as to encourage the industry to launch more low-carbon construction projects in the future. CIC will continue to engage developers, contractors, subcontractors, suppliers and other stakeholders together to cooperate and move towards carbon neutrality.

Mr. Cheng Ting-ning

Executive Director, Construction Industry Council

CARBONCARE INNOLAB REMARKS

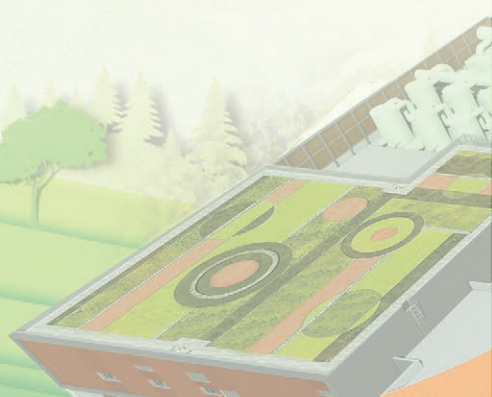
Climate change is an overwhelming challenge, and the achievement of sustainable development requires the concerted efforts of organizations from all sectors. The effectiveness of organizations' carbon management will directly affect the progress of carbon reduction in the society.

To recognize the efforts of organizations in sustainable development, over 450 CarbonCare® Labels have been awarded to organizations from various sectors, including companies, government departments, public organizations, social enterprises, NGOs, etc. since 2011.

In the O·PARK2 project, CSHK has effectively managed the greenhouse gas emissions during the construction period and has performed well in terms of carbon neutrality, and therefore, is well deserved to be awarded the "CarbonCare® Construction (Process) Label" at the "Carbon Neutral" level.

As a climate partner of the CarbonCare InnoLab, CSHK has set a good example for the industry with the O·PARK2 project. I hope that CSHK will continue to launch more carbon-neutral construction projects and lead the construction industry to accelerate sustainable development.

Mr. Chong Chan Yau
Founder and Chief Executive Officer,
CarbonCare InnoLab



SUBCONTRACTOR REMARKS

As a subcontractor of the O·PARK2 project, we are responsible for the structural works of concrete buildings. This is the first time I come across the concept of "Carbon Neutrality". The site has implemented many decarbonization measures covering various aspects, such as using low-carbon construction materials and stop operating some facilities during off-peak hours. Moreover, we conform to the advocates of CSHK, maximizing the recycling and reuse of construction materials to reduce carbon emissions, waste generation and disposal.

In terms of digitalization, CSHK provides us with smart site related training to enable our staff to master C-SMART and BIM, so as to implement efficient digitalized construction and thus saving manpower and resources.

The project has a novel proposal while its site management is phenomenal, especially in terms of epidemic prevention and employees' wellbeing. Thanks to the strict and effective epidemic prevention measures at the site, the construction progress of O·PARK2 has not been significantly affected during the epidemic. The site's clean environment and proper catering arrangements greatly ensured suitable working conditions for the workers, which constructed O·PARK2's strengths.

Mr. John Ho Kwun Fung
Engineering Subcontractor

MESSAGE FROM THE TEAM

For a better mapping of the green development, CSCI has formulated a sustainable development roadmap, set targets for carbon neutrality and promoted low-carbon construction.

In applying ultra-low carbon construction technologies and management practices, CSCI is experimenting with various cutting-edge decarbonization technologies on CSHK's O·PARK2, a demonstration project that achieves carbon neutrality during the construction period. We will summarize the carbon neutral experience of the project and extend the replicable technology and management system to all our projects, share the decarbonization experience with our peers, and promote the sustainable development of the construction industry.

In the future, we will continue to follow the green development and explore the opportunities of developing carbon assets during O·PARK2's operation period, so as to contribute to the development of Hong Kong's carbon trading market and the transformation into the low-carbon economy.

Mr. POON Ka Wing, Ricky
Head of Sustainability, CSCI/CSHK

O·PARK2 is the first project that aims at achieving carbon neutrality during the construction period in Hong Kong and even the whole country. Therefore, there is a lack of related projects or experience that we could refer to. As a pioneer in the industry, we are actively bridging the gap between industry and research, taking advices through various means, and continuously learning and practicing. Besides, we have shared carbon reduction knowledge and experience with the industry through a wide range of educational events and exhibitions. We are glad to apply our experiences acquired in the O·PARK2 to other projects for the promotion and advancement of carbon neutrality in Hong Kong.

Mr. SHI Da
Senior Site Manager of O·PARK2

Green building is a common trend in Hong Kong's construction industry. As a leading construction enterprise in Hong Kong, CSHK, while vigorously practicing green building, strives to implement the concept of green construction and continuously strengthen sustainable development strategies. In the O·PARK2 project, the team actively recruits talents who specialize in green construction and carbon neutrality development, introduces innovative new construction techniques, implements comprehensive on-site carbon reduction measures and low-carbon management, and integrates intelligent site control to successfully carry out CSHK's first carbon neutral project, accumulating experience for future carbon asset development and leading Hong Kong's construction industry to embrace the green transformation of the low-carbon era.

Mr. LEUNG Kee Wo, Chris
Project Director of O·PARK2

The goals to achieve carbon peaking in 2030 and carbon neutrality in 2060 have ushered in the new low-carbon era. To confront and prepare for this historic challenge and opportunity, we are developing the Carbon Neutrality Cloud Platform independently that combines the efforts of enterprises, universities, and research institutes, and pilot it in O·PARK2, possibly the first national project to achieve carbon neutrality during the construction period. So far, the first stage of the platform application has been completed, achieving the intelligent collection, analysis, and display of carbon emission data. In the future, we will continue to conduct in-depth research to improve and upgrade the platform and promote its application in other projects.

Mr. KA Chiu, Caspar
Senior Manager of Information Management/
R&D Director of the Carbon Neutrality Cloud Platform

Since September 2021, I have joined the O·PARK2 project and been responsible for coordinating with various departments to carry out carbon accounting, develop the Carbon Neutrality Cloud Platform, and conduct carbon asset development. Carbon asset development is undoubtedly crucial to the world's future, and building materials and construction would be critical sectors for carbon asset development. I am very honored to get involved in this advanced project and contribute to the development of carbon neutrality in Hong Kong.

Ir. Dr. DAI Ji
Decarbonization Director of O·PARK2

The research and implementation of the carbon reduction measures in O·PARK2 is a challenging but promising task, and I am honored to join it. With the introduction of carbon reduction measures, we collaborated with various teams to translate theory into practice and successfully implemented several related technologies. In the future, I, together with other members of the Carbon Neutrality R&D team, will continuously improve and advance O·PARK2's carbon neutral mission and strive to contribute to the development of carbon neutrality in the construction industry.

Dr. CUI Yan-xiang, Jason
Senior Design Engineer & Member of the Carbon Neutrality R&D Team of O·PARK2

Carbon neutrality is a global trend, and the decarbonization project O·PARK2 is an innovative breakthrough in the industry. The use of BIM for DfMA in the design makes the construction process smoother and reduces carbon emissions. In addition, our team works closely with structural design consultants daily to optimize the design to reduce carbon emissions. I am honored to get involved in such an important project and to contribute to the green and sustainable development of Hong Kong.

Mr. WAI Jeremy
Engineer Trainee

I feel privileged to be involved in the carbon reduction work at O·PARK2's construction site in 2021, in which I was responsible for procuring innovative carbon-neutral materials and assisting the site in recording energy and material usage for carbon accounting and auditing. Based on the site's preliminary carbon accounting results, we identified the largest sources of carbon emissions and developed corresponding carbon reduction measures. I procured various low-carbon construction materials for the project, contributing to achieving carbon neutrality during construction. By actively sharing carbon reduction knowledge and experience, we will continue to work hard to lead our peers toward the national carbon reduction goal, setting an example for the construction industry and promoting the sustainable development and carbon neutrality.

Ms. WONG Ying Fan, Yvonne
Senior Material Control Supervisor

KEY ENVIRONMENTAL

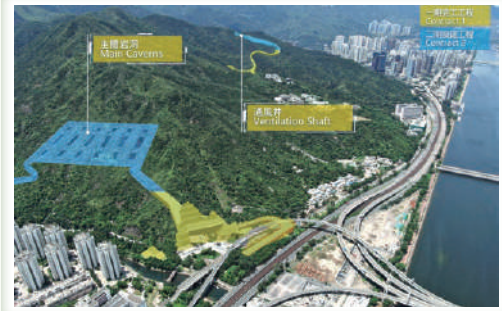
PROJECTS

KEY ENVIRONMENTAL PROJECTS

Since its inception 43 years ago, China State Construction Engineering (Hong Kong) Limited ("CSHK") has continued to undertake high-quality and technically advanced projects and has steadily developed its core operational strength. As a major contractor, CSHK is committed to building and promoting the stable and healthy development of the city and securing the basic functioning of society. Over the past few decades, we have been building environmental engineering projects to improve people's livelihood, including a number of projects related to water supply and sewage treatment.

Relocation of Sha Tin Sewage Treatment Works to Caverns — Construction of Main Caverns

2021–Construction in progress



Constructing a main cavern at Nui Po Shan of about 14 hectares in area, including site formation, construction of the tunnel, vertical ventilation shafts, ventilation adit, and effluent pipes.

Relocation of Sha Tin Sewage Treatment Works to Caverns — Site Formation and Access Tunnel Construction

2019–2022

Constructing the main access tunnel, including site formation at the entrance of the main access tunnel, associated road works, water and drainage works, landscape, and geotechnical works.

Development of Organic Resources Recovery Centre, Phase 2 (O·PARK2)

2019–Construction in progress (+15 years of operation)

Designing, constructing, and operating the O·PARK2 with a site area of approximately 2.5 hectares, which, upon completion, is expected to receive and process up to 300 tonnes of source-separated organic food waste per day.

Design, Build and Operate Tseung Kwan O Desalination Plant (Phase I)

2019–Construction in progress (10+5 years of operation)

Designing, constructing, and operating the first phase of development of the desalination plant, which has a capacity of supplying 135,000 cubic meters of fresh water per day and shall be expanded to 270,000 cubic meters per day.

Expansion of Tai Po Water Treatment Works and Ancillary Raw Water and Fresh Water Transfer Facilities — Design and Build of New Stream II

2013–2018

Upgrading existing facilities and constructing additional facilities at Tai Po Water Treatment Works to increase its water treatment capacity from 400,000 cubic meters to 800,000 cubic meters per day.

Design, Build and Operate Pillar Point Sewage Treatment Works

2010–2013

Upgrading the sewage treatment level from the preliminary level to chemically enhanced primary treatment plus disinfection; expanding the treatment capacity from 215,000 cubic meters per day to 241,000 cubic meters per day; providing new septic waste collection and treatment facilities; other ancillary works.

Construction of Yuen Long South Branch Sewers and Expansion of Ha Tsuen Sewage Pumping Station

2009–2013

Constructing approximately 9-kilometer-long sewage pipes and a new pumping station; expanding the existing Ha Tsuen Sewage Pumping Station.

Stonecutters Island Sewage Treatment Works – Series Works

1995–1997 and 2009–2016

Constructing a sewage sedimentation tank, effluent sewage tunnel, and a circular diaphragm wall around the main pumping station. Demolishing existing washing facilities, sludge dewatering building, and storage silos; constructing a sludge dewatering building, storage silos, a deodorization system, and a workshop building at Stonecutters Island Sewage Treatment Works, and in particular, installing the relevant infrastructure works, electrical and mechanical systems, fire services and treatment process systems, etc.

In 2020,
Hong Kong disposed of

3,255 tonnes of food waste per day at landfills

accounting for about **30%** of the total municipal solid waste

FOOD WASTE ISSUE IN HONG KONG

Currently, most food waste in Hong Kong is disposed of at landfills along with other municipal solid waste. In 2020, Hong Kong disposed of 3,255 tonnes of food waste per day, accounting for about 30% of the total municipal solid waste. Food waste disposal not only occupies limited landfill space and adds to the burden of landfills, but the biomass contained in food waste can also generate other pollutants in the environment, causing more damage. Therefore, landfilling is not the most desirable option for food waste disposal in terms of sustainable development.

To alleviate the food waste problem in Hong Kong, the Hong Kong SAR Government ("the Government") issued A Food Waste and Yard Waste Plan for Hong Kong 2014–2022 in 2014, which set out four food waste management strategies: reduction at source, food donation, food waste collection, and recycling at facilities. For recycling at facilities, the Government planned to set up a network of organic resource recovery centres across Hong Kong to recycle food waste and convert it into energy, such as biogas (a renewable energy resource similar to natural gas) and electricity, thereby reducing greenhouse gas (GHG) emissions and mitigating climate change. The processed food waste can also be converted into high-quality compost for landscaping or agricultural uses. The release of the Waste Blueprint for Hong Kong 2035 by the Government in 2021 further proposed a new vision of "Zero Landfill".

O·PARK2 INTRODUCTION

Currently, the Organic Resources Recovery Centre, Phase 1 (O·PARK1) and the food waste/ sewage sludge anaerobic co-digestion trial at the Tai Po Sewage Treatment Works have a combined treatment capacity of 250 tonnes of food waste per day. In particular, O·PARK1, located in Siu Ho Wan, Lantau Island can treat up to 200 tonnes of food waste per day.

O·PARK1
can treat up to

200 **tonnes** of food waste per day

Located in Sha Ling, North District, Hong Kong, O·PARK2 will be the largest food waste recycling facility in Hong Kong upon its completion. The project will be constructed by Alchmex International Construction Limited (Alchmex), a wholly owned subsidiary of CSHK, in conjunction with the Jardine Engineering Corporation Limited and Agrivert Limited (AJA Joint Venture). O·PARK2 is a representative green project implemented under the Design, Build and Operate (DBO) model. The project construction started in 2019 and is expected to commission in 2024, followed by 15 years of operation.

ALCHMEX INTERNATIONAL CONSTRUCTION LIMITED

Holding the highest level of construction permits in Hong Kong and is deeply involved in the environmental field with an edge in international leading technology management

JARDINE ENGINEERING CORPORATION LIMITED

A leading provider of advanced products and services that combine engineering expertise, technical service and project management experience

AGRIVERT LIMITED

A seasoned company specialized in food waste treatment in the UK that provides economical and environmentally friendly solutions for organic waste treatment

Treat **300 tonnes** **of food waste daily**

Treat a total of about **110,000 tonnes** **of food waste annually**

Reduce carbon emissions of about **67,000 tonnes** **CO_2-e annually**

Tackle about **8%** **of food waste generated in Hong Kong annually**

Generate about 24 million kWh of surplus electricity annually, after meeting the electricity and thermal energy needs of the O·PARK2 facilities

Meet the annual electricity consumption of about 5,000 households

CONSTRUCTION PERIOD:

CSHK implements low-carbon construction techniques and management methods in constructing O·PARK2, making it a demonstration project for achieving carbon neutrality during the construction period. During the design and construction periods, a carbon neutral strategy was developed based on the anticipated carbon footprint of the project. On the basis of technological research and development, the project implements innovative carbon reduction measures. After a significant reduction of carbon emissions, carbon credits will be purchased to offset the remaining carbon emissions to achieve carbon neutrality during the construction period.

OPERATION PERIOD:

O·PARK2 takes sustainable development as a construction goal and adheres to the principles of relieving the burden of landfills, reducing carbon emissions and environmental pollution, and converting waste into energy/resources. It adopts a new combination of process technologies to effectively optimize the building area required for the facilities, improve odor control, and reduce the environmental impacts of the project.

In addition to food waste recycling, during the operation period of the project, CSHK will explore the use of renewable energy generated from the project to develop carbon assets that meet international standards. Through this project, CSHK hopes to develop carbon trading in Hong Kong's construction industry, thereby setting an example for Hong Kong in achieving carbon neutrality and developing green finance.

SUMMARY:

O·PARK2 will not only improve the food waste recycling system in Hong Kong, but also be the first project in China to achieve carbon neutrality during the civil, structural, and architectural construction period, marking a significant milestone in the low-carbon transformation of the construction industry.

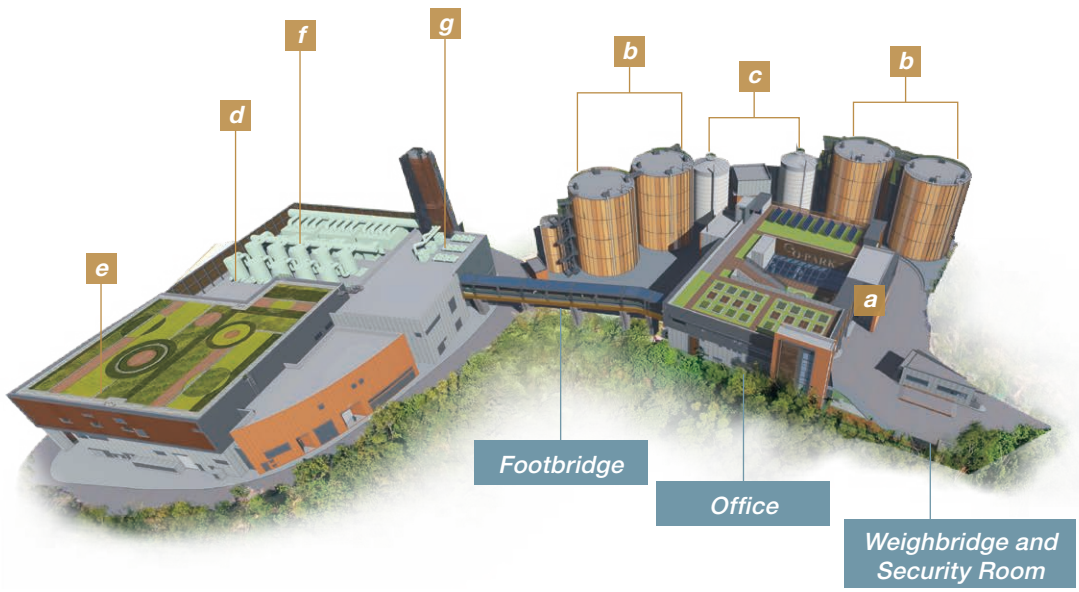
In addition, as an industry leader, CSHK hopes to explore the possibility of developing carbon assets through the operation of O·PARK2. O·PARK2 also aims to achieve self-sufficiency in electricity and heat during the operation period, and to export surplus electricity to the power grid for the benefit of the community.

MAJOR RECOGNITIONS AND AWARDS

O·PARK2 has received a number of certifications and awards in sustainability and technology related application, including the one-and-only "CarbonCare® Construction (Process) Label – Carbon Neutral Level" in Hong Kong, the Provisional Platinum Rating in BEAM Plus New Buildings, and the most premium "Gold Rating" in the 2021 annual government projects competition by the Hong Kong Institute of Building Information (HKIBIM). This shows that O·PARK2 has been widely recognized by the industry for its outstanding performance in low-carbon construction, green building, and digitalization.

Award Category	Award	Award-winning Unit	Issuer
Environment	CarbonCare® Construction (Process) Label 2021 — Carbon Neutral Level	O·PARK2	CarbonCare InnoLab
	Hong Kong Awards for Environmental Excellence — Certificate of Merit	AJA Joint Venture	Environmental Campaign Committee (ECC) and other organizations
	Provisional Platinum Rating in BEAM Plus New Buildings	O·PARK2	HKGBC
Digitalization	HKIBIM 2021 Annual Award	O·PARK2	HKIBIM
	Second Prize in 2021 CSHK Excellent Technology Team	O·PARK2	CSHK
Safety	2020 Innovative Safety Initiative Award — Safety Operational Device Category — Merit	AJA Joint Venture	Development Bureau, Construction Industry Council, Hong Kong Construction Association
	Best Program for Work Safety & Health in Hot Weather — Merit Prize	O·PARK2	Occupational Safety and Health Bureau
	Joyful@Healthy Workplace Best Practices Award — Outstanding Award	AJA Joint Venture	Occupational Safety and Health Bureau

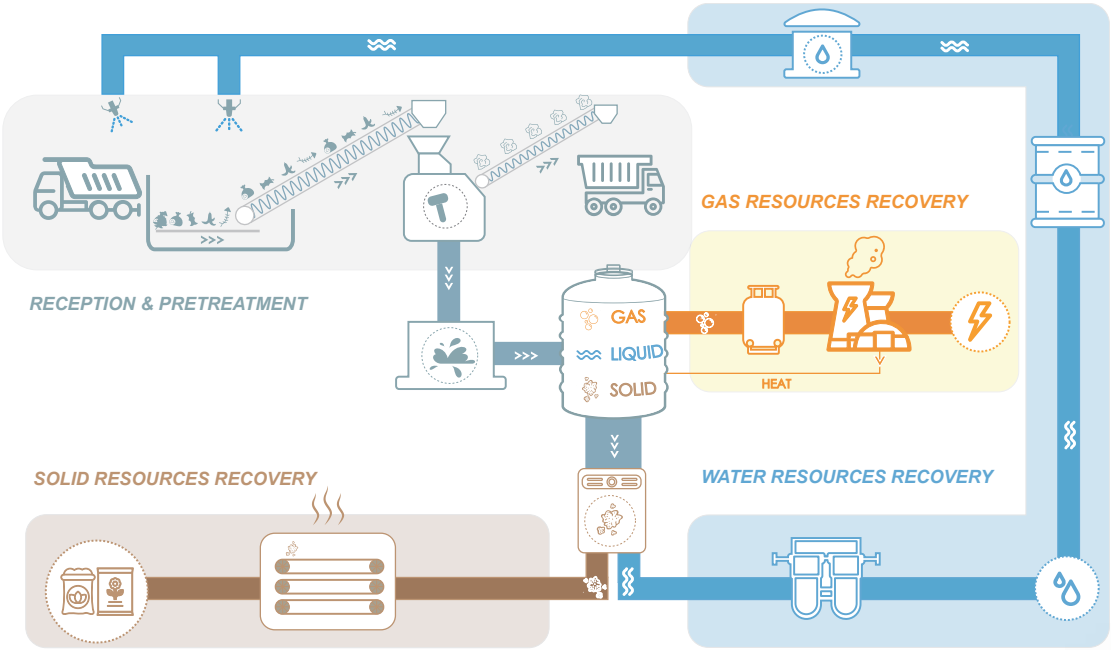
TECHNOLOGIES APPLIED IN O·PARK2



O·PARK2 food waste treatment facilities

O·PARK2 food waste treatment facilities consist of the following seven major systems:

- ***a*** Food waste reception and pre-treatment system;
- ***b*** Anaerobic digestion system;
- ***c*** Biogas purification and storage system;
- ***d*** Granulation system;
- ***e*** Wastewater treatment system;
- ***f*** Centralized air pollution control system; and
- ***g*** Combined heat and power system



The waste-to-energy process of O·PARK2

AUTOMATED PRE-TREATMENT SYSTEM

The food waste is broken up by a hammer mill and made into food waste slurry after it is transferred to the pre-treatment system. During this process, inorganic materials (e.g., plastics and metals) in the slurry are sorted and removed through an automatic sorting process. Compared to conventional food waste treatment, the automated pre-treatment system can quickly process large amounts of food waste while retaining as many organic materials as possible without requiring staff on duty, thus significantly reducing labor costs.

ANAEROBIC DIGESTION SYSTEM

The anaerobic digestion system provides suitable biochemical reaction conditions for microorganisms to break down food waste and produce biogas.

BIOGAS PURIFICATION AND STORAGE SYSTEM

Biogas from the anaerobic digestion tanks is collected by piping and then proceeded to the dehumidification and desulfurization processes to avoid corrosion of the downstream equipment. The purified biogas is then transferred and stored in biogas storage tanks for power generation.

GRANULATION SYSTEM

Digestate is first dehydrated in a centrifuge and then transformed into a high-quality fertilizer. O·PARK2 is a pioneer in the large-scale use of digestate granulation technology in food waste recycling facilities in Hong Kong and even in China. Compared to traditional composting methods, digestate granulation technology requires only a short period of retention time, and results in a 96% reduction in floor area.

O·PARK2 is a pioneer in the large-scale use of digestate granulation technology in food waste recycling facilities in Hong Kong and even in China.

Digestate granulation technology can achieve a

96% **reduction in floor area**

COMBINED HEAT AND POWER SYSTEM

The combined heat and power system generates electricity through the combustion of biogas. In addition to the use of internal supply, the surplus electricity will be exported to the main power grid, sufficient for the power consumption of approximately 5,000 households. Heat generated by combined heat and power system will also be properly recovered to supply heat for facilities such as the anaerobic digestion tanks and granulation facility.

CENTRALIZED AIR POLLUTION CONTROL SYSTEM

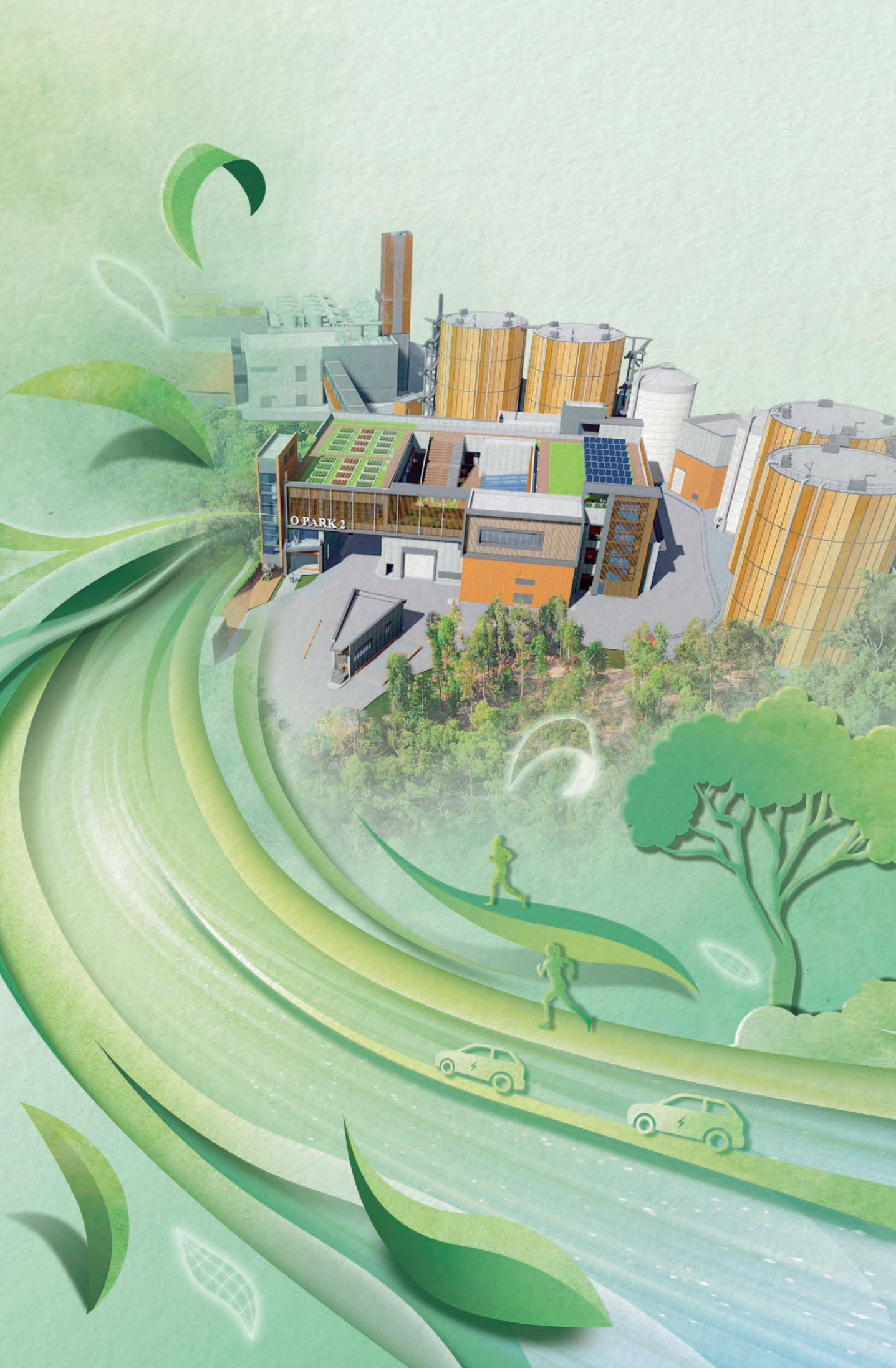
Odorous gases from all facilities in O·PARK2 are extracted to a centralized odor control system for treatment. The system removes odorous compounds (primarily hydrogen sulfide, ammonia, and other volatile organic compounds) and dust particles from the air. The performance of the system is monitored to ensure that the emissions are in compliance with legal requirements.

WASTEWATER TREATMENT SYSTEM

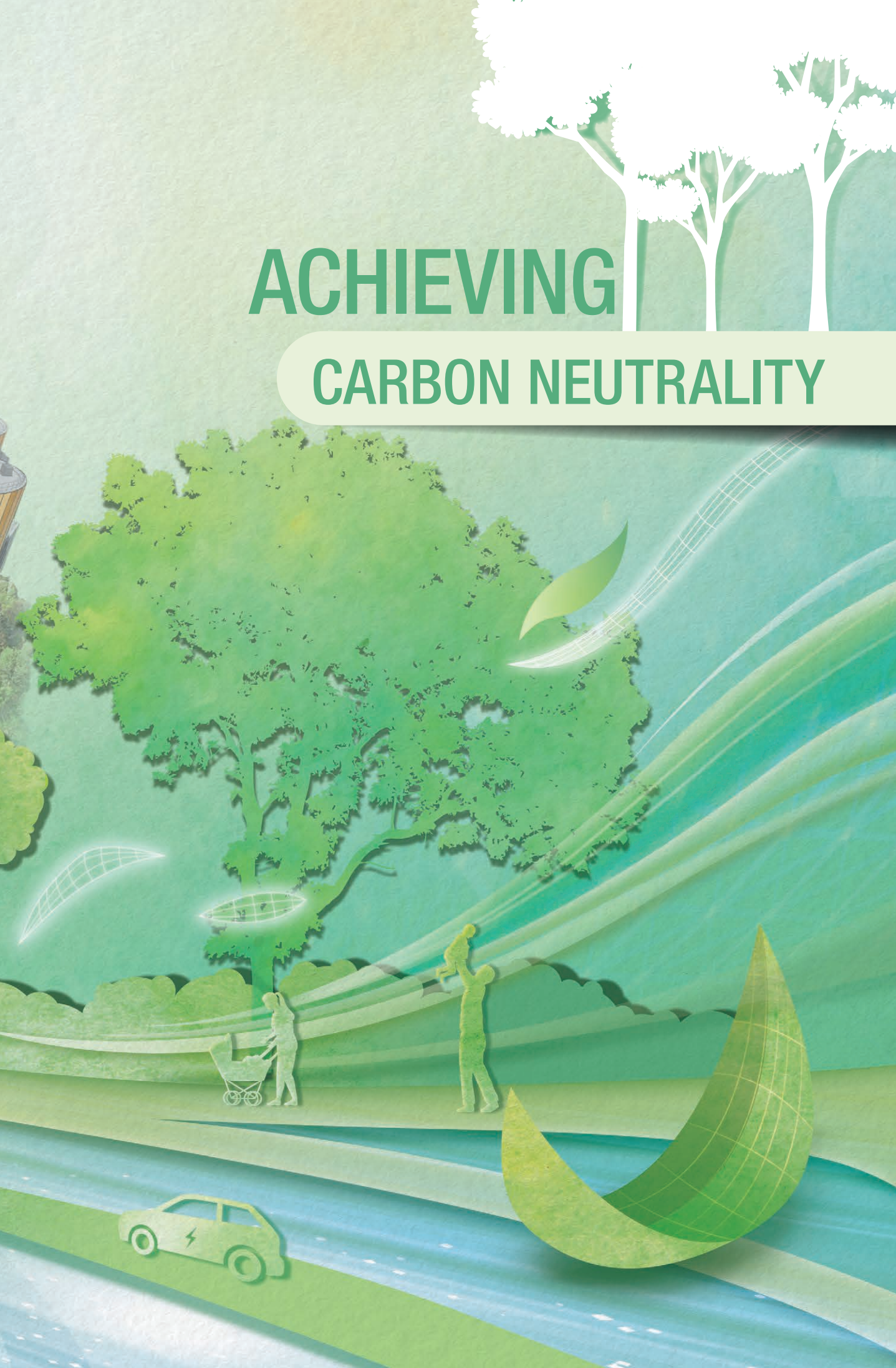
In the pre-treatment stage, the majority of the suspended solids and organic matter in the wastewater will be removed. The anaerobic ammonia oxidation (ANAMMOX) system removes most of the ammonia nitrogen, and the residual ammonia nitrogen will be removed subsequently in the activated sludge holding tank. Finally, the wastewater will be filtrated to meet the water quality standards for reuse in the facility. Around 70% of the wastewater will be recycled within the facility, and the remaining wastewater will be discharged to the municipal sewage treatment works for comprehensive treatment. O·PARK2's on-site treatment will be systematically monitored to ensure the compliance with legal requirements.

Around 70%

of the wastewater will be recycled within the facility


O·PARK 2

ACHIEVING CARBON NEUTRALITY



ACHIEVING CARBON NEUTRALITY

Climate change is a major global challenge. Countries and local governments around the world are undergoing a low-carbon transformation with a goal of carbon neutrality. China announced its national carbon emission target in 2020, aiming to reach the carbon emission peak by 2030 and achieve carbon neutrality by 2060. The construction industry's low-carbon transformation plays a significant role in achieving China's carbon neutrality target, as it accounts for up to half of the country's carbon emissions over the entire life cycle of buildings. Hong Kong has even set a target to achieve carbon neutrality by 2050. Therefore, Hong Kong companies need to steadily accelerate the progress of carbon neutrality.

As a subsidiary of China State Construction International Holdings Limited ("CSCI"), CSHK is actively addressing the challenge of low-carbon transformation and moving towards carbon neutrality. O·PARK2 is the first and demonstration project in China to achieve carbon neutrality during the construction period. The project has adopted CSCI's sustainability strategies to promote carbon neutrality and implemented specific measures in accordance with CSCI's five focus areas of sustainable development, which are: safeguarding the environment, building a sustainable supply chain, nurturing and supporting talent, serving the community, and leading with innovation.

GOVERNANCE STRUCTURE OF CSHK IN LOW-CARBON DEVELOPMENT

In the face of the enormous challenges posed by climate change, CSHK is actively promoting carbon neutrality. We took the lead to establish a low-carbon development governance structure covering both the decision-making and execution levels in June 2021. CSHK set up relevant committee and working group for carbon neutrality and carbon asset development to increase our competitiveness in green and low-carbon construction through the coordination and cooperation between senior management and various subsidiaries and functional departments.

CSHK CARBON NEUTRALITY AND CARBON ASSET DEVELOPMENT COMMITTEE (THE "COMMITTEE")

The president of CSHK serves as the chairperson of the Committee. The Committee consists of the heads of the functional departments of engineering, safety, environmental protection, supply chain management, human resources, quality control, and technological innovation. The day-to-day work of the committee is managed and coordinated by the Corporate Communications Department. The secretary of the Committee is in charge of sustainable development within CSHK.

The Committee is mainly responsible for promoting and managing the low-carbon construction and carbon asset development of CSHK.

CSHK CARBON NEUTRALITY AND CARBON ASSET DEVELOPMENT WORKING GROUP (THE "WORKING GROUP")

The head of the Corporate Communications Department serves as the chairperson of the working group. The members are key employees from the engineering, safety, environmental protection, supply chain management, human resources, quality control, and technological innovation departments. The secretary of the working group is in charge of sustainable development within CSHK.

The working group mainly helps the committee carry out its work. It is responsible for identifying potential carbon-neutrality construction projects and carbon asset development projects as well as formulating relevant documentation and implementation plans.

CSHK CARBON NEUTRALITY AND CARBON ASSET DEVELOPMENT COMMITTEE

Chairperson
Mr. HUNG Cheung Shew, Danny
(Chairman and President)

Member
Mr. HUANG Jiang
(Executive Vice President)

Member
Mr. ZHANG Ming
(Vice President)

Member
Mr. LAU Wing Shing
(Vice President)

Member
Mr. SHAO Ruizhe
(Assistant President)

Member
Mr. ZHAN Jiangsong
(General Manager of Safety and Environmental Protection Department)

Member
Mr. CHEN Qimeng
(General Manager of Human Resources Department)

Member
Mr. CHEN Cheng
(Deputy General Manager of Corporate Communications Department)

Member
Mr. WANG Qi
(Deputy General Manager of Procurement Department)

Secretary
Mr. POON Ka Wing
(Head of Sustainability, Corporate Communications Department)

O·PARK2 CARBON NEUTRALITY PLAN

As a carbon neutrality demonstration project, CSHK has set up an O·PARK2 CSHK Carbon Neutrality Working Group, which is responsible for implementing the carbon accounting and other carbon reduction issues associated with the project and reporting to the working group.

O·PARK2 CSHK CARBON NEUTRALITY WORKING GROUP

Team Leader
Mr. SHI Da
(Senior Site Manager of O·PARK2)

Deputy Team Leader
Dr. DAI Ji
(Decarbonization Director of O·PARK2)

Deputy Team Leader
Mr. LEUNG Kee Wo
(Project Director of O·PARK2)

Design Team	Quantity Surveying Team	Civil Engineering Team	Quality Control Team, Procurement Team	Environment Team
Implementation of carbon reduction measures at the design stage	Budget planning and evaluation of carbon reduction measures	Construction project management, materials consumption estimation, and construction progress monitoring	Use of resources and monitoring of equipment and energy usage	Water usage, waste treatment, and energy usage at the site and site office

CARBON REDUCTION ACHIEVEMENTS IN 2021

Based on the construction experiences and the materials consumption estimation for O·PARK2, the carbon emission from the civil and structural construction works of O·PARK2 project in FY2021 (accounting period: January 1, 2021 to December 31, 2021) is estimated to be 17,037[1] tonnes carbon dioxide equivalent (CO_2-e) if no carbon reduction measure is applied. The actual carbon emission from the civil and structural construction works of O·PARK2 project in FY2021 was 12,886[1] tonnes CO_2-e. Various carbon reduction measures have contributed to a total carbon reduction of 4,151[1] tonnes CO_2-e which is equivalent to the total amount of CO_2 that 180,489[1] trees can absorb in one year, with a reduction rate of 24%[1].

If no carbon reduction measure is applied, the carbon emission from the civil and structural construction works of O·PARK2 project in FY2021 is estimated to be

17,037 tonnes

CO_2-e

Actual carbon emission from the civil and structural construction works of O·PARK2 project in FY2021

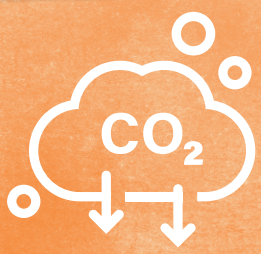
12,886 tonnes

CO_2-e

[1] *GHG quantification and estimation were conducted by a third-party consultant.*

Various carbon reduction measures have contributed to

a total carbon reduction of



4,151 tonnes

CO_2-e

equivalent to the total amount of CO_2 that

180,489 trees

can absorb in one year

with a reduction rate of

24%

ROADMAP TO CARBON NEUTRALITY

CSHK developed the following roadmap for the O·PARK2 to keep it following the prescribed plan and ensure it could finally achieve carbon neutrality during the construction period.

2021 Jul–Aug

Measure Carbon Footprint

- The site collects various **environmental data** (including energy, building, transportation, machinery and equipment use etc.) to measure current and future overall carbon emissions of the project in order to formulate carbon reduction strategies

Early 2022

Annual Evaluation Performance Report

- Calculate the actual carbon footprint, evaluate various carbon reduction measures and adjust the carbon neutrality strategy

2023

Carbon Neutrality Statement

- **Purchase carbon credit** to offset other remaining carbon emissions
- Disclose research data related to carbon neutrality, explore the application possibility in other projects
- Issue a **carbon neutrality statement**

CARBON NEUTRAL Certified

2021 Sep–Oct

Formulate Carbon Neutral Plan

Develop detailed carbon emission reduction strategies and implement them item by item during the construction phase:

- **Sustainable management**
- **Technological innovation**
- **Support voluntary emission reduction projects**
- **Implement emission reduction measures:**
  - Apply **BIM7D** system and **DfMA**
  - Project office built by **MiC**
  - Install **solar panels to generate electricity** in the project office
  - Replace fuel vehicles with electric ones
  - Use **low-carbon steel** and concrete
  - **Energy storage battery** replaces fuel generators
  - Develop the **Carbon Neutrality Cloud Platform** for real-time monitoring of carbon emissions
  - More advanced carbon reduction measures are being discussed and implemented

2023

Audit Carbon Footprint

Calculate the actual carbon footprint after the project is completed and invite an authoritative third party to conduct an audit

TECHNOLOGICAL INNOVATION

Leading the innovation

Over the years, CSHK has continued to invest in the development of Smart Site and has applied a number of low-carbon management and digital technologies in the design and construction of the O·PARK2 to practice the green construction strategy. The specific technologies applied are as follows.

1 Carbon Capture, Utilization and Storage (CCUS)

Carbon fixation bricks based on CCUS technology

Wall made of the carbon fixation bricks (taken at O·PARK2 site)

CCUS technology is one of the cutting-edge technologies to address climate change and has a huge potential for carbon reduction. O·PARK2 is the first project in Hong Kong to apply carbon dioxide mineralized concrete carbon fixation bricks ("carbon fixation bricks") based on CCUS technology. The carbon fixation bricks can effectively sequester a portion of carbon dioxide during the curing phase of the production process, and have a series of advantages over traditional prefabricated bricks, such as shorter maintenance time, lower energy consumption and higher compressive strength, which have the potential to replace traditional bricks as a new choice of building materials for the construction industry.

- **EVERY CUBIC METER OF THE CARBON FIXATION BRICKS CAN CAPTURE 61 KILOGRAMS OF CARBON DIOXIDE.**

  Apart from adopting the carbon fixation bricks in the construction, O·PARK2 carbon neutrality R&D team and Zhejiang University have collaborated on a technical evaluation of carbon reduction in carbon fixation bricks using O·PARK2 as an implementation case. The academic findings have been published in civil engineering journals in China, and the research results have been successfully shared with the public.

For more information on the carbon fixation bricks, please scan the QR Code.

2 C-SMART

C-SMART

7+2+1 BIM

Personnel management
- Face recognition-based attendance system
- Real time monitoring of workers and construction sites
- Automatic registration system
- Electronic health form

Mechanical equipment management
- Mobile monitoring of machinery at construction sites
- Scale operation efficiency
- Operating efficiency of material hoist

Material management
- Remote monitoring of prefabricated components
- Monitoring of license plate at the entrance and exit of the construction site

Construction environment and energy consumption management
- Environment, gas and water quality intelligent monitoring system
- Smart electric box AMPD
- AMPD mobile power storage

Construction survey management
- Tower crane counted imaging camera measuring and monitoring system
- 3D laser scanning
- Smart monitoring system of building settlement

Security management
- Monitoring of workers'unsafe practice
- AI-based fire monitoring system
- Safe driving management
- VR-assisted real scene safety training
- Digital Twin real-time monitoring

Quality management
- Project progress and quality management system

Building robots
- AMR robot (under development)

Schedule management
- UAV aerial imaging and mapping for construction progress
- BIM visualization of construction progress

Integrated platform

C-SMART Integrated smart site management system

C-SMART dashboard

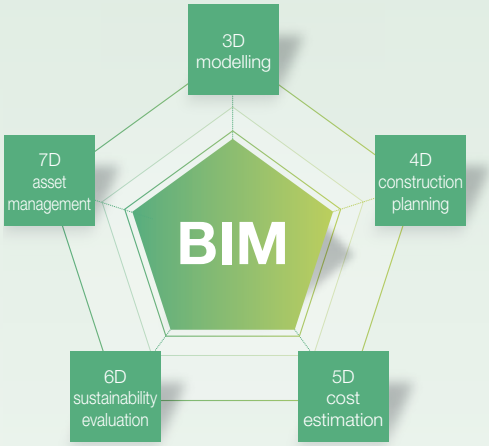
In order to improve the efficiency and quality of construction management, CSHK has developed its integrated smart site management system — C-SMART, which is based on technologies such as Internet of Things (IoTs), Artificial Intelligence (AI), Cloud Computing and Building Information Modeling (BIM) to comprehensively monitor and manage safety, personnel, progress, materials, and other aspects of construction projects, promoting the overall site digitalization and intelligentization and presenting information in a user-friendly UX/UI.

The engineering team applied C-SMART to manage staff, safety, materials, construction environment, energy consumption, and progress during the construction period of O·PARK2, which achieved digitalization and intelligent management that enable efficient monitoring and effective reduction of carbon emission in the daily management of the site.

For more information on the C-SMART system, please scan the QR code.

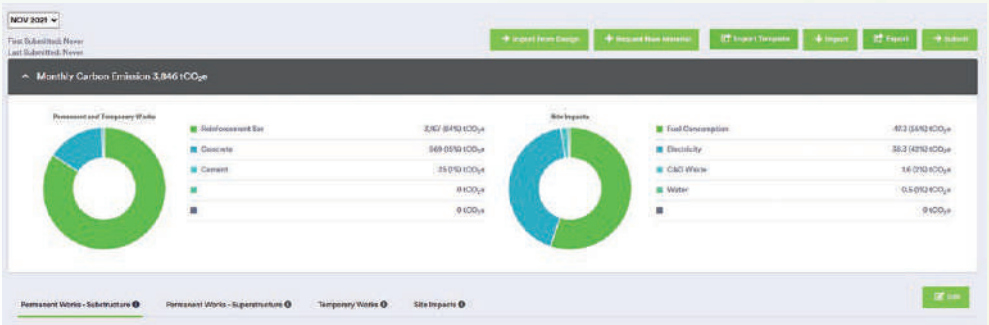
3 BIM

BIM is a practical tool for the construction industry to fully integrate complex and large building information data (including building, structural, fire, electrical, Heating, ventilation, and air conditioning (HVAC), water supply and drainage, energy facilities and equipment, and asset information of the building) to achieve visualized and multi-dimensional building information management.



BIM has been widely applied in O·PARK2. During the project, CSHK used 3D modeling for collision check, 4D for construction planning, 5D for cost estimation, 6D for sustainability evaluation, and 7D for asset management. In particular, CSHK adopts 6D with energy consumption analysis, thereby realizing efficient and precise management of all equipment information.

The 6D function can help analyze energy consumption in building assets and generate energy assessment reports in the early design stages. This dimension ensures the accurate prediction of energy consumption throughout the life cycle of the building asset. In addition, the O·PARK2 Carbon Neutrality Research & Development (R&D) Team has innovatively integrated the Construction Industry Council Carbon Assessment Tool (CIC CAT) into BIM 6D to successfully create a platform for managing and monitoring carbon emissions for all major building materials and processes during the construction phase of projects. While energy consumption analysis of large buildings usually requires the application of various complex analysis software, this can simplify the carbon assessment process during the design and construction stages, saving a lot of time and is of great significance to the management of carbon emissions throughout the project's life cycle.



Energy consumption analysis for O·PARK2

ACHIEVEMENTS

The team uses the advanced BIM design process to coordinate the work of each design team and facilitate the accounting. The BIM modeling method can reduce the design modification time by 70% compared to the traditional method, which increases the work efficiency significantly and ensures the quality and timeliness of the drawings.

O·PARK2 adopts the relevant functions of BIM technology to eliminate 80% of engineering risks in advance and 95% of channel coordination problems to achieve risk management and guarantee the work progress.

The BIM 360 cloud collaboration platform updates models, drawings, and files in a timely and uniform manner, ensuring that design teams from different countries and regions can communicate and collaborate in real time, resulting in a 70% increase in communication efficiency.

reduce the design modification time by

70%

eliminate

80%

of engineering risks

eliminate

95%

of channel coordination problems

increase

70%

in communication efficiency

4 MiC Site Office

The O·PARK2 site office is built using the "Modular Integrated Construction" (MiC) method

Benefits of MiC

Shorten On-site Construction Time

70% **construction processes**

was completed at the factories in Mainland China

Overcome On-site Condition Limitations

completed all the lifting and installation work under the extremely limited space

Reduce On-site Risks

completed potentially hazardous work procedures in the factory with standardized processes

The O·PARK2 site office is built using the "Modular Integrated Construction" (MiC) method, which adopts the "factory assembly followed by on-site installation" concept. The MiC modular units are built in the factory, delivered to the site and installed. This will help address the current challenges faced by the construction industry in Hong Kong.

SHORTEN ON-SITE CONSTRUCTION TIME

- 70% of the construction processes of the O·PARK2 site office was completed at the factories in Mainland China. After the modular units arrived in Hong Kong, only simple installation work was required on site, reducing the on-site construction process.

- MiC technology enabled the main structure of the O·PARK2 site office to be completed within 20 days, significantly reducing construction time.

OVERCOME ON-SITE CONDITION LIMITATIONS

- The location of the site office is complex. The site office is small in area and surrounded by residential buildings and roads. Through MiC technology and well-designed construction arrangements, the workers successfully completed all the lifting and installation work under the extremely limited space.

REDUCE ON-SITE RISKS

- Most of the potentially hazardous work procedures were completed in the factory with standardized processes, reducing construction safety risks on site.

SUSTAINABILITY AND ENVIRONMENT PROTECTION

- MiC technology can significantly reduce the noise, dust, and sewage generated by on-site construction.
- Assembly and disassembly of modular units are easy and the office can be disassembled and recycled after the project is completed, avoiding the production of large amounts of construction waste.
- By reducing assembly processes and building materials, O·PARK2 can reduce emissions from hidden carbon and waste disposal. In particular, wood consumption can be reduced by 80%; construction noise and construction waste can be reduced by 60%, respectively.

HIGH-QUALITY CONSTRUCTION

- Most of the construction processes were conducted in a standardized factory, and the outputs were strictly inspected before delivery to ensure quality.

INCREASE EFFICIENCY

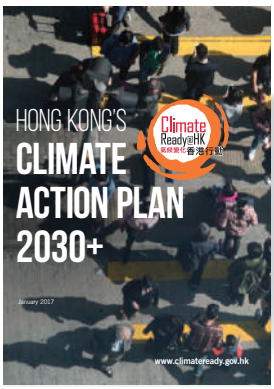
- The mass production of MiC modular units in parallel production lines can effectively improve overall production efficiency and reduce labor demand by approximately 50%.

GREEN BUILDING

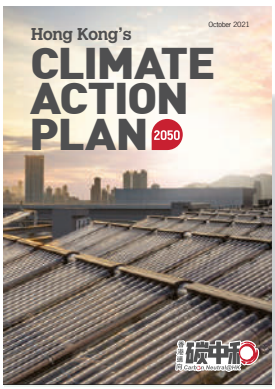
Safeguarding the environment

Building a sustainable supply chain

The Government announced the Hong Kong's Climate Action Plan 2030+ in 2017, setting a carbon emission reduction target for Hong Kong to achieve absolute carbon emission reduction of 26% to 36% by 2030, using 2005 as the base year. The Government also announced the Hong Kong's Climate Action Plan 2050 in 2021, in response to the dual carbon goals of China, to further promote Hong Kong's move towards carbon neutrality by 2050. "Energy Saving and Green Buildings" is one of the four major carbon reduction strategies in the Hong Kong's Climate Action Plan 2050. According to Hong Kong's carbon emission data for 2019, building-related electricity consumption accounts for 90% of total electricity consumption, and over 60% of total carbon emissions are attributed to electricity generation for buildings. This shows that the development of green buildings is an essential part for Hong Kong to achieve carbon neutrality.



Hong Kong's Climate Action Plan 2030+

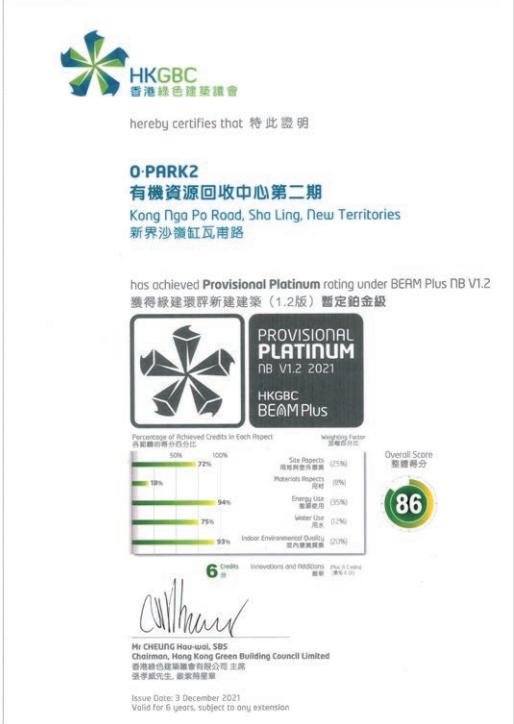


Hong Kong's Climate Action Plan 2050

Green building refers to the practice of planning throughout the entire life cycle of buildings, from site selection, design, construction, operation to demolition, in order to minimize the environmental impacts of the buildings. As a leader in promoting environmental innovation in Hong Kong's construction industry, CSHK is pushing forward the development of green buildings in Hong Kong, adopting a number of green building technologies in its construction projects to meet the needs of the community while minimizing the environmental impacts of construction projects.

O·PARK2 DESIGN PHILOSOPHY

Based on the design philosophy of green building, the O·PARK2 project team considered energy saving and low-carbon operation throughout the life cycle of the project, and systematically evaluated the project against the professional evaluation standards of BEAM Plus. BEAM Plus is an authoritative tool to objectively assess the sustainability performance of buildings based on laws and regulations in Hong Kong. It sets comprehensive sustainability performance standards for all aspects of buildings, including planning, design, construction, commissioning, renovation, management, operation, and maintenance. The assessment results of which have also been recognized and certified by the Hong Kong Green Building Council.


HKGBC
香港綠色建築議會

hereby certifies that 特此證明

O·PARK2
有機資源回收中心第二期
Kong Nga Po Road, Sha Ling, New Territories
新界沙嶺紅瓦甫路

has achieved **Provisional Platinum** rating under BEAM Plus NB V1.2
獲得綠建環評新建建築（1.2版）暫定鉑金級

PROVISIONAL
PLATINUM
NB V1.2 2021
HKGBC
BEAM Plus

Percentage of Achieved Credits in Each Aspect
各範疇的得分百分比
Weighting Factor
加權百分比
Overall Score
整體得分
Site Aspects (25%)
Materials Aspects (8%)
Energy Use (35%)
Water Use (12%)
Indoor Environmental Quality (20%)
86
6 Credits
Innovations and Additions

Mr CHEUNG Hau-wai, SBS
Chairman, Hong Kong Green Building Council Limited
香港綠色建築議會有限公司 主席
張孝威先生, 銀紫荊星章

Issue Date: 3 December 2021
Valid for 6 years, subject to any extension

Since the design stage, O·PARK2 project design team engaged BEAM Plus professionals and engineers with backgrounds in architecture, structure, civil engineering, electrical & mechanical, and other related fields to jointly design and develop green building energy-saving solutions with the use of multiple systematic tools. The design team has enhanced the building's green metrics performance, guided its implementation and improvement, and successfully achieved the BEAM Plus provisional Platinum rating for new building of O·PARK2.

O·PARK2 BEAM PLUS HIGHLIGHTS

Innovative adoption of the Integrated Design Process (IDP) incorporating BIM technology improved the project's **BEAM Plus score from**

73 ▸▸ 86

without a significant increase in investment

Energy consumption in relative terms

reduce **32%**

Peak-hour electricity consumption in relative terms

reduce **26%**

Water savings of over

230,000 liters per year

Total water use in relative terms

reduce **56.2%**

Increase the percentage of on-site greenery by retaining

40% **original vegetation**

On-site greenery

50%

Meanwhile, a rooftop garden and an urban farm were designed on the roof of the building to ensure the integration of the building with its surroundings. In addition, the number of trees re-planted on the slope of the site was same as the number of trees felled during the construction to maintain the vegetation coverage.

Energy efficient sunroof design

Solar panel installation for more renewable electricity generation is under planning

The green design of O·PARK2's rooftop

Rooftop garden/urban farm

SITE SELECTION AND PLANNING

As an environmental engineering project, one primary target of site selection for O·PARK2 was to minimize ecological impacts. The closed livestock waste composting plant, of which the land has relatively low ecological value, was selected as the project site.

O·PARK2 makes full use of land resources. Despite the small project area of about 2.5 hectares, which is smaller than traditional food waste treatment facilities, it achieves a higher food waste treatment capacity through the use of advanced technology. The technical team of O·PARK2 learned from the experience of existing food waste treatment facilities in Hong Kong and advanced technologies from Mainland China and abroad, incorporating production, studying, research and practical application to improve the efficiency of food waste treatment and provide valuable experience to Hong Kong in solving the local food waste treatment problems.

expected to reduce carbon emissions to around

25,000[2] tonnes

by the end of the construction period

If comprehensive carbon reduction measures are encouraged from tendering period, **total carbon emissions during the construction period would be around**

17,000[2] tonnes

CONSTRUCTION

1. CARBON EMISSION PROJECTION

To project the carbon emissions during construction more accurately and to develop corresponding carbon reduction strategies, the O·PARK2 Carbon Neutrality Working Group conducted a decarbonization feasibility study and a carbon footprint estimation for the project. The results of the study showed that without any carbon reduction measures, the total carbon emissions during the civil and structural construction of O·PARK2 would be around 31,000 tonnes CO_2-e, with steel and concrete accounting for 88%[2] of the carbon emissions. Therefore, the project increased the use of low-carbon building materials, such as low-carbon concrete and low-carbon rebars, which is expected to reduce carbon emissions to around 25,000[2] tonnes CO_2-e by the end of the construction period. If comprehensive carbon reduction measures are encouraged from tendering period, total carbon emissions during the construction period would be around 17,000[2] tonnes CO_2-e, indicating that the consideration of carbon reduction measures from planning stage would gain more benefits.

[2] *GHG quantification and estimation were conducted by a third-party consultant.*

2. DECARBONIZATION MEASURES

CSHK has been actively formulating emission reduction strategies, based on the carbon emission projection. O·PARK2 aims at carbon neutrality during the construction period, formulating and implementing corresponding carbon reduction measures for different emission sources.

SUSTAINABLE SUPPLY CHAIN

The majority of carbon emissions from construction period of projects comes from the embodied carbon in construction materials. In this regard, CSHK has set out clear guidelines for green procurement in the Procurement Policy and the Supplier Code of Conduct, requiring all procurement departments and personnel to give priority to local and environmentally friendly materials, and order goods according to the needs of the construction site to reduce carbon emissions and waste of resources.

In addition to green procurement, O·PARK2 further introduces low-carbon innovative building materials to reduce its embodied carbon emissions of projects. As a leading company in the construction industry, CSHK's implementation of green procurement will help promote the development of low-carbon supply chain in the construction industry, facilitating the green transformation and sustainable development in upstream and downstream enterprises to develop low-carbon building materials.

Procurement Policy

Supplier Code of Conduct

Low-carbon building materials certification

Low-carbon building materials certification

LOW-CARBON BUILDING MATERIALS

- Adopts rebar made with 100% recycled content and low-carbon concrete with 60% Ground Granulated Blast-furnace Slag (GGBS)

Low-carbon rebar

Low-carbon concrete

INNOVATIVE BUILDING MATERIALS

- Adopts innovative materials and technologies such as inlaid high-density protective layer for anti-corrosion protection to ensure the equipment is resistant to acid, high-temperature, aging, wear and tear in the process of food waste treatment, thereby reducing resource consumption and achieving sustainable development with longer machine lifespan.

High-density protective layer

SITE ELECTRIFICATION

- During the construction of O·PARK2, the team used Battery Energy Storage System (BESS) to replace traditional diesel-driven power generation. Since BESS has lower carbon emissions than conventional diesel generators, it helps to decarbonize and avoid severe air and noise pollution on site. In addition, BESS has the advantage of enormous electricity storage, which is suitable for heavy machinery with high power demand in a short period of time.

Heavy machinery using battery energy storage system

ALL-ROUND DECARBONIZATION

Scope I (Direct GHG emissions)

MAJOR EMISSION SOURCE

Site equipment using fossil fuels

MEASURES

Site

- Site electrification
  - *Replacing traditional diesel generators with BESS*

Site Office

- Low-carbon transportation
  - *Promoting electric vehicles*

Scope II (Indirect GHG emissions from electricity)

MAJOR EMISSION SOURCE

Site office electricity consumption

MEASURES

Site Office

- Setting energy-saving target in the site office
  - *Using energy-saving appliances and equipment; setting up energy-saving tips and automatic power-off sensors for offices; using photovoltaic panels*

Scope III (other indirect GHG emissions)

MAJOR EMISSION SOURCE

Implicit carbon in construction materials and disposal of construction materials wastes

MEASURES

Site

- Using low-carbon building materials
- Reducing material wastage
  - *Adopts Design for Manufacture and Assembly (DfMA) approach*
- Applying the BIM 6D technology to analyze energy consumption
- Establishing environmental objectives for the site
  - *Wastewater recycling on-site, source separation and recycling of waste materials, resource conservation, and reduction of wastages of building materials*

Site Office

- Recycling MiC modular units of offices for reuse
- Advocating paperless office to reduce the use of paper

3. CARBON EMISSION ACCOUNTING

For better management of the actual carbon emission situation and carbon reduction effectiveness of the project during the construction period, CSHK has committed to conducting annual carbon emission accounting. The O·PARK2 Carbon Neutrality Working Group has implemented carbon emission accounting in accordance with the international carbon emission standard ISO 14064 to identify and quantify the O·PARK2 emission sources within CSHK's operation scope to ensure the carbon emission data is true and accurate.

Based on the 2021 carbon emission accounting results, the total annual carbon emissions of O·PARK2 are 12,886 tonnes CO_2-e.

Since the estimation and accounting of carbon footprints in July 2021, CSHK has adopted various carbon reduction measures at the O·PARK2 project, including the installation of photovoltaic panels and the use of low-carbon building materials, and been continuously recording the effectiveness of the various carbon reduction measures. CSHK has accelerated the adoption of these measures and started to use BESS and photovoltaic panels by end 2021. Other measures have also been progressively implemented in 2022.

Low-carbon Rebar made with 100% recyclable materials[3]

- Total of **5,588 tonnes** of low-carbon rebars are used, representing **65%** of total rebar usage.
- The average recycled materials in rebar was **32%** before August 2021, which was increased to **100%** afterward. The embodied carbon of rebars was reduced by **59%**.

Solar Photovoltaic Power Generation 1,622 kWh

- Installed **213 square meters of photovoltaic panels** in mid-December 2021
- **A total of 1,622 kWh of electricity was generated, of which 1,534 kWh was consumed by the site office and 88 kWh was exported to power grid.**

[3] *GHG quantification was conducted by a third-party consultant.*

4. ENHANCE CARBON RELATED INFORMATION DISCLOSURE — CARBON NEUTRALITY CLOUD PLATFORM

To digitalize the carbon verification process, the team independently developed the "Carbon Neutrality Cloud Platform" ("Cloud Platform") employing technologies including big data, blockchain, AI, and IoT. The Cloud Platform integrates internal and external information to reduce the difficulty of collecting related carbon emission data and improve data accuracy at construction sites and offices in various forms, such as automatic data acquisition, intelligent identification of bills, real-time update of carbon emission data, and big data analysis, to realize carbont accounting automation, whole-lifecycle carbon emission management and carbon asset management.

In terms of collection, the level of automation and timeliness has been greatly improved, and the blockchain technology has been applied to ensure the authenticity and reliability of carbon emission calculation and analysis. The Cloud Platform has achieved an automation rate of over 90% in O·PARK2 data collection, with full coverage in intelligent identification, filling and verification. In terms of quantitative metrics, the Cloud Platform has a built-in carbon emission factor management module that converts carbon accounting standards into carbon dioxide equivalent data for scientific calculation of carbon emissions, including accounting, verification, threshold and interface management. In terms of analysis and administration, the Cloud Platform provides data on the quantity and distribution of GHG emissions and the effectiveness of carbon reduction measures at construction sites and offices, and through intelligent analysis of data to benchmark industry emission levels and predict future emissions. Combined with carbon asset management and carbon reduction project process management, the Cloud Platform helps decision makers to grasp the carbon emission situation in real time, formulate corresponding policies in time, and lay the foundation for future carbon asset development and trading.

Now, the above-mentioned functions have been developed and launched on the Cloud Platform. The Cloud Platform applies micro-service architecture and lightweight container technology, which features high business throughput, high scalability, and high responsiveness, to realize the functions of group-level management, organization management, user management, process management, statistical management, and multilingual management, meeting the management requirements at different levels. In the next phase, the Cloud Platform will continue to iterate and optimize to complete the intelligent prediction of emission reduction, BIM model integration, and realize the triple blockchain authentication of order delivery, contract, and quotation, satisfying the whole lifecycle management of projects and promote the development of carbon asset development, management, trading, and carbon auditing.

Cloud Platform dashboard

OPERATION

The operation of O·PARK2 also adopts the sustainability concept. The facilities will be self-sufficient in terms of electricity consumption, and surplus electricity generated will be exported to the power grid. In addition, the team is using combined heat and power technology to improve the energy efficiency of the facility. The facility uses biogas to generate electricity while recovering heat, which maximizes energy use and increases the energy conversion rate to 96%. The recovered heat is used for anaerobic digestion, providing a suitable environment for microorganisms to grow and ensuring the efficiency of biogas production.

IN THE COMING OPERATION PERIOD:

Treat
300 tonnes of food waste daily

Treat a total of about
110,000 tonnes of food waste annually

Reduce carbon emissions of about
67,000 tonnes CO_2-e annually

Tackle about
8% of food waste generated in Hong Kong annually

Generate about
24 million kWh
of surplus electricity annually, after meeting the electricity and thermal energy needs of the O·PARK2 facilities

Meet the annual electricity consumption of about
5,000 households

INTEGRATED MANAGEMENT SYSTEM

Building a sustainable supply chain

Nurturing and supporting talents

O·PARK2 has prepared an Integrated Project Management Plan based on the requirements of ISO 9001:2015 Quality Management System, ISO 14001:2015 Environmental Management System, and OHSAS 18001 Occupational Health and Safety Management System to identify and assess risks and opportunities, and develop and implement necessary measures and actions. We are committed to improving the safety, health and environmental performance of our projects while ensuring project quality.

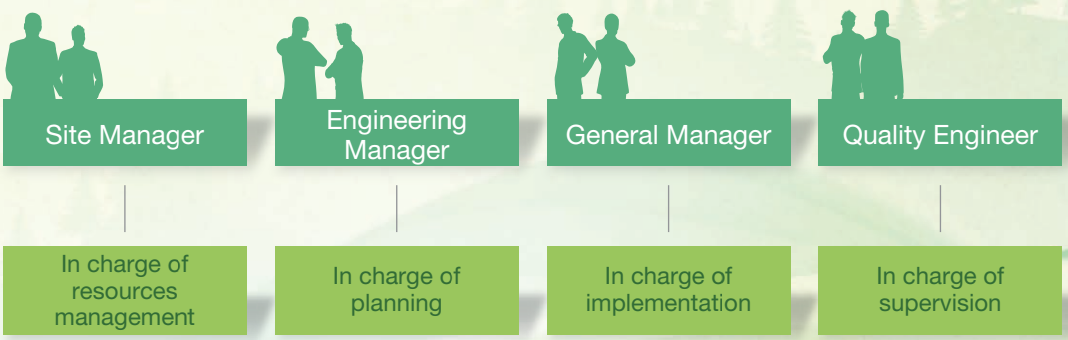
CONSTRUCTION SITE INTEGRATED MANAGEMENT WORKING GROUP

The Construction Site Integrated Management Working Group consists of site managers, deputy site managers, site agent, quality engineers, general foremen, foremen, safety officers, environmental officers, quality control engineers, and other key management staff. This working group is responsible for preparing inspection plans, conducting weekly inspections for major work plans in quality, safety, and environment; conducting weekly site inspections to follow up on site construction problems and propose improvement measures; and holding monthly review meetings to review and discuss in detail the overall management performance of the site.

QUALITY MANAGEMENT

O·PARK2 has also set up a team to manage site quality, which is responsible for assisting in the site coordination and execution of quality management of the relevant site projects, as well as developing work plans to ensure continuous and stable monitoring of the construction process.

SITE QUALITY MONITORING



QUALITY ASSURANCE

The O·PARK2 team is committed to strictly abiding by the terms of the contract, enforcing the highest quality management standards, implementing the "Management 4X100" principle, continuously improving quality performance by setting quantifiable targets and indicators, and striving to provide quality services and products to our customers.

Management 4X100 Principle

QUALITY TARGETS

1. Compliance and quality assurance: no significant quality incidents.
2. Legal compliance: no quality violations or prosecutions.
3. Owner's satisfaction: quarterly Contractor Performance Rating (CPR) of the site at or above the quarterly median CPR of the government.
4. "Alright for one time, alright for all times": 94% or more of the initial acceptance rate by the owners.

QUALITY MANAGEMENT MEASURES

O·PARK2 adopts an area divisional responsibility system for the safety and environmental management of frontline management staff, preparing a site quality assurance plan and designating responsible personnel for quality management (consists of two or more people) to efficiently carry out specific quality management works such as documentation management, architectural drawing management, engineer/owner order review, material management, construction inspection and test control, instrument calibration and maintenance, and evaluation on subcontractors and suppliers.

REVIEW AND IMPROVEMENT

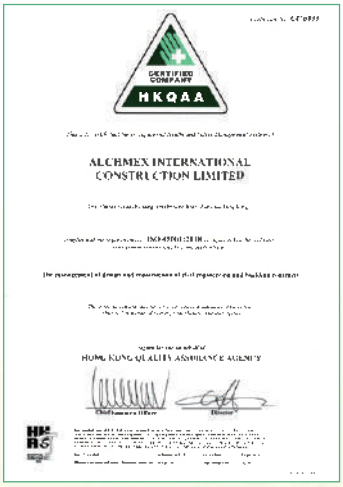
The site conducts regular self-inspections and assessments to review the implementation of quality management measures and make specific improvements. Meanwhile, the site applies innovative construction methods and takes advantage of new technologies to improve quality assurance management.

100% SELF-INSPECTION OF KEY PROCESSES

The O·PARK2 team implements quality control of key processes with reference to the Quality Control Procedures for Key Construction Processes of Engineering Projects to avoid quality risks in all aspects.

- ***SAFETY MANAGEMENT***

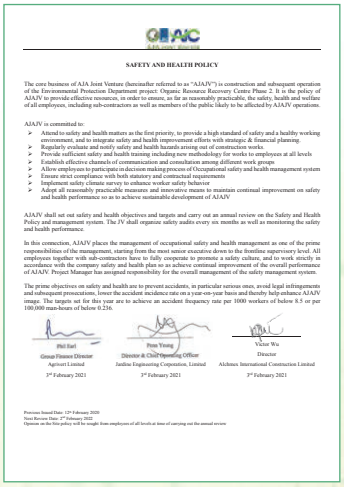
  In order to prevent accidents and eliminate serious incidents, avoid prosecution and continuously reduce the rate of work-related accidents, the project sets annual safety and health objectives and targets, and regularly reviews the Safety and Health Policy, while conducting safety audits biannually to monitor the overall safety and health performance of the project. In particular, the project's safety management system and standard work procedures are formulated in accordance with the relevant requirements of ISO 45001:2018 Occupational Health and Safety Management System.


CERTIFIED COMPANY
HKQAA

ALCHMEX INTERNATIONAL CONSTRUCTION LIMITED

HONG KONG QUALITY ASSURANCE AGENCY

ISO 45001:2018 Certification


AJAC

SAFETY AND HEALTH POLICY

The core business of AJA Joint Venture (hereinafter referred to as "AJAJV") is construction and subsequent operation of the Environmental Protection Department project: Organic Resource Recovery Centre Phase 2. It is the policy of AJAJV to provide effective resources, in order to ensure, as far as reasonably practicable, the safety, health and welfare of all employees, including sub-contractors as well as members of the public likely to be affected by AJAJV operations.

AJAJV is committed to:

- Attend to safety and health matters as the first priority, to provide a high standard of safety and a healthy working environment, and to integrate safety and health improvement efforts with strategic & financial planning.
- Regularly evaluate and notify safety and health hazards arising out of construction works
- Provide sufficient safety and health training including new methodology for works to employees at all levels
- Establish effective channels of communication and consultation among different work groups
- Allow employees to participate in decision making process of Occupational safety and health management system
- Ensure strict compliance with both statutory and contractual requirements
- Implement safety climate survey to enhance worker safety behavior
- Adopt all reasonably practicable measures and innovative means to maintain continual improvement on safety and health performance so as to achieve sustainable development of AJAJV

AJAJV shall set out safety and health objectives and targets and carry out an annual review on the Safety and Health Policy and management system. The JV shall organise safety audits every six months as well as monitoring the safety and health performance.

In this connection, AJAJV places the management of occupational safety and health management as one of the prime responsibilities of the management, starting from the most senior executive down to the frontline supervisory level. All employees together with sub-contractors have to fully cooperate to promote a safety culture, and to work strictly in accordance with the company safety and health plan so as achieve continual improvement of the overall performance of AJAJV. Project Manager has assigned responsibility for the overall management of the safety management system.

The prime objectives on safety and health are to prevent accidents, in particular serious ones, avoid legal infringements and subsequent prosecutions, lower the accident incidence rate on a year-on-year basis and thereby help enhance AJAJV image. The targets set for this year are to achieve an accident frequency rate per 1000 workers of below 8.5 or per 100,000 man-hours of below 0.236.

Phil Earl
Group Finance Director
Agrivert Limited
3rd February 2021

Penn Yeung
Director & Chief Operating Officer
Jardine Engineering Corporation, Limited
3rd February 2021

Victor Wu
Director
Alchmex International Construction Limited
3rd February 2021

Previous Issued Date: 12th February 2020
Next Review Date: 2nd February 2022
Opinion on this policy will be sought from employees of all levels at time of carrying out the annual review

Safety and Health Policy

SAFETY COMMITMENTS

CSHK is committed to protecting the safety and health of all employees, subcontractors, and the public affected by the project. We assure that we will:

Establish a high standard of safety and health work environment by putting safety and health matters first, and integrate safety and health improvement efforts with strategic and financial planning

Regularly assess and disclose safety and health-related hazards and risks arising from construction projects

Provide occupational safety and health education and training to employees at all levels, including new construction methods

Establish effective communication and consultation channels for employees

Allow employees to participate in the decision-making processes of the occupational health and safety management system

Strictly comply with regulatory and contractual requirements

Strengthen the sense of safety among workers through safety climate surveys

Adopt reasonable and feasible measures and innovative methods to continuously improve safety and health performance, thus achieving sustainability goals

KPIs for Safety and Health Management

Accident rate for work-related injuries per 1,000 workers

lower than 8.6

Accident rate per 100,000 working hours

lower than 0.239

SAFETY TRAINING

The site safety training has achieved full coverage for all levels of staff to enhance their safety awareness.

"LIFE FIRST" CAMPAIGN

In May 2021, the O·PARK2 team responded to CIC's invitation to launch a "Life First" promotional campaign at construction sites to review four major high-risk tasks, including working at height, lifting, heavy machinery, and electrical engineering, in order to reduce serious and fatal accidents.

EMPLOYEE HEALTH PROTECTION: KEY ANTI-COVID-19 MEASURES

During the COVID-19 outbreak, O·PARK2 site has upgraded its C-SMART platform and specifically set up an electronic health reporting system and health monitoring station to effectively help the site achieve the goal of zero COVID-19 infection.

The health monitoring station is equipped with basic health monitoring devices and workers can go to the station in time for COVID-19 testing if they feel unwell. In addition, the health monitoring station is always equipped with materials for COVID-19 prevention, making it an important station for epidemic control at the site.

Electronic health reporting system

Health monitoring station

EMPLOYEE CARING

CSHK values the well-being of employees and regularly organizes caring and teambuilding activities to express our care and understand and listen to employees' voices, enhancing their sense of belonging.

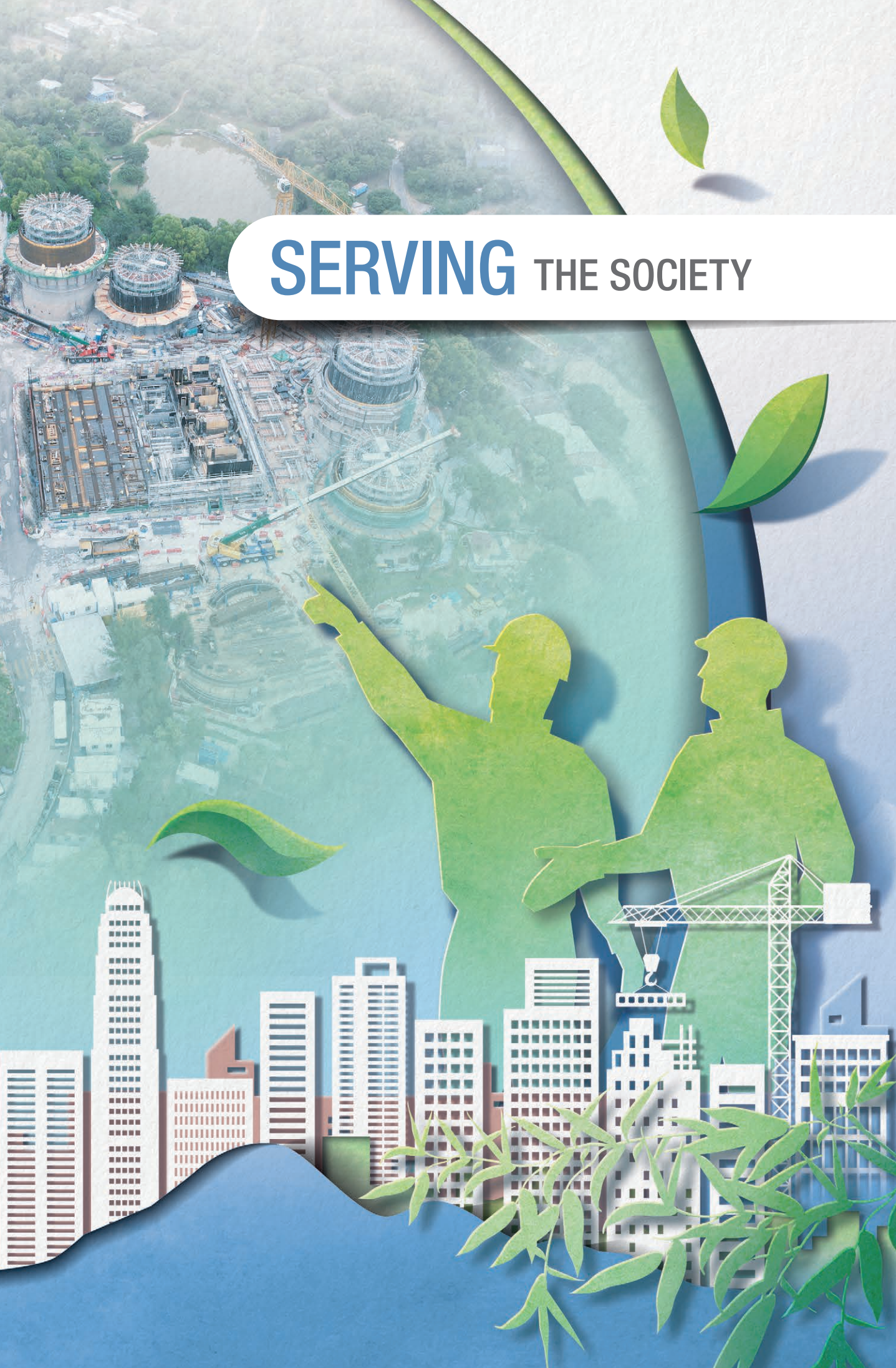
Dragon boat

Birthday party

In addition to organizing staff caring and teambuilding activities, CSHK cares about the work environment of employees, and has set up a resting pavilion in the construction site for employees to take a rest and chill after meals.

Apart from flower garden and lawn for construction workers to relieve their stress, a fishpond is placed in the pavilion to light up the atmosphere. In order to enhance the practicality of the resting area, a white mini-conference room has been built for the engineers and foremen to hold meetings, saving their efforts to travel between the construction site and the site office.

Pavilion



SERVING THE SOCIETY

CARE FOR THE COMMUNITY

Serving the community

CSHK is actively involved in charity activities and is committed to reaching out to and serving the community, hoping to build a more harmonious, beautiful, and livable social environment together with various stakeholders.

The O·PARK2 team organizes and participates in various types of volunteer services and encourages all staff to take practical actions to serve the needs of the community and help the disadvantaged groups in society.

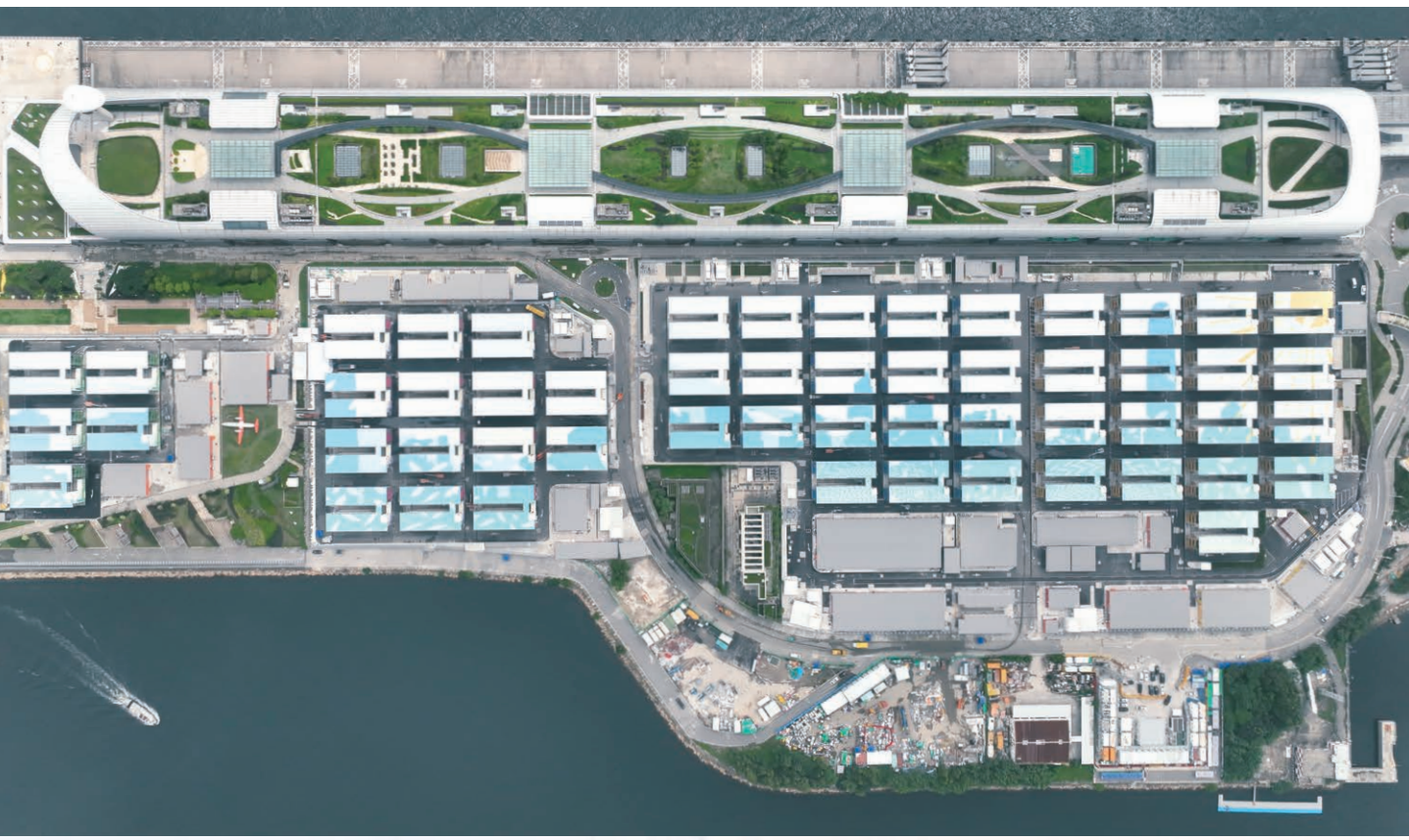
Examples of volunteer services that the O·PARK2 team has participated in, include but are not limited to:

- Beach cleaning
- Mosquito repellent and fishpond repair for the local community
- Tree planting activities
- Voluntary rice delivery in the North District
- "Green Day" activities

Lung Mei Beach cleaning activity

FIGHTING COVID-19

In early 2022, Hong Kong was in the midst of the fifth wave of the COVID-19 epidemic, with confirmed cases on the rise and the crashing of local healthcare system. CSHK was tasked with the daunting challenge of building 8 additional community isolation facilities within a very short period of time. The O·PARK2 project deployed more than 40 capable staff members, from project directors to junior engineers, to work on the facility building projects, and some of them even stayed on the project for over a hundred days. With this joint effort, all community isolation facilities were delivered on schedule, which helped in combating the epidemic in Hong Kong.



In early 2022, the epidemic greatly affected people's daily life. As a state-owned enterprise, CSHK took the initiative to construct the community isolation facilities, and I also volunteered to join the projects to do my part in protecting the health of Hong Kong citizens.

One of the major challenges of such emergency projects is to ensure the quality of construction while trying to meet the tight schedule. As a main contractor, CSHK needed to quickly adjust the schedule of the original work within a short period of time, and must think in innovative ways.

As the site senior general foreman, it was my job to negotiate with various parties and oversee the construction effectiveness during the projects. Under the premise of ensuring the safety of the projects, not only do I need to promote efficient construction, but also to ensure effective epidemic prevention measures, in order to safeguard the health and safety of workers, so that everyone in the projects can be fully committed to overcoming the difficulties and building the strongest line of defense for the prevention and control of the epidemic in Hong Kong.

Mr. CHU Chi Fai, Senior General Foreman

The rapid spread of the epidemic in Hong Kong has greatly affected the lives of the citizens and even hindered the basic production activities of various industries. CSHK's anti-COVID-19 facility building projects are dedicated to maintaining the prosperity and development of Hong Kong. It is for this reason that I am honored to volunteer to join the projects. In view of its special and urgent nature, each of the volunteers strived to adapt to the pace of the projects in the shortest possible time, so I tried my best to equip myself to keep up with the pace.

Due to the rapid progress of the projects, the number of engineering documents that needed to be handled increased many times in a short period of time, and my work pressure in quality control increased day by day. However, the passion and enthusiasm of the site engineers for the projects encouraged me to take up the heavy responsibility of quality control and strictly control every detail of the projects. As the last defense of quality control, my job is not only a bridge of communication with the engineers on site, but also a back-up for Hong Kong citizens. Besides, I was honored to join the company's "Young Frontiner" team, and I was once again awarded the company's recognition for young engineers.

Mr. LIU Dong, Assistant Engineer

O·PARK2 INFORMATION SHARING AND EDUCATION

RESEARCH COLLABORATION

The technical evaluation of carbon sequestration of the carbon fixation bricks by the O·PARK2 team and Zhejiang University is pioneering in the low-carbon construction technologies in Hong Kong. In the meantime, the O·PARK2 team collaborated with the Harbin Institute of Technology (Shenzhen) to make tailored improvements to the food waste treatment procedures and technology in accordance with the waste composition and collection strategy in Hong Kong. The team is developing local food waste treatment facility for Hong Kong, and has been actively seeking cooperation with communities, restaurants, and canteens in Hong Kong to solve the issues of food waste collection and treatment. In addition, the team is collaborating with the BIM team of the Hong Kong University of Science and Technology to incorporate BIM and the CIC-CAT to predict carbon emissions during the construction period of the project.

RESEARCH PUBLICATIONS

To further support the low-carbon transformation of Hong Kong's construction industry, CSHK plans to share the research results of O·PARK2 with the community through the project website and annual sustainability reports, and will launch a series of exploration projects. In particular, CSHK will continue to deepen knowledge exchange with tertiary institutions on decarbonization-related research topics, and continue to promote local technological innovations through sharing of information and technological achievements, facilitating the transformation of scientific achievements and industrial upgrading, with the hope that the research results can be transformed into valuable products and services.

In addition, the O·PARK2 team participates in a number of promotional campaigns for industry promotion and technology sharing.

2021 ECO Expo Asia

The first BEYOND EXPO

O·PARK2 EXHIBITION GALLERY

Upon its completion, a exhibition gallery will be set up in O·PARK2 for education purpose, demonstrating the food waste treatment, the measures we adopted to achieve carbon neutrality during the construction period, and other carbon neutrality information. O·PARK2 will arrange visits from schools and organizations by appointment to promote the knowledge of waste-to-energy, the awareness of green building, and the concept of sustainable development.

FUTURE VISION

CARBON ASSET DEVELOPMENT

Leading with Innovation

Currently, many enterprises have set carbon reduction targets and even committed to achieving net-zero emissions. After implementing carbon reduction measures, enterprises can use carbon credits to offset the remaining carbon emissions to achieve their carbon reduction targets. CSHK is keen to develop carbon assets for the O·PARK2 during its operation period and hopes to contribute to the low-carbon transformation in Hong Kong while achieving net-zero emissions in the project.

Developing the carbon trading market will be the direction of development in Hong Kong. At present, the carbon trading market in Hong Kong is still in the research and exploration stage. With O·PARK2 as a green pilot project, CSHK hopes to make it the first local verified construction project that voluntarily conducts carbon emission reduction in Hong Kong to meet international standards. As a pioneer in the development of carbon asset development in Hong Kong, CSHK is committed to leading the development of carbon trading in Hong Kong and making due contribution to the realization of the carbon reduction blueprint in Hong Kong.

With the decrease in use of fossil fuel for electricity generation together with the reduced amount of organic waste landfill, the operation of O·PARK2 is estimated to reduce 67,000 tonnes of greenhouse gas emissions annually. CSHK will explore the development of carbon assets based on the reduction in greenhouse gas emission that meet international standards, such as the Gold Standard[4] and the Verified Carbon Standard[5].

At this stage, CSHK is conducting preliminary research on carbon asset development and expects to finalize a preliminary proposal for carbon asset development in the second quarter of 2023 to confirm the feasibility of the project.

[4] *The Gold Standard was established in 2003 by WWF and other international NGOs. It is currently the most reputable, recognized and stringent international standard for carbon assets, which involves a rigorous examination of the environmental, ecological and social impacts of a project. The standard requires not only that the project has outstanding environmental and social benefits, but also that any possible negative impacts during the construction and operation periods of the project are controlled and compensated for as much as possible. Gold Standard has certified 2,300 projects in over 98 countries, reducing a total of approximately 200 million tonnes CO2-e. For more information, please visit https://www.goldstandard.org/*

[5] *Verified Carbon Standard was launched in 2006 and administered by Verra, a tax-exempt organization headquartered in Washington, D.C. It is the most widely used and compatible carbon asset standard in the world. It provides a reliable and solid verification basis for voluntary carbon credit trading projects, and the project development approach is flexible enough to co-exist with various standards. Verified Carbon Standard has over 1,800 registered projects, reducing or removing a total of approximately 1 billion tonnes CO2-e from the atmosphere. For more information, please visit https://verra.org/project/vcs-program/*

FORTHCOMING CARBON NEUTRALITY INITIATIVES

O·PARK2 is now implementing decarbonization measures for the construction period, so as to achieve the carbon neutrality goal. The team will further introduce various initiatives, including:

- To progressively implement the carbon reduction measures in line with the plan.
- To keep exploring and adopting more feasible carbon reduction options while upholding quality and safety requirements.
- To nurture more carbon accounting professionals.
- To conduct stage reviews of the work progress towards carbon neutrality, and promote O·PARK2's carbon neutrality experience to the industry in the form of journals, conferences, and forum presentations.
- To study the carbon trading markets in the Mainland and Hong Kong and get well-prepared for the potential first carbon trading deal in the construction industry in Hong Kong.

APPENDIX

ABOUT THIS REPORT

REPORTING PERIOD

This is the O·PARK2 2021 Sustainability Report issued by CSHK, which summarizes the sustainability performance of the O·PARK2 covering the period from 1 January 2021 to 31 December 2021. Where appropriate, past and recent activities should also be included, with a clear indication of the period of activity.

REPORTING SCOPE

This report covers the business scope of CSHK in the course of the construction of O·PARK2. Unless otherwise indicated, all data in this report are obtained from internal calculations and verification by CSHK.

BASIS OF REPORTING

This report is prepared with reference to the Environmental, Social, and Governance Reporting Guide of the Stock Exchange of Hong Kong Limited and the Global Reporting Initiative Standards (GRI Standards) to fully demonstrate to stakeholders the efforts and performance of CSHK in terms of sustainability of the O·PARK2 project.

SUMMARY OF KEY PERFORMANCE INDICATORS[6]

ENVIRONMENTAL PERFORMANCE

AIR EMISSIONS

Air pollutants	Emissions	Unit
Nitrogen oxides	4.82	tonne
Sulphur oxides	0.14	tonne
Respirable suspended particulates	0.60	tonne

GREENHOUSE GAS EMISSIONS[7]

Scope	Source of emissions	Emissions		Unit
Scope 1: Direct GHG emissions	Transportation of staff	70.99	427.58	tonne of CO_2-e
	GHG emissions from machinery equipment	352.97		
	Welding process — Acetylene	0.02		
	Fugitive emission — refrigerants	1.79		
	Fugitive emission — fire suppression system	0.36		
	Fuel use — LPG	1.45		
Scope 2: Energy indirect GHG emissions	Purchased electricity	170.42		tonne of CO_2-e
Total GHG emissions (Scope 1 & 2)		598.09		tonne of CO_2-e

[6] *The data of key performance indicators cover the operation data of O·PARK2 within the operation area of CSHK between 1 January and 31 December 2021, environmental data outside of the operation area of CSHK are not included in this Report.*

[7] *The quantification process and emission factors referenced the Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong compiled by the Environmental Protection Department and the Electrical and Mechanical Services Department of Hong Kong, and international standards such as ISO14064–1 and the GHG Protocol.*

Scope	Source of emissions	Emissions		Unit
Scope 3: Other indirect GHG emissions	Transport of building materials, supplies and machinery	585.82	12,287.60	tonne of CO_2-e
	Transport of waste	5.15		tonne of CO_2-e
	Business travel	0		tonne of CO_2-e
	Water consumption	13.61		tonne of CO_2-e
	Paper	2.40		tonne of CO_2-e
	Rebar	6,969.06		tonne of CO_2-e
	Other steel materials	536.40		tonne of CO_2-e
	Concrete	4,069.43		tonne of CO_2-e
	Cement mortar	36.22		tonne of CO_2-e
	Other construction materials	68.05		tonne of CO_2-e
	Printing facilities	1.46		tonne of CO_2-e
	Product use	0		tonne of CO_2-e
	Other sources	0		tonne of CO_2-e
Total GHG emissions (Scope 1, 2 and 3)			12,885.69	tonne of CO_2-e

WASTE GENERATION

Type	Generation	Unit
Hazardous waste generated		
Total hazardous waste	0	tonne
Non-hazardous waste produced		
Construction waste	1,337.17	tonne
Other non-hazardous waste	75.79	tonne
Total non-hazardous waste	1,412.96	tonne
Recycled waste	766.58	tonne

USE OF ENERGY

Type	Consumption	Unit
Diesel	1,528.92	MWh
Gasoline	179.01	MWh
LPG	3.72	MWh
Purchased electricity	436.98	MWh
Total energy consumption	2,148.63	MWh
Renewable energy	1.53	MWh

USE OF WATER AND DISCHARGE OF SEWAGE

Type	Consumption/ Discharge	Unit
Water consumption		
Total water consumption	31,042.25	cubic meter
Sewage discharge		
Stored in septic tanks and collected by contractor	3,150.00	cubic meter
Total water discharge	3,150.00	cubic meter

USE OF RAW MATERIALS

Type	Consumption	Unit
Supplied by CSHK		
Concrete	17,508.00	cubic meter
Cement mortar	88.50	cubic meter
Reinforced rebar (excluding low-carbon rebar)	2,753.00	tonne
Low-carbon rebar	5,587.74	tonne
Other steel materials	238.40	tonne
Sheet piles	36.06	tonne
River sand	69.53	tonne
Stones	436.87	tonne
Paint	41.00	gallon
Plastic liner	1,360.00	square meter
Paper	3.24	tonne

SOCIAL PERFORMANCE

EMPLOYMENT

Type			Number	Total
Current employees[8]	Gender	Male	49	68
		Female	19	
	Age group	30 or below	12	
		31–40	19	
		41–50	18	
		51 or above	19	
	Employment rank	Senior	0	
		Middle	1	
		Executive	10	
		General employees	57	
Number of new hires	Gender	Male	25	34
		Female	9	
	Age group	30 or below	8	
		31–40	11	
		41–50	9	
		51 or above	6	
Rate of new hires[9]	Gender	Male	37%	50%
		Female	13%	
	Age group	30 or below	12%	
		31–40	16%	
		41–50	13%	
		51 or above	9%	

[8] *Total number of employees as of 31 December 2021.*

[9] *Rate of new hires = (Number of new hires in 2021/Number of current employees on 31 December 2021) × 100%.*

Type			Number	Total
Number of employee turnover	Gender	Male	23	26
		Female	3	
	Age group	30 or below	6	
		31–40	7	
		41–50	9	
		51 or above	4	
Rate of employee turnover[10]	Gender	Male	34%	38%
		Female	4%	
	Age group	30 or below	9%	
		31–40	10%	
		41–50	13%	
		51 or above	6%	

[10] *Rate of employee turnover = (Number of employee turnover in 2021/Average number of current employees on 1 January 2021 and 31 December 2021) × 100%.*

HEALTH AND SAFETY[11]

		Total
Employees	Number of work-related injuries	0
	Work-related rate per 1,000 persons	0%
	Number of work-related fatalities	0
	Work-related fatality rate per 1,000 persons	0%
	Lost days due to work-related injury or occupational diseases	0
	Lost day rate[12]	0%
	Absent days	253.5
	Absentee rate[13]	1.03
Other Workers[14]	Number of work-related injuries[15]	0
	Work-related rate per 1,000 persons	0%
	Number of work-related fatalities	0
	Work-related fatality rate per 1,000 persons	0%
	Lost days due to work-related injury or occupational diseases	0
	Lost day rate[16]	0%
	Absent days	318.3
	Absentee rate[17]	0.47

[11] There were no employee and other worker with occupational diseases in CSHK during the reporting period.

[12] Lost day rate = (Total number of lost days/Original number of total working hours) × 200,000; total number of working hours measured by 8 hours per working day.

[13] Absentee rate = (Number of absent days/Original number of working days) × 100%.

[14] Including contractors/sub-contractors, volunteers, and other workers whose venue of work or work are managed by CSHK.

[15] Including number of work-related fatalities.

[16] Lost day rate = (Total number of lost days/Original number of total working hours) × 200,000; total number of working hours measured by 8 hours per working day.

[17] Absentee rate = (Number of absent days/Original number of working days) × 100%.

TRAINING AND DEVELOPMENT[18]

			Number	Total
Training percentage	Gender	Male	81%	73
		Female	19%	
	Employment rank	Senior	0%	
		Middle	0%	
		Executive	14%	
		General employees	86%	
Average training hours	Gender	Male	4.8	279
		Female	2.3	
	Employment rank	Senior	0	
		Middle	0	
		Executive	3.2	
		General employees	4.3	
Percentage of employees who received performance review	Gender	Male	72%	68
		Female	28%	
	Employment rank	Senior	0%	
		Middle	1%	
		Executive	15%	
		General employees	84%	

[18] *Including data of resigned employees who have received training during the reporting period.*

SUPPLY CHAIN MANAGEMENT[19]

	Number
Number of suppliers	73

COMMUNITY INVESTMENT

	Number	Unit
Total amount of investment	4,746	HKD
Number of participating volunteers	16	person times
Number of volunteer participation hours	59	hour

[19] *CSHK applies the same practice of hiring, managing and monitoring suppliers to all suppliers under the same category to ensure the fairness of supplier management systems.*

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